

**A Metascan  
of Natural Resource  
Management &  
Rural Futures  
Literature  
in Australia**

A Report for the Partnerships for  
Desert Uplands Solutions

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## *Part I: Background*

### *Introduction*

This report examines literature pertaining to Natural Resource Management (NRM) and rural futures in Australia. It is a preliminary attempt to contextualise the fundamental shifts taking place in the area to inform wiser social change.

This report is not definitive. It seeks to open up dimensions and perspectives in this area which can be used by a wider group of stakeholders with more involved and distinct interests. It does not presume positivist certainty, nor attempt to put forward definitive recommendations. Recommendations should flow from the insights derived from an individuals reading of the report, in respect to the particular circumstances faced by the community. In this respect this report is more a work of translation, to convey a sense of fundamental states, shifts and emergences in this area. But this report does not presume to be value free either. It is the work of an urban academic, a post-colonial theorist, of particular ethnic origins, with an inter-disciplinary background based in liberal arts and social sciences.

This report is an environmental scan (ES). Environmental scans attempt to look as broadly at the world as possible in respect to a particular issue, organisation or community. This scan looked broadly at literature on NRM in relation to the challenges faced by farmers and the community in the Desert Uplands region of Queensland. Because scanning is work at developing breadth knowledge, the information presented here will likely range from pertinent to peripheral. Environmental scanning is essentially a modified literature search, which accumulates data and literature in particular areas. This scan in particular focuses on futures literature and emerging issues in this area. I have abstracted the finds and 'hits' in the scan found by Gerry Roberts, Emma Patterson and myself into an appendix section. Scans are heuristic, evolving through iterative approaches to looking and learning, and thus this scan is not complete, but a starting point and a work in progress. It should evolve based on the informational needs of stakeholders, whoever they may be.

The first section of this report provides a framework for thinking about changes and the speed of change in respect to NRM and rural futures. This is based on recently methodological innovation in this area. This framework for 'layered complexity' allows for a nuanced appreciation of the levels and speeds of change in various dimensions of the issue. Again it is not predictive nor definitive, it rather helps to contour our understanding of changes, shifts and

emergences based on various levels of causation. As such the framework is incomplete, will require critique, review and updating over time, by the author and by others who wish to improve on this work.

The second section of this report provides an analysis of past, dominant and emerging states, shifts and developments in NRM and rural futures. This three stage delineation is an over-simplification of states and shifts, and is more a cognitive tool than a rendering of social change processes. Such a map is a sense making tool, in the tradition of maps used by Peter Checkland and rich picturing. In addition this three stage delineation is intersected by four layers that represent speed, size and depth of changes. The first layer represents fast, smaller and shallower shifts, the second layer slower, larger and deeper shifts and so on through the layers.

Finally the third section provides an abstracts section, a database of the literature scanned and used, which can be referred to for a deeper understanding, changed / modified, interpreted and re-interpreted, and added to.

### *Framework for Inquiry*

This metascan draws upon three theoretical schools in the construction of a scanning framework for layered complexity. Layered complexity is futures oriented research inclusive of both complex systems analysis, and discursive analysis. This research builds on Meta-scanning methodology (a variant on environmental scanning), complex adaptive systems, in particular the Panarchy model of nested socio-ecological systems, and Causal Layered Analysis (and discourse analysis generally).

This metascan builds on already established methods and frameworks of inquiry, in exploring layered shifts pertaining to rural and Natural Resource Management futures in Australia, in particular in respect to rural sustainability in the Desert Uplands in Queensland.

### *Meta-scanning*

‘Meta’ refers to context, usually ‘as much context as you can imagine’ (Fisher 2004). In this case three broad meta principles direct scanning: 1) to find as many examples of NRM futures literature as was possible, 2) to use an integrally informed / layered complexity perspective to evaluate the findings within, 3) a normative evaluation aimed at making explicit emerging

shifts, trends, practices, issues, ideational shifts and narratives in the constitution of sustainable NRM.

The concept for 'metascanning' was initially developed by Richard Slaughter, to describe a critical and encompassing overview of available literature, resources, processes and institutions in aspects of the futures field. 'Looking for the real mega-trends', published in *Futures* in 1993, identified some of the factors included in a depth analysis of a given subject, including: personal, institutional, professional, methodological, cultural, ideological, spatial and levels of practice (pop, problem oriented, critical, and epistemological) (Slaughter 1999 p280). In the *Foresight Principle*, published in 1995, metascanning took the form of an overview of seven prominent Institutes of Foresight (IOFs) around the world, whereby the critical perspective extended toward a more encompassing look at the institutions in the field and their practices (Slaughter 1995 p96). In 1999, 'A new framework for environmental scanning', saw the convergence of the work of Ken Wilber's meta-perspective toward its application in environmental scanning, a process frequently used in the futures field (Slaughter 1999). In 2003 Joseph Voros further developed this integral scanning methodology in *Reframing environmental scanning* (Voros 2003). Slaughter has continued to develop the concept of metascanning (Slaughter 2003), and recently published *Futures Beyond Dystopia*, the most comprehensive synthesis of an integrally informed meta-perspective in futures studies (Slaughter 2004). Finally an integral meta-scan of futures practitioners and organisations was conducted in 2004 which has further extended this methodology (Ramos 2004).

### *Causal Layered Analysis*

Causal Layered Analysis (CLA) is a future oriented methodology created by Sohail Inayatullah. This methodology is post-structural in so far as it seeks to problematise existing future oriented thinking; exploring the assumptions, ideologies, worldviews, epistemes, myths and metaphors that already are embedded in images, statements or policy oriented research about the future. It has also developed as a way of opening up spaces for alternative futures. These alternative futures are not based on extrapolating trends or tweaking the assumptions in a systems model, as is common in scenario building, but through deconstructing/reconstructing critical assumption about the way we constitute the world. The articulation of alternatives is a product of this method, not a primary focus of the method.

While the theoretical underpinning of CLA is based on post-structuralism, the approach is layered, that is, it is a method of analysis which is inclusive of accounting for various

streams of causality operating in unison upon an issue. CLA is a way of integrating levels of causation.

<b>Litany</b>	This refers to the most superficial aspects of social life: headlines, fads, fashions, common sense, miracle fixes,
<b>Social Causes</b>	This refers to academic / scientific explanations of the world, such as in: economics, technology, ecology, sociology, political science, etc.
<b>Worldview</b>	This refers to what underpins academic explanations, such as: the ideologies and worldviews through which the world is interpreted.
<b>Myth / Metaphor</b>	This refers to the core images or narratives that operates like a gestalt perspective on the world.

**Table 1: description of levels in Causal Layered Analysis**

### *Panarchy*

Research into complex adaptive systems, pioneered by Gunderson and Hollings (2002), in particular the ‘Panarchy’ model, has yielded insights into the socio-ecological dynamics that constitute social and ecological resilience. This scholarship has developed new spatial / temporal frameworks and models for transformation within socio-ecological systems. In their holarchical view of socio-ecological systems, every system is part of a larger system, and has within it many smaller sub systems. More importantly, larger systems move and change slower, smaller systems move and change more quickly. The big systems are characterised by slow variables, the small systems by fast variables. They offer their model as metaphor. It is not a positivist universalising of all change processes through time and space, but a model which provides insights if applied appropriately and modestly.

Each holon at its respective level expresses change through a distinct speed. If systems are larger the cycles are longer, change is slower (with slow variables). If systems are smaller the cycles are shorter, change is more quickly (with fast variables). Within each cycle there are four phases. 1) Re-organisation: A cycle begins after the crisis-release phase, with an overall system in a state of dis-organisation, and in the process of re-organisation. This corresponds to an open field, where innovation is possible, restructuring, and where the future operation of the system is still up for grabs. 2) Exploitation: Here actors scramble to exploit and colonise the system. Actors include survivors of the last stage, new entrants, and the ‘legacy’ of the system (its memory and deeper scripts). Successful actors get the ‘founding rights’ to the new system and enjoy the increasing returns as this system matures. 3) Conservation: Here connectedness and stability increase, with only a set number of actors maintaining and increasing their power. This consolidation of power is done through various interconnected symbiotic elements that make up a regime. In this phase the regime experiences diminishing returns and plateaus - the system becomes fat with potential, but rigid and unable to change. 4) Crisis: Here a system has

become too rigid and exogenous disturbances trigger a crisis. The previously highly interconnected system loses its integrity through its inability to deal with change. It is a breakdown in the system, akin to sickness. This analytic framework acts as a narrative of change within and between temporal categories.

Panarchy's holarchical view of systems has resemblances to the bioregionalism of Kirpatrick Sale (see Mander and Goldsmith 1996). The description of cyclic change employed in the Panarchy model also has resemblances to S-curve analysis in diffusion of innovation models (but is not linked to conventional extension), as well as the Transformation cycle (T-cycles) developed by Slaughter (1999), which analyses ideational breakdowns, and re-constitutions of meaning.

### *Layered complexity*

Layered complexity draws together an understanding of complex systems, with an understanding of social structures and dynamics, and the ideational systems that underpin these: ethical, moral and normative fields, as well as subconscious systems of ordering.

The work of Maturana and Varela (1987) on cognition embodies this type of layered complexity, which includes an ontological analysis of the nature of self organising systems, as well as an epistemological analysis of the nature of cognition. Their integrative theories show cognition as interpenetrated by material conditions and visa versa, situated in historical context and expressed through the concept of 'ontogeny', the history of being for auto-poetic systems, such as biological systems.

This approach acknowledges our own complicity in the production of knowledge, not reducible to perceptual determinants, nor reducible to empirical determinants, but inclusive of both how worldviews and ideologies shape the nature of the 'facts' that we acknowledge as important, and how the 'facts' influence our understanding of the world.

*Complex analysis .....seeks to reveal how our knowing efforts are complicit in our conclusions – on the politics of knowledge. But complex and layered analysis is not easy to engage in. This is generally because we do not desire to account for how our own worldview interests shape the future we predict, or the alternative scenarios we posit. (Inayatullah 2002, p298)*

Inayatullah (2002) argues that a first step to layered complex analysis is to start with an environmental scan (metascan) that is both empirical, interpretive and critical. In this spirit this metascan of NRM and rural futures aims to enfold layered (empirical, interpretive and critical) research into a scanning methodology with temporal dimensions. Inayatullah emphasises both

breadth and depth in futures analysis. Temporal dimensions, referred to as horizontal space, helps to contour dimensions of change through examining social processes, shifts, stages, states and transformations. This is futures as historical and emerging issues analysis. Depth and layered dimensions are referred to as vertical approaches to futures, which look at various causal dimensions.

The Panarchy model resonates with the critical futures perspective of Causal Layered Analysis (CLA). Within CLA, worldview, ideology, and the even deeper core myths and metaphors of a culture are the slow movers. As one Chinese proverb says: 'its easier to move a mountain than change a culture.' Indeed, these are civilisational in dimensions. What changes faster are laws, policy, or the level in CLA that refers to social forces. Fads in the Panarchy framework correlate with the CLA level called Litany. Speed of change has been a tacit assumption within the use of the CLA framework. Recently, however, List (2005) explicitly attached speed of change to levels in the CLA framework.

In the work of Gunderson and Hollings on complex adaptive systems, they make the distinction between fast variables and slow variables, or correspondingly short cycles and long cycles. In formulating layerings of change, and their speeds, they argue that small groups can undergo fads in days or months (they are fast variables with short cycles), social shifts in policy, values, and law can take years or decades (they medium variable with medium cycles), and shifts in larger bodies (ie constitutions / culture / civilisation) can take hundreds of years and a millennia (they are slow moving variables in long cycles) (Gunderson and Holling 2002, p111). Inayatullah's Causal Layered Analysis makes the distinction between Litany, Policy, Worldview, and (deepest) core Myths / Metaphors (Inayatullah 2004). List added speeds of change to this, arguing that Litany changes fast, Policy has a slower rate of change, while Worldviews, Myths and Metaphors are the slowest to change (List 2004). Slaughter's distinctions between pragmatic, progress and civilisation foresight, as well as his distinction between pop, problem and epistemological futures work also corresponds to this.

The Panarchy model opens up one view on the dynamics of change, in spatial and temporal terms. The large body of work using CLA further helps to strengthen this framework, normatively and through the critical futures approach. As Inayatullah has argued, the weakness within many systems models are their omission of the nature of political power, and questions of ethics generally. A layered complexity approach allows an inclusion of complex systemic changes as well as questions of power and normative fields.



Rate of change	CLA Inayatullah & List	Panarchy	Dimensions within NRM
<b>Fast</b>	Litany	Policy / contracts / fashions / fads	- Seemingly irrational reactions to policy - management fads - technological quick fixes - 'I have THE answer', or 'one size fits all' fashions
<b>Medium</b>	Social	Laws / Institutions – 5 to 50 years	- emergence of institutionally embedded changes - Dominant vs alternative NRM practices - shifts in our understanding of causal factors in NRM sustainability
<b>Slow</b>	Worldview / Ideology	Traditions / constitutions 50 - 100 years	- productivist paradigm vs post productivist - neo-liberal economics vs ecological economics - emerging cultures of stewardship - changes in epistemologies of Nature
<b>Very slow</b>	Myth / Metaphor – Civilisational	Culture – 100 to 1000 years	- Judeo-Christian relationship with nature vs - Aboriginal land based mythology vs Gaia etc...

**Table 2: Correlations between CLA, Panarchy and NRM**

This analysis employs the layered complexity approach to understanding basic changes in NRM in Australia. As seen in table 2, shifts in NRM are layered into four sections. The top layer reflects litany change, fast changing but also superficial. At a deeper level are institutional and structural shifts, to society and the environment. At a deeper level are the worldviews or ideologies that cognitively organise the variables by which the world is understood. Finally the myth / metaphor layer is the slow changing shift in our archetypal ways of knowing.

Rate of change	Gunderson and Hollings correlations	Size of shifts
Fast	<i>Small group decisions:</i> 2-10 Months = Groups between 10-100 pop <i>Fads:</i> 2-10 Months = 10,000 and 80,000,000 pop	Individuals or small groups of people adopting novelty in fast, impulsive, reactive or opportunistic ways
Medium	<i>Policy and contracts:</i> 1/2 year – 5 years = 20 – 10,000 pop <i>Values:</i> 1/2 year – 5 years = 100,000 – 1/2 billion <i>Law:</i> 5 – 50 years = 1000 – 1,000,000	Social changes to general practices, professional orientations, policy frameworks that impact on larger populations, ie legal jurisdictions across states
Slow	<i>Constitution:</i> 20-100 years = 20,000 – 100 million	The dominant way of seeing the world for large populations in a particular place and time, set down in a reified social ordering, within 'person invariant' deep structures
Very slow	<i>Culture:</i> 100 – 1000 years = 100,000 and 1 billion people <i>Traditions:</i> 10-100 years = 100 million – 10 billion (global)	Global shifts in the perceptual orientation of cultures and countries. Detected through the confluence of entire cultures, or historical / macro-historical analysis.

**Table 3: rates of change correlated with population (Gunderson and Hollings p111)**

In addition a correlation between the rate of change and population size is postulated. Individuals or small groups can adopt changes or react quickly, while policy shifts and

professional practices change more slowly, along with structural changes in society. Ideologies tend to encompass slower changing socio-political processes, and work as master narratives and key signifiers to help organise policy formation, while global or ‘civilisational’ shifts reveal seemingly ‘tectonic’ changes in the orientations of cultural clusters. Examples of this were shifts in consciousness in Europe from the medieval to Renaissance, and Enlightenment to modernity. Or as revealed in this report, the difficult reconciliation between European Australian’s assumptions of the land, and its ecological dynamics and limits.

We can apply theories of social change and transformation to the shifts that we see evidenced through the literature scanned. Generally a single theory of change is insufficient to understand the process through which change occurs at the popular, systemic, ideological, worldview and cultural. Social change involves a number of interlocking variables that cannot be understood from one perspective. If a single theory of social change is espoused, it tends toward a historicist and reductive explanation of change that obscures a more profound, if not messier, grasp of the processes as work. For example we can apply Gunderson and Hollings (2002) explanation of complex adaptive change in human and social systems, but this will only be sufficient at some scales and some situations. For this reason this report aims to *characterise* the main shifts in an oversimplified three part delineation. The distinct and particular processes of change and transformations are too varied and too complex to explain in a satisfactory way. Characterisation is instead an attempt to describe the features of change, in such a way as to help contextual the shifts in a useful way.

Time →			
	What is waning or has waned	What is current and status quo	What is emerging
<b>Other possible language:</b>	<b>Disowned, abandoned, passed by, antiquated, sedimentary, recessive, descending, repressed, discredited</b>	<b>Dominant, hegemonic, centres of gravity, normal, mature, accepted, current practices</b>	<b>Emerging, alternatives, challengers, embryonic, leaders, weak signals, dissenters,</b>

**Table 4: Time delineation to explicate basic states and shifts**

In order to analyse shifts into probable / possible alternative futures, rate and depth of change are cross referenced with a type of emerging issues analysis (EIA). This EIA examines the temporal dimensions to the various layers described above. This simplified framework gives a sense of the stages that delineate shifts into new organisations. For simplification purposes three states are offered: what has waned (legacy of system), what is current or dominant, and emerging states. When EIA is combined with the layered complexity model

with its corresponding rates / depth / size of change, a two dimensional picture emerges which helps to contour the complex changes occurring in NRM in Australia.

<b>Frames</b>	<b>What is waning or has waned</b>	<b>What is current and status quo</b>	<b>What is emerging</b>
<b>Litany / fad / reactive: Small scale and fast moving shifts; pop culture</b>	What fads, and fashions in NRM and farming are now considered ridiculous?	What are the current fashions, fads and flavour of the month in NRM and farming?	What fads or fashions are on the horizon? What fads or fashions could turn out to be part of deeper shifts?
<b>Structures – looks complex interactions between many parts of a system, and the centres of gravity within a system, systems stages, corresponds to medium cycle shifts</b>	What system was superceded? What structures were dismantled? What practices have been discarded? What trends have waned?	What are the dominant trends? (technological, economic, structural) How does the system currently work? What are the dominant practices?	What emerging systems variable could perturb or tip the system? What are emerging or alternative practices?
<b>Worldview and ideology, discourses, cultures, long perceptual shifts</b>	What perspectives have been discredited? What are the antiquated ideologies? What discourses have been debunked?	What is the dominant ideological regime? What is the hegemonic discourse? What is the normal way to seeing the issue? What is the mainsteam culture like?	What are emerging or alternative ideologies, or conceptual systems? What are the alternative discourses? What are the unique or emerging views? What are alternative cultures of sustainment?
<b>Myth / metaphor - Civilisational narratives, looks at very long cycle shifts, global in dimensions</b>	What stories / myths have been discarded (ie terra nullius, social darwinism), repressed, or disowned?	What are the primary stories about NRM and the Bush? What are the primary mythologies of farmers and the Bush	What are the new stories or narratives of sustainment?

**Table 5: Typology of potential questions based on the framework of inquiry**

### *Limitations to the framework*

There are limitations to this framework now apparent and which may emerge in future. As Inayatullah argues (2002), Layered Complexity makes life harder in the short term, plunging us into a deeper questioning of our assumptions, as there are no easy answers, and what answers we have are provisional; but better in the long term, as we are able to appreciate fundamental shifts in a more nuanced way.

My colleague Cate Turner, a specialist in NRM and rural futures, commented that spatial dimensions do not necessarily correlate to speeds of change. Some cultures can change faster than others, worldview shifts may change more slowly among small groups (in religious sects for example) while larger changes to culture can happen quickly at times. Separating speed of change and scale created a more nuanced three dimensional picture, but was too complex to use in this metascan.

In addition and adding to this, my own interpretation of authors, using the three part delineation of states and shifts, is likely to be too generalised for some, and inaccurate for

others. This criticism is accepted, as I am not a specialist in this area, and have attempted to provide generalisations for sense making. Others can modify and update the interpretations.

## *Part II: Finding*

This next section gives a summary of the findings, as well as tabled breakdowns of each authors argument, based on the four layered model explained.

### *Fads, fashions, reactions and the world of litany*

The framework for this metascan encompassed an examination of fads, fashions, reactions and the world of litany in respect to changes in NRM. Due to the focus on academic literature, however, most scanning 'hits' were found in the systems / structure and worldview / cultural categories. I have attempted to give an intuitive, yet un-authoritative, rendering of this area in brief.

From the vantage point of Gunderson and Hollings (2002) work on scaled systems, we look here for fast moving changes within relatively small or isolated groups / populations. Tree clearing, in response to potential fear of the introduction of state laws against tree clearing are an example. While this behaviour may have its origins at deeper levels (increasing global pressure, less government support, decrease asset debt ratios, or deeper neo-liberalism) the behaviour is nonetheless reactive.

In conjunction Cullen (1999) argues that the constantly changing policy fashions in government is one of the key obstacles to addressing NRM challenges in rural regions. The tyranny of the political election cycle, through which policy is made in short time scales, is vastly insufficient in dealing with the longer time scales required to address deep NRM sustainability issues. This has been described by a number of authors, such as Hazell and Williams (2003). Election cycles are a deeper structural issue, but the problem manifests as a faster cycle embodied in litany level campaigning sloganeering and political rhetoric.

The current fashion in technological optimism is the potential for Information and Communication Technologies (ICT) to allow new possibilities for farmers, such as remote sensing and manipulation of farms, precision farming, satellite imaging etc. While technological shifts are structural level changes, they are often hyped and overstated by media. Biotechnology is the emerging fad and / or nightmare. With New Zealand GM free, and US corporations vigorously promoting it as a miracle against global hunger, Australia lives at an uncertain cross road. While the potential for saline resistant plants for grazing is considered a

type of technological miracle, and could have amazing applications for conservation and economic productivity in Australia, much of the potential for biotech to be beneficial is over hyped.

<b>Authors</b>	<b>Past - what is waning or has waned, legacy and memory</b>	<b>Present - What is current and status quo</b>	<b>Future - What is emerging, alternative and possible</b>
<b>Reactions</b>	Tree clearing in wooded areas before conservation laws can take effect	Snowy mountains march to the Victorian parliament	
<b>Fashions</b>		Remote sensing and manipulation of farm land through ICT breakthroughs	
<b>Miracles</b>			Biotech - Saline resistant plants for grazing
<b>Cullen (1999)</b>		Describes fashions in government as one of the key obstacles to addressing NRM challenges	

**Table 6: Cursory description to some dimensions in litany / fad level change**

*Shifts in social systems, structures, practices and policies*

Shifts in extension work have been profound. The area has shifted to extension with little or no consultation, pre-formulated solutions that are considered broadly applicable, to highly consultative and facilitatory approach aimed at capacity building. The current state of extension is described by Coutts, Roberts, Frost, and Coutts, (2005), while Curtis (2003a, 2003b) describes both Current Recommended Practices (CRPs) and the shift toward Active Adaptive Management (AAM) approaches. The Most Significant Change (MSC) approach allows farmers to draw upon each others change stories for peer knowledge, inspiration and support, and is a stark contrast to a top down style of extension, described by Dart, Drysdale, Cole, and Saddington (2000). Robertson, and McGee (2003) describe how oral histories (qualitative) approaches to environmental management, can be balanced or referenced across other data sets (quantitative research) in complementary fashion. The patronising discounting of farmers concepts, especially notions of ‘good farming’, and local cultural factors, is giving way to a greater acknowledgment of cultural influences and how local tacit notions of ‘good farming’ are central in the adoption of new practices, which is described by Shulman and Price (2000). Vanclay (2004) gives 27 principles of extension based on the social – cultural approach, which underlines this important shift. Finally Thyssen (2000) argues that the role of extension officers is shifting from ‘information pusher’ to information & knowledge

facilitators, in light of the ICT revolution. In the future, if not already in the present, no one is privileged with information, so extension becomes a facilitatory role more than an expert one.

In her work with the consulting company Sinclair Knight, Cate Turner has described to me problems and confusion in the use of indicators, legal jurisdictions, authorities, and responsibilities, for taking action in NRM issues across both spatial and temporal time scales. An unreflected, static or rigid framework for scales leads to duplication, inaction or incompatibility of efforts. She argues what is needed is integration of NRM efforts based on appropriate scales of change, from commonwealth to state, to bioregional, catchment and local. Hazell and Williams (2003) corroborate this. They also argue current NRM efforts are fragmented, with intervention only with farmers, unrealistic and rigid time scales for NRM projects, and too many NRM approaches which are 'one size fits all', not flexible to ecological and social diversity. They also feel, as state above, that NRM is tied detrimentally to political election cycles and unrealistic government expectations. They argue for a need to integrate NRM efforts with dispersed intervention with broad stakeholders, flexible and realistic time scales for NRM, NRM approaches tailored and flexible to diversity of conditions, both social (values) and ecological, with whole communities, including urbanites, involved in NRM. An example of this integration might be seen in Tasmania's 'Conservation Covenants'. The state against farmer dynamic, which pits conservationist interest against farmer's interests is being reconciled through programs that find a synergy of interests, as described by Courtney (2005). Conservation covenants are a new legal framework through which farmers take on legal and moral obligations to protect / conserve land deemed ecologically strategic, for which they receive a stewardship fee. However, whether Conservation Covenants are a fashion, or have deeper dimensions is yet to be seen. Cullen (1999) argues for such an integrative approach, but refers to this as a paradigmatic shift, which is described in a later section. Robertson and Watts (1999) explicitly argue for partnerships between primary producers, scientists and management agencies in ecosystem management at different scales of space and time relevant to both farmers and ecological processes.

The structural changes examined in various articles describe Australian farmers and NRM at a cross roads, under severe pressure economically and to better protect the environments they exist in. Cocklin, Dibden and Mautner (2003) created four scenarios for rural landholders based on farmer's experience. The status quo futures saw the continuing decline of small farms unable to compete globally, increasing debt, and lagging innovation. Gleeson, Turner and Douglas (2002) argue that innovative farmers have multiple income streams, while single income farmers are falling behind, slipping into desperate cycles of debt

and over – production. They envision / recommend a shift toward farming which is based on diverse multiple level income streams, high community interaction, flexible business models, and a farm centric view (beyond agricultural production as only model). Pierce (1994) supports this, as his research also support diversified non-commodity farming as one path toward rural sustainability. His description of structural change in Canada has parallels with Australia: the consolidation of farms, and increasing farm size, pointing to increasing hegemony of agribusiness; the increasing indebtedness of farms through the 80's and 90's (debt to asset ratios); with attempts by government to de-couple itself from program payments. As an alternative he argues for a hypothesized sustainability model based on Bowler (1992), featuring diversified, low input – out put, and organic farming. Hudson (2005) describes problems in the labour force, including ad hoc skilling, impermanent employment structures, piece meal, part time, casual, unskilled or semi skilled work, and poor opportunity for career advancement. These conditions create sever problems in attracting the social capital required for innovation and environmental management. He argues for a fundamental shift in rural policy, that encompasses improving skills of farm employers, accreditation of farm employers, lifelong skilling for rural populations, broad certificate for rural or farm operations, and financial support to encourage youth to take careers in rural based professions, ie farming, extension, NRM etc.

The technological shift which has the greatest immediate potential impact at the moment is ICT. Thysen (2000) explores the implications of ICT on farming from a European perspective, which includes a revolution in agricultural supply chains, for example, from plough to plate monitoring of food production, traceability of foodstuff increasingly expected / demanded by super markets and health authorities, the increasing demand of customers to know more and more about food chain and processes (in particular the ethics of, and industrial processing of, ie use of what chemicals etc). The trend here is that agri-chains protects themselves from loss of customers by demanding information at each link, and farmers accept increased transparency. In exploring the implications of the emerging network society on farming he argues it will allow remote sensing, remote manipulation / control (such as auto feeding, sequestering, greenhousing), using a global positioning system (GPS) for positioning of animals / cattle, greater data about land and seed / breed types that may allow greater precision farming, which in turn allows for greater bio-diversity without losing productivity, and finally reduce risk / uncertainly in the application of new techniques / inputs. Delaney and Cork (2005) offer a detailed analysis of the potential impacts / opportunities of technological shifts on Australian farmers / landscapes. Biotechnology is still seen as emerging, with yet unclear utility and risks.



More comprehensive analysis of the drivers of change have been conducted by Cullen (1999), Cocklin C. & Dibden J. (2005), Hudson (2005), Robertson and Watts (1999) and Delaney and Cork (2005), among others. It is beyond the scope of this metascan to address every dimension and aspect of change, and underlying drivers of change. For more detail on drivers of change see these various authors in Section III, containing Abstracts.

In respect to the global dimension in this issue, it is important to acknowledge that desertification is a global phenomenon (Chiras 1991), affecting almost every continent on Earth, and is a clear ecological trend and threat. Extensive literature exists in the process through which this occurs in arid and semi arid regions. The issues in the Desert Uplands are not totally unique, and there is much to learn from other cultural responses to this. According to Diamond (2005), it is learning from other cultures that will be the basis for a successful shift to a sustainable farming. In addition, Scheffer, Westley, Brock & Holmgren M. (2002) have modelled ecosystem change in arid and semi arid regions, and produced an understanding of the 'critical thresholds' that operate within such ecosystems, and the multi-stable states that ecosystems can express. In turn, human systems need to develop a sensitivity, responsiveness and flexibility in relation to ecosystem functions and 'critical thresholds'. This is supported by Robertson and Watts (1999), in arguing the ecological sciences need to merge with social sciences – so graduates have the skills to place their work in a context meaningful to producers. Desertification in arid and semi arid regions is increasingly being tackled through interdisciplinary work across the world that integrated our understanding of human, economic, political and eco-system interactions. This shift to whole systems and multiple epistemologies in addressing NRM challenges is described by Hames (2003) in the next section.

As we move through the 'Hubbard peak' and fossil fuels become more expensive to drill and extract, oil / energy prices may spike, making industrial farming more expensive, including fertiliser, pesticides and transport costs. This view sees a future in which local, and low input-output agriculture production / distribution predominates, is commensurate with Pierce's (1994) alternative model, and localisation proponents such as Mander and Goldsmith (1996) which carry a more ideological laden position explored in the next section. Indeed some Permaculture advocates argue that Cuba has already experienced what other countries using industrial agriculture will someday have to do. Cuba was forced to introduce low input farming (organic / permaculture / co-operative horticulture / home gardening) methods after the Soviet Union cut off shipments of oil and oil based products, precipitating a mini peak oil energy crisis. Both Robertson and Watts (1999) and Delaney and Cork (2005) feel that global population increase will create greater demand for Australian rural products, with the former

seeing this a source of more ecological strain, and the latter unsure whether Australia can compete with innovation in these developing countries.

Both social and technical innovations are featuring prominently in addressing NRM challenges, including the use of saline resistant strains of grass by farmers, Seed Catching Windbanks, the use of oil by-products to create Sand Mulching which stabilises sandy soils (in Iran) and the use of Green Walls (in northern China) (Chiras1991). Diamond (2005) listed a number of farming innovations being conducted in Australia, including:

- *South Australian Tax to raise \$300 million to undo damage to the Murray River*
- *NSW government \$406 million agreement with farmers to end land clearing*
- *QLD agreement with Commonwealth to end land clearing by 2006*
- *Cell grazing – livestock forced to eat unpalatable plants as well as palatable*
- *SA 42 year leases and ‘duty of care’ obligations*
- *Australian Landscape Trust – bottom up community management*
- *Potter Foundations Potter Landcare Plan – helping 15,000 farmers pass on their farms in decent conditions to their children*
- *Incorporation of Kangaroo into diet (less methane produced and soft footed)*

Although it is also evident that Diamond reveals some worldview based assumptions critiqued in the next section, such as the ‘nature fragile’ worldview of nature described by Gunderson L & Hollings C. (2002) as well as a rural mythologising described by Gill (2005) as a conservation geography of death.

<b>Authors</b>	<b>Past - what is waning or has waned, legacy and memory</b>	<b>Present - What is current and status quo</b>	<b>Future - What is emerging, alternative and possible</b>
Allan and Curtis (2003)	Extension with little or no consultation, pre-formulated solutions that are considered broadly applicable		Active adaptive management (AAM) – local, participatory, evolving approaches to NRM
Chiras (1991)		Desertification is a global phenomenon	Seed Catching Windbanks (Aus) Sand Mulching (Iran) Green Walls (China)
Cocklin C, Dibden J. and Mautner N (2003)		Plodding on and in the red, life gets harder economically, little NRM / product innovation for sustainability	Optimistic scenario for smart and green farming, sees values plus political and practice based change
Coutts, J. Roberts, K. Frost, F. Coutts, A. (2005)		A review of the current state of extension services in Australia	
Courtney P. (2005)		State vs farmer dynamic, at loggerheads between conservationist and farmers interests	Conservation covenants – a new legal framework through which farmers take on legal and more obligations to protect / conserve land, finding a synergy of interests, and get a stewardship fee

**Table 7: Breakdown of shifts in structures, systems, practices and policy**

<b>Authors</b>	<b>Past - what is waning or has waned, legacy and memory</b>	<b>Present - What is current and status quo</b>	<b>Future - What is emerging, alternative and possible</b>
Curtis (2003)	Extension that is a one size fits all	CRP's that embrace diversity of farmers	
Daimond (2005)	Indigenous diets, adaptation to land	'Mining' Australia through industrial agriculture and overlay of European grazing / farming practices	Australia leading the world in a horse race between sustainability and collapse gives rise to NRM innovations.
Dart J. Drysdale G, Cole D, Saddington M. (2000)		Extension officers used models and frameworks / not stories. Modernist diffusion model (Rogers etc) A → B	Most Significant Change (MSC) approach allows farmers to draw upon each others change stories for peer knowledge, inspiration and support
Delaney K. and Cork S. (2005)		Comprehensive futures research on the key systemic / structural dynamics of change	
Gleeson, T. Turner C. and Douglas R. (2002)	Single income streams, isolated farmers, low level of experience / knowledge sharing – typified by agricultural centric view	Innovative farmers have multiple income streams Single income farmers falling behind, slipping into desperate over - production	Diverse income, high community interaction, flexible business models, farm centric view (beyond agriculture)
Greene, G. (2004)		As we move over the 'hubbard peak' and fossil fuels become more expensive to drill and extract, oil / energy prices may spike, making industrial farming for expensive, including fertiliser, pesticides and transport costs	This view sees a future in which local, and low input-output agriculture production / distribution predominates, in respects commensurate with localisation proponents such as Mander and Goldsmith (2006)
Hazell D. and Williams M. (2003)		Current NRM efforts are fragmented Intervention with farmers only Unrealistic and rigid time scales for NRM projects NRM approaches 'one size fits all', not flexible to ecological and social diversity Disengaged urbanites Only farmers and extension involved in NRM NRM tied detrimentally to political election cycles and unrealistic gov expectations	Need for integration of NRM efforts Dispersed intervention with broad stakeholders Flexible and realistic time scales for NRM NRM approaches tailored and flexible to diversity of conditions, both social (values) and ecological Involved urbanites Whole community involved in NRM Realistic gov expectations, support, time frames to match expectations,

**Table 7 cont'**

Authors	Past - what is waning or has waned, legacy and memory	Present - What is current and status quo	Future - What is emerging, alternative and possible
Hudson, B. (2005)		Ad hoc skilling, impermanent structures, piece meal, part time, casual, unskilled or semi skilled, poor opportunity for career advancement Ad hoc NRM / environmental management Poor state support toward addressing community values	Farm union compact: modernised and professionalised workforce; appreciation of rural diversity, commitment to boost creativity, knowledge, skills; Comprehensive & Integrated NRM / environmental management approach State support for farm diversity and multi-functionality
Pierce J. (1994)		Consolidation of farms, and increasing farm size, pointing to increasing hegemony of agribusiness; Increasing indebtedness of farms through 80's (debt to asset ratios); Attempts by gov. to de-couple itself from program payments (in Canada)	Hypothesized sustainability model (Bowler 1992) Diversified, low input – out put, organic
Robertson A. and Watts R. (1999)			Examination of the key dimensions of change in ecological restoration in next 50 years
Robertson, H.A. and McGee, T.K. (2003)		Purely quantitative and empirical approach to assessing ecosystems, and environmental management	Oral histories (qualitative) approach to environmental management, balanced or referenced across other data (ie empirical)
Scheffer, M. Westley, F. Brock W. & Holmgren M. (2002)		Static / naïve view of ecosystem dynamics	Understanding of multi-stable states in ecosystems requires greater flexibility / responsiveness in human systems
Shulman AD and Price RJ ed. (2000)	Discounting of farmers concepts of 'good farming', and local cultural factors.		Acknowledgment of cultural influences and how local tacit notions of 'good farming', in NRM adoption
Thysen, I. (2000)		ICT slow to be adopted and utilised by farmers. Farmers have not found the ICT fundamentally changes their practice of farming.	extension officers shift from information pushers to information & knowledge facilitators. Extension becomes a facilitatory role Transparent, information rich agri chains ICT allows powerful data processing on land type / conditions Remote manipulation, remote sensing

Table 7 cont'

Authors	Past - what is waning or has waned, legacy and memory	Present - What is current and status quo	Future - What is emerging, alternative and possible
Turner 2005	Simplistic view of setting NRM standards and targets, no understanding of scales / levels	Confusion in the use of indicators, legal jurisdictions, authority, responsibilities, for taking action in NRM across scales – leads to duplication or inaction – as static and rigid framework for scales	Integration of NRM efforts based on appropriate scales of change, from commonwealth to state, to bioregional, catchment and local.
Vanclay F. (2004)	Complete negation of social dimensions in NRM extension	Poorly formulated, or under theorised social principles	27 Social principles in agricultural extension
NRMMC (2001)		Official policy framework for the preservation of Australia’s native vegetation	

Table 7 cont’

### *Worldview, Ideology and Culture*

As highlighted earlier NRM and extension have undergone, and continue to undergo shifts. Vanclay (2002) gives the most comprehensive account of deep changes in extension. He describes four worldviews of extension. The oldest is *Agriscience*, farming is the application of scientific knowledge. *Conventional extension* follows modernist presumptions as well, but applied to adoption of innovations (diffusion curves etc). The *farmer-orientated approach* is more basically about furthering economic goals for farmers while mitigating against environmental harm. Finally the *socially informed* approach is about appreciating the social processes and symbolic contexts among farmers, and using this toward creating more socially and environmentally better futures. Reflecting on extension itself allows for a fundamental shift in our approach to social change. Elsewhere I have described such reflexive change agency, oriented toward sustainability as ‘Anticipatory Innovation’ (Ramos 2004). Case studies in Shulman and Price (2000) demonstrate the ineffectiveness of a narrow concentration on the ‘correct’ NRM solution, or a limited choice of management options in NRM, developed without consultation with broad stakeholders (ie top down), and inversely argue for an alternative paradigm of tactical decision making as a tool to provide a process for interaction – an iterative, evolutionary, participatory prototyping approach to sustainable technology, where development is done by a broad group of stakeholders. For Cullen (1999) NRM has seen fundamental paradigmatic shifts: from human preferences as primary in NRM, to ecology setting what is possible, and designed interventions based on heuristic testing of limits / thresholds. Solving NRM problems from a single disciplinary perspective is ineffective, with disciplinary integration, whole systems thinking needed to solve NRM problems. Likewise

change processes have shifted from more passive community acceptance of expert knowledge and advice, to developing learning community, where NRM knowledge circulates for community decision making, and experimentation takes place through community initiatives. Parallels exist with the paradigmatic shifts in systems thinking described by Holt and Schoorl D. (1989). They argue systems approaches applied to agricultural development have shifted from *Hard systems*, which is goal oriented, where systems can be controlled, and problems have solutions, (models are an ontology, reflecting in the world, a representational model of cognition), to *Soft systems*, through the use of cognitive maps and rich pictures (for example through the work of Peter Checkland), and now in the emergence of *Appreciative systems*, inclusive of hard and soft systems, based on context making and integrative thinking.

With the shift in systems thinking from hard systems to soft and appreciative systems comes a new acknowledgement of the role of mental models and disciplinary / occupational perspectives in defining and solving NRM issues. It might be conjectured that until recently, there was little acknowledgement that mental models exist, within the representationalist epistemology of empirical science. The notion of mutually exclusive perspectives may have been re-enforced through the hyperbole of ‘incommensurable paradigms’, or a grudging acknowledgment that mental models exist but are un-important – ecology, economy and farm practices are what counts. In this context Ross, Abel, Herbert, Manning, Walker, and Wheeler (1999) studied how different occupational perspectives describe NRM issue differently. They argue that a confluence of different occupational perspectives help teams solve problems, and can be synergetic and commensurate. Indeed identifying mental models helps to build communication bridges for action between people of different backgrounds. The three groups that they studied were *farmers*, *scientists* and *extension officers*. However if we think about other roles that impinge upon NRM issues this can be expanded to other backgrounds, such as the *urban voter* and *government worker / policy maker*, and others. Indeed Hames (2003) generated four scenarios for landscapes in Australia based on four distinct worldviews. The *My Backyard* scenario, based on diverse epistemologies and narrow / particular focuses (not systems thinking) sees ideological conflicts across community lines, for example environmentalist vs. industrialists, and somewhat akin to the single minded *lobbyist*. The *Country* scenario is characterised by whole systems thinking and diverse epistemologies, typified by integration and collaboration, as control (of systems) is not possible, so we must communicate and relate to adapt to change. This perspective is typical of *action researchers* such as Robert Flood. In the *Botanical Gardens* scenario, empiricism combines with systems thinking, view is very grounded in the physical and biophysical processes that determine the conditions for sustainability, and typical of the ecological scientist who understands eco-

systems from an empirical perspective. Finally in the *Hothouse* scenario, empiricism and narrow / particular focuses (not systems thinking) helps create knowledge and control over particular component / aspects of life, much like the instrumental scientist or *engineer*.

Our understanding of sustainability rests upon a deeper understanding of Nature, social change and the future. Gunderson and Hollings (2002) provide the core worldviews of Nature that have predominated in the sciences and society. In the *Linear* (Newtonian) view of nature, nature as infinitely malleable. In Nature Balanced, nature is in constant equilibrium, always forgiving of human intervention (which is in respects the view of pre-Keynesian economics). In Nature Anarchic, anarchy and collapse are just around the corner (the humpty dumpty problem), which is the view of ecological (and social) pessimists. This fragile and untouched notion of Nature is in respects closer to a romantic ideal of a pure state that has never really existed. Nonetheless the sustainability discourse emerged from such a worldview, and continues through work such as Diamond's *Collapse* (2005). *Nature Resilient* presupposes nature as alternating between various multi-stable states. This view sees fundamental changes through discontinuous events and non-linear processes. Finally *Nature Evolving* is derived from the emerging evolutionary and complexity sciences, and sees change as abrupt and transformative change, with unpredictable or counter-intuitive dynamics in ecosystems. The resilience and evolutionary views might be understood as post-sustainability discourses, in their rejection of sustainability as a static or ideal goals or state, and their acceptance of dynamic change, which human systems must learn to live with, and interact flexibly to. Each of these worldviews of Nature are not right or wrong, but embody an aspect of nature. An integrative theory of nature incorporates many worldviews.

According to Pierce (1994), agriculture is in a transition from *productionist* farming (since 1930's), typified by rapid growth in yields, large increases in external inputs, and capital intensification to a *Post industrial* agriculture through either redeployment to non-commodity / non-farm goods and services and / or new (diversified) commodity farm goods and services. Cocklin (2005) argues parts of the world, such as Europe, are already shifting into a *post-productivist* agriculture, as the contradiction in *productivist* neo-liberalism are too great. There are fundamental contradictions between deregulated, competitive, intensive agriculture and the challenge of addressing ecological. As well there exist contradictions between provision of government support for sustainability aims to rural Australia and Australia's Cairns Group / WTO convictions / ambitions that imply the end to anything resembling a subsidy. He finds a need to question the neo-liberal political-economic ideology through which these processes rest. He argues a shift from *productivism* to *post-productivism* might include, rural regimes

with a multitude of functions, not simply to produce food and fiber, multi-functionality (triple bottom line valuations of rurality), a focus on food quality as opposed to quantity, and a recognition of the role of landholders in environmental protection. He also sees the importance of building social capital as critical determinant in rural sustainability, altered terms of interdependency between state and communities, and coordinated support and local initiatives for rural development. Along similar lines Hudson (2005) sees the detrimental effects of the current state of competitive individualism, the poorly organised race to the bottom competition between farmers, and argues for a paradigm shift in the industrial relations posture of farm organisations to one that is more collaborative, to gain basic wages for labour inputs. The Localisation discourse is an alternative political-economic ideology to neo-liberalism, a fundamental critique to corporate globalisation, and offers post-productivist solutions as well, advocating for bio-regional approaches to land care and production, localised economies and distribution, and participatory democracy (Mander and Goldsmith 1996).

Diamond (2005) critiques land degradation in Australia as flowing from highly exploitative farming practices based on European cultural assumptions, specifically how Europeans brought / projected assumptions about land onto an Australian landscape unsuitable to European style farming. He argues current cultural assumptions are still incommensurate with ecological sustainability, and argues for the need for cultural adaptation, learning from others. In this respect both science and aboriginal culture represent the Other / Othered epistemological worlds which conventional Australia might learn from.

Davidson (2005) gives a more comprehensive and deeper account of the ideological transition and cultural shifts that European Australia has undergone in its relationship to the land. He charts stages in the rise and fall of the ideology of 'Countrymindedness', the core belief that rural life is healthiest, purist and superior form of life. *Planting* (1800-1850) saw a push toward the development of a countryside that would resemble England. Towns were planted (after convict settlements), with the hope of replicating the peasant model of England. *Watering* (1850-1900) followed the great gold rush, which created the first large rural settlements, and saw a push for state support for education, telegraph, railways, and irrigation that would unlock the land. Irrigation was seen as a way of overcoming the limitations of the land, dry weather and nutrient poor soils. *Protecting* (1900-1940) saw the first signs of the 'Australia Unlimited' vision (of an Australia that would support 50-100 million people) being questioned. Rural decline hit both mining towns and farming communities in the early 1900's. A set of attitudes called 'countrymindedness' aimed to support rural development, protect farmers through state measures, and develop better services to make country life better



(transport, education, community services, etc). *Planning* (1940-1980) emerges from the planned war economy, as well as the influence of Soviet planning, and sees rural policy-planning toward social ideals, as opposed to accepting market forces. Drift into the cities was seen unfavourably, and a 'reindustrialisation of the countryside' through hydropower, coal, steel and manufacturing industries, allowed rural populations sustenance through this alternative model. By the end of this period people begin to question *countrymindedness*, the assumption that country people are morally and biologically superior to city people. *Sustaining* (1980+) sees the dismantling of tariffs and services, through economic rationalism, that support rural farming communities, making life harder for farmers, economically and socially. Looking with hindsight Davidson argues that the previous phases of rural development were founded on false hopes. The sustaining belief in the value of country farming, which underpinned earlier phases, has now collapsed. The worldview of *countrymindedness* saw its ascent and now decline. Ideals to populate rural Australia have now been abandoned, and the limitations of the land are starting to be more profoundly accepted.

Amid this challenging reconciliation with the land, we can hypothesise an emerging culture of stewardship that links generational accession with desires and practices to maintain the integrity of land. Cocklin and Dibden (2005), and others, have noted that generational accession is a key variables in the maintenance of land conditions. Here I offer a We might call this *Progressive Bush Culture*, one that expresses a deep care. However this is still obscured by *Pragmatic Bush Culture*: doing what works to survive, make a living, and getting by, but not led by a vision of the future nor a deep connection with the land. The remnants of *Exploitative Bush Culture* still exist, based on short term thinking or narrow economic interests, what Diamond refers to as 'Mining Australia'. The shareholder system which underpins modern corporations creates a dynamic through which economic investors are experientially abstracted from the actions of the company. The process through which corporate shareholders become conveniently oblivious to how their company displaces problems and externalises costs is a widely accepted phenomenon. From this we might infer that it is this connection with the land, deeper than simply new NRM practices, but rather verging on a resonant and profound meaningfulness of co-existence, which allows for a culture of stewardship vs. exploitation to emerge. This meaningful connection with the land can be seen as both spatial, located in a place (bio-regionalism) and temporal, the experience of presence, permanence, and change / transformation over generations.

Authors	Past - what is waning or has waned, legacy and memory	Present - What is current and status quo	Future - What is emerging, alternative and possible
Cocklin C. & Dibden J. (2005)		NRM is about resources and practices	Inter-generational farm culture as key variable in NRM
Cocklin (2005)		Productivist neo-liberalism	Post-productivist and post neo-liberal political – economic regime
Cullen P. (1999)		Human preferences are primary in NRM  Passive acceptance of expert knowledge and advice  Solving NRM from a single disciplinary perspective, using	Ecology sets what is possible, design interventions based on heuristic testing of limits / thresholds Learning community - NRM knowledge circulate for community decision making. Experimentation takes place through community initiatives Disciplinary and integration, whole systems thinking, are needed to solve NRM problems
Davidson (2005)	Ideology of 'Countrymindedness' rural life the healthiest and purist form of life	Economic rationalism and self reliance	Increasing obligations on farmers to conserve and sustain land
Diamond (2005)	Highly exploitative farming practices	Negotiated acceptance of the need for change. Yet current cultural assumptions still incommensurate with ecological sustainability	Cultural adaptation, learning from others ie science and aboriginals – invokes post-conventional / post-parochial mode, as booth science and aboriginal culture represent Other / Othered epistemological worlds
Gunderson L & Hollings C. (2002)	Linear (Newtonian) view of nature – nature as infinitely malleable & Nature as a balanced and constant equilibrium, always forgiving of human intervention	Nature as fragile: anarchy and collapse are just around the corner (humpty dumpty), read Diamond and Shumacher Also sustainability as a static or ideal state, without an understanding of critical thresholds	Integrative theory that incorporates many worldviews of nature. Post-sustainability <i>resilience and evolutionary</i> discourse that accepts multiple semi-stable states, and flexible human systems responses
Hames (2003)		Description of four futures worldviews for Australian landscapes and NRM	My backyard – Lobbyist Country – Action Researcher Botanical Garden – Ecologist Hothouse – Engineer
Holt JE & School D. (1989)	Hard systems – static ontology	Soft systems – use of cognitive maps / rich pictures etc. (Checkland)	Appreciative systems – inclusive of hard and soft systems, context making and integrative
Hudson (2005)		Competitive Individualism - Poorly organised race to the bottom competition between farmers	Paradigm shift in the industrial relations posture of farm organisations to one that is more collaborative, to gain basic wages for labour inputs
Pierce (1994)	<i>Pre-industrial</i> farming	<i>Productionist</i> (since 1930's) - Rapid growth in yields, Increase in external inputs, Capital intensification	<i>Post industrial</i> , through either / and redeployment to noncommodity / nonfarm goods and services and new (diversified) commodity / farm good / services
Ross H. Abel N. Herbert, A. Manning, M. Walker P. &	No / little acknowledgement that mental models exist – ie	Lack of acknowledgement of occupational perspectives. Notion of mutually exclusive perspectives.	Acknowledgement that confluence of occupational perspectives help solve problems, and can be synergetic

Wheeler H. (1999)	representationalist epistemology	Mental models exist but unimportant – ecology, economy and farm practices are what counts	and commensurate Identifying mental models helps to build bridges for communication
Shulman AD and Price RJ ed. (2000)		Concentration on the correct solution, or a limited choice of management options in NRM, developed without consultation with broad stakeholders	Alternative paradigm of tactical decision making as a tool to provide a process for interaction’ – an iterative, evolutionary, participatory prototyping approach to sustainable tech. development done by a broad group of stakeholders
Vanclay F. (2002)	Agriscience – extension as the embodiment of scientific knowledge; assumes farmers are economically motivated	Conventional extension – top down, assumes extension knows best, ie categories such as early adopter vs laggard Farmer-orientated approach – getting by, balance farmer / ecological interests; assumes farmers are economically motivated	Socially informed approach – appreciating the cultural / symbolic contexts farmers live in, their perspectives on ‘good farming’; farmers motivated by ‘doing the right thing’ which is a complex and negotiated process determined by many factors
Cultural archetypes	<i>Exploitative Bush Culture:</i> Take the money and run, short term thinking or narrow economic interests, abstracted from land, no real stake or meaning, its all just a thing	<i>Pragmatic Bush Culture:</i> Just do what works, make a living, get by, don’t try what hasn’t been tested	<i>Progressive Bush Culture:</i> Stewardship and perennial regeneration / co-existence with the land. Willing to experiment in ‘dialogue’ with land – spiritual connection to land

**Table 8: states and shifts in discourses, worldviews, ideology and culture**

### *Narratives, Myths and Metaphor*

Gill (2005) has done a depth analysis of the myths used in relation to rural Australia. Outback mythologies are employed to promote distinct interests and manufacture a sense of unity. This article critiques the mythologizing of the outback as a constructed narrative, in particular in the case of the recent Australian government’s *Year of the Outback in 2002*, which re-enforces a nostalgic pastoralism that, it is argued, is in practice a ‘geography of death’. It seeks to evaluate a number of mythologies, including eco-mythologies (the notion of the empty land), and others, to form a more multi-dimensional understanding of geographical narrative. Such narratives are used to construct visions of the desirable use of land, mobilise resources and maintain / distribute power.

*Pastoralism* is the core geographic mythology, associated with the sheep a cattle regime, with nostalgia for the bush man, the rugged farmer, and the pioneer. She argues that this is in fact a mythology of destruction, which is still used to maintain certain power interests. In this pioneer myth, neatly bounded spaces conform to an imagination of empire as certainty, and clear delineation of civilisation from savagery. The creation of a monological self underpins colonising practices unable to dialogue with social and natural others. Cattle and

sheep are the shock troops for the colonisation and reshaping the landscape. In this light the use of the term ‘farmer’ by Prime Minister John Howard obscures the corporate Grazier interests at work in perpetuating this mythology.

By contrast, in the *Conservationist-Environmental* mythology, graziers are completely vilified, and nature idealized as untouched. In this view cattle brings death to the interior. European settlement is challenged through native title claims as opportunistic, destructive and unethical. Farmers are characterised as absentee owners with tenuous links to the land or as self promoting trans-national corporations (TNCs). Overall farmers will only be tolerated if they can prove they are sustainable. The image of outback is repackaged as an ecological resource and confrontation with ugly past of aboriginal dispossession. This *Eco-mythology* believes the death caused by pastoralism can be shifted to a ‘living heart’, (again) invoking an Australian essence. But farmers and people are largely absent from this vision. Like the pastoralist narrative, it employs the imagery of the empty land. Like pastoralism it is a simplified version of reality – especially when there are assertions that inland pastoralism only brings death. Finally this opening up of ‘empty land’, or land untouched is again a cultural projection of White Australia, idealising an untouched outback, a new terra nullius. This view also parallels the *Nature anarchic / fragile* view described by Gunderson and Hollings (2002), as well as assertions by Diamond (2002), who recommends a mandated end to some types of farming.

Gill argues for a *De-colonising* space inclusive of aboriginal culture and land use, as well as post-European narratives of land habitation. Gill articulates a moral *post colonial Australian geography*, created through new sense of vision, ‘variety and complexity’, an understanding of the consequences of our actions, a new perception of interconnections, and an enriched geographical reality that preserves diversity: ‘actions that promote opacity, insular singularity of place, perspective and life, and diminish variety and complexity by homogenising places are immoral’ (p 42). This *Post-colonial* mythology is a conversation between many geographic mythologies., which can surface core narratives and how they operate to empower and to marginalise, sustain and destroy. Gill asks: ‘who is constructed as the Other in rural mythologising? And can this be embraced to achieve a fuller vision of it?’

<b>Authors</b>	<b>Legacy - What is waning or has waned</b>	<b>Reality - What is current and dominant</b>	<b>Possibility - What is emerging and alternative</b>
Gill (2005)	Pastoralism: sheep a cattle regime, nostalgia with the bush man	Conservationist – Environmental: vilifies graziers, idealizes nature as untouched	Post-colonial: conversation between many mythologies of the land.

**Table 9: shifts in the mythologizing of the Outback**



### *Part III: Resources*

#### *Abstracts*

**Allan C and Curtis A. (2003) 'Learning to Implement Adaptive Management', *Australian Association of Natural Resource Management*, vol 6 n1 march 25-30**

The paper reviews a workshop between key proponents of active adaptive management, a approach to ecosystem management in which stakeholders in a ecosystem participatively reflect on the management practices used in that area, and through trial and error, improve their practices through iterative learning by doing. 'Active adaptive management sets out to use policy and its implementation as tools for accelerated learning.' It sees as a major learning interface the relationship between management / policy / human culture and ecosystems at various scales. Through the workshop the proponents developed a definition of AAM as ' a designed purposeful and reflexive system that grows, assesses, and incorporates emerging knowledge and context, and builds the capacity of stakeholders to manage change.'

**Chiras D. (1991) *Environmental Science: action for a sustainable future*, Benjamin Cummings Publishing, Redwood City Calif.**

An environmental science textbook with general overview of ecological principles and sustainability issues. The main contribution this textbook offers is in contextualising soil erosion and desertification as a global and historical phenomenon. It argues that, across every continent and through history various factors cause soil erosion and desertification. These are:

- Forest / woodland clearing
- Overgrazing
- Reduced rainfall / climate change / warming
- Overcropping
- Overpopulation
- Water mismanagement
- Groundwater depletion
- Waterlogging and salinisation

**Cocklin C, Dibden J. and Mautner N (2003) *Stewards of the Land: Landholder perspectives on sustainable land management*, Report prepared for the Victorian Catchment Management Council Project in collaboration with Catchment and Water Services Division (Department of Sustainability and Environment).**

This report details a scenario development process conducted with landholders in Victoria, that produced four scenarios on rural futures. The report details the methodology used, as well as the particular futures constructed.

*Scenario 1 – hard to be green when you are in the red*

Economic pressures, competition and cost price squeeze / commodification and little diversification has made economic life harder, and given little room for farmers to change practices and value added production. New red tape on environmental protection adds to farmers burdens, but water and land quality still deteriorate

*Scenario 2 – plodding on*

Public apathy for environmental issues lets farmers off the hook, who continue business as usual, and focused on increased productivity. Big high tech farms do well, small farms suffer. Rural pop decline as many farmers fed up of tough lifestyle

*Scenario 3 – farming smarter*

Investment in R&D, farmer training, landcare and NRM extension has combined to allow rural innovation, development of niche value added products, diversification, and better NRM practices. Venture capitalism and green interests come together. Alternative land use such as eco-tourism allow for key structural shifts in local economies, including less intensive use of marginal and fragile land and ecosystems.

*Scenario 4 – the grass is greener*

Public and gov. support for environmental protection through market driven (consumption) and state driven (support) for value added products. This support makes life easier for farmers, especially intergenerational transfer. Socially responsible investment schemes make use of sensitive / marginal land for new purposes. Immigration creates more diverse rural centres, but also creates some issues with ethnic integration.

*Summary*

All scenarios were seen as possible (not improbable or likely), but 3 and 4 were seen as more probable and more preferable, expressed by an optimism among the landholders that were part of the workshops / research.

**Cocklin C and Dibden J. (2005) *Sustainability and Change in Rural Australia*, UNSW Press, Sydney**

This book offers a number of innovative perspectives on sustainability in rural Australia. A few of the book chapters were considered relevant to this metascan.

*Cocklin C. (2005) 'Natural capital and the sustainability of rural communities' in Sustainability and Change in Rural Australia, UNSW Press, Sydney*

Cocklin comments (p174) about the overlay of European industrial mindset (citing Gray and Lawrence) on the Australian landscape, which was and is largely inappropriate. This also parallels Diamond (2005) comments about the need for a cultural response, and also parallels Graeme Davidson's (2005) comments on the unsuitability of the ideology of 'country mindedness' and the need to shift European Australian perceptions of the land.

Cocklin also comments on how the culture – practice of stewardship emerges from intergenerational accession (p179) – expressing a notion of what I term 'progressive bush

culture', as linked with temporal permanence (past experience plus vicarious sense of the future).

In addition, Cocklin's key influences on rural future look at shifts in:

- Environmental variability and change
- Public attitudes and community expectations
- Markets
- Demographics
- Technology and innovation
- Governance
- Land use change and ownership

**Cocklin C. (2005) 'Conclusion' in Sustainability and Change in Rural Australia, UNSW Press, Sydney**

'cultural shift toward recognition of the mutual benefits of making a profit and looking after the environment' (from Cocklin et al 2003).

- Fundamental incompatibility between deregulated, competitive, intensive agriculture and addressing ecological crisis which threatens the future of communities and towns.
- Questioning of the neo-liberal political – economic grounds by which these processes rest
- Contradiction between providing gov. support for sustainability to rural Australia and Cairns Group / WTO convictions that this implies subsidies
- Envisions policy shift from productivism to post-productivism in Europe should be matched in Australia, which includes:
  - Such a rural regime has a multitude of functions, not simply to produce food and fiber
  - Multifunctionality – triple bottom line valuations of rurality
  - Focus on food quality as opposed to quantity
  - Recognises the role of landholders in environmental protection
- Also sees the pre-eminence of social capital as critical determinant in rural sustainability
- Altered terms of dependency toward independent communities
- But self help strategy is not effective enough, need coordinated support
- Need to coordinate local initiatives within sub-regional and regional efforts

**Courtney P. (2005) - Tasmanian conservation covenants, Landline, ABC, Australia**  
[www.abc.net.au/landline/content/2005/s1464476.htm](http://www.abc.net.au/landline/content/2005/s1464476.htm)

Conservation Covenants is a type of social innovation, social contract, in which the owner of a particular rural area agrees to protect certain aspects of the land from degradation, to protect aspects of the land, ie endangered species and bio diversity. They can be permanent and part of the title of the land (even if the property is sold) or can be a commitment on the part of farmers. Farmers which sign a CC can get paid a stewardship fee per annum per hectare as well. Since 1998 so far 33,000 hectares have been protected through CCs

*I didn't want to think that 100 years from now someone could come in and rip all the trees out, so I really wanted to protect it, and I also was in desperate need of fencing, so I went into a full covenant so that I got money to fence all those areas..*



CC vary from 5, 10 hectares up to 1,600 hectares, depending on the requirements for protecting certain eco-systems. Erosion controls have helped to stabilize water flows that have created erosion in the past. By creating CC corridors birds help to regulate pests, and the variety of birds has increased.

**Coutts, J. Roberts, K. Frost, F. Coutts, A. (2005) *The role of extension in capacity building - what works and why*, A report for the Cooperative Venture for Capacity Building, <http://www.rirdc.gov.au/reports/HCC/05-094.pdf>**

- Shift from one to one toward group approaches
- Shift from focus on economic outcomes to social and environmental concerns

Four types of extension

1. group facilitation / empowerment – helping communities define and solve their own problems
2. programmed learning - national training framework etc, linked to experiential learning in specific areas of development needs
3. technology development – participatory approaches to technology development and implementation are increasingly common
4. information access - services diverse information needs, specifically addressed to different steps in decision making processes for diverse stakeholders
5. new model – individual consultant / mentor model

Together this comprises a capacity building ladder of extension services

**Curtis A. (2003) 'Who are program managers working with and does it matter?' *Australian Association of natural resource management*, vol 6 , n 2 ,**

Based on extension work in the promotion and adoption of current recommended practices (CRP) it argues that land holders are a heterogenous group, and social research need to be broad enough to embrace the diversity of farms and farmers – there must be a representative sample of population that reflects the complexity of the region. Also CRP need to focus on awareness raising, improving knowledge, and skills and enhancing the acceptability of CRP.

**Davidson, G. (2005) 'Rural sustainability in historical perspective'. In *Sustainability and Change in Rural Australia*, UNSW Press, Sydney**

This article traces the history of government policy and rural development in Australia from settlement times to the present. It has a particular focus on the assumptions that settlers brought into the bush, and examines the role of ideology in respect to farming the land. This would seem to be an excellent source of knowledge of how policy making and ideology interplay with rural development.

Davidson argues that there are several phases in Australian rural development through history. These are *Plant, Water, Protect, Plan, and Sustain*.

**Planting (1800-1850)** – the early colonial saw the Crown push toward the development of a country side that would resemble England. Towns were planted (after convict settlements), with the hope of replicating the peasant model of England. Also there was an attempt to force convicts into the interior, as it was thought it would improve their character, and would provide a plantation labour force. From this beginning the concentration of people in coastal towns was seen as abnormal, and a condition to be remedied. Despite this effort towns grew only slowly.

**Watering (1850-1900)** – the Australian gold rush created the first large rural settlements. Even after the gold had been mined, the new towns revealed a permanence that previous *planting* efforts could not achieve. Political movements emerged during and after the gold rush era than embodied Victorian Liberalism, agrarian aspirations to open up the frontier (and break the power of squatters). Liberals pushed for state support for education, telegraph, railways, and irrigation that would unlock the land. Toward the end of this period irrigation was seen as a way of overcoming the limitations of the land (soils and dryness). The state would support irrigation, while farmers and community enterprises would take advantage of this.

**Protecting (1900-1940)** – Early in the century the assumption of ‘Australia Unlimited’ that would support 50-100 million people was beginning to be questioned. Rural decline hit both mining towns and farming communities in the early 1900’s. The urbanisation that followed was looked upon harshly, as a weakening of the moral spirit of the nation. A set of attitudes called ‘countrymindedness’ aimed to support rural development, protect farmers through state measures, and develop better services to make country life better (transport, education, community services, etc). The first acknowledgements that supporting rural settlement was having a great impact on the sustainability of the land emerges.

**Planning (1940-1980)** – The planned war economy, as well as the influence of Soviet planning, influenced rural policy in the direction of planning toward social ideals, as opposed to accepting market forces. Again the drift into the cities was seen unfavourably, and a ‘reindustrialisation of the countryside’ through hydropower, coal, steel and manufacturing industries, allowed rural populations sustenance through this alternative model. High prices for wool and wheat, as well as tariff protection made this planning model successful in the 1950’s and 60’s before the advent of economic rationalism. By the end of this period people begin to question countrymindedness, the assumption that country babies were morally and biologically superior to city babies.

**Sustaining (1980+)** - The dismantling of tariffs and services, through economic rationalism, that support rural farming communities, had made life harder for farmers, economically and socially. Looking with hindsight Davidson argues that the previous phases of rural development were founded on false hopes. The sustaining belief in the value of country farming, which underpinned earlier phases, has now collapsed. The worldview of countrymindedness saw its ascent and now decline. ‘The ethic of development on which rural progress had long rested is now challenged by an ethic of conservation, that portrays many traditional farming practices as harmful and imposes a new obligation of ‘sustainability’. (p54)

**Delaney K. and Cork S. (2005) *Thinking about the future of Australia’s landscapes, Land & Water Australia***

A comprehensive prospective analysis of the futures of land, NRM, rural communities and farming futures in Australia. Looks at the key drivers of change in this area, the key changes,

controversies, and challenges. The report is too complex to abstract here, but a reformatted report is attached in the appendix.

**Diamond J. (2005) 'Mining Australia', in *Collapse, how societies choose to fail and succeed*, Viking Penguin, London**

The anthropologist and popular American writer has written this book in response to widespread ecological crisis in many parts of the world, arguing for dramatic changes to the way we live. The first part of the book is about societies that collapsed due to a variety of factors, the Maya, Easter Island, Norse Greenland etc. He argues they collapsed based on one or more of the following reasons: 1) ecological over-exploitation, 2) climate change, 3) war, 4) loss of trading partners, 5) poor responses to the challenges largely predicated on cultural values.

In the chapter 'Mining Australia' - Diamond essentially argues via a juxtaposition of two critical factors, the first being the bio-physical aspects of Australia, and the second the way that modern European Australians have 'mined' and over exploited the land through forestry, grazing and mineral extraction.

In terms of Australia's bio-physical attributes, he argues that Australia has the poorest soils in the world, due to a lack of geological activity over millions of years (tectonics, volcanos etc), and the particular flora and fauna have adapted to this quite successfully.

While indigenous aboriginal peoples had adapted to this over a period of 40,000 years, white settlement projected European assumptions about agriculture onto the Australian landscape. To make matters more dramatic, modern industrial agriculture is particularly detrimental to Australian soils and eco-systems.

Because of this, he argues that Australians have had to deal with the consequences of intensive industrial agriculture much sooner than US or European counterparts, who have much deeper topsoils and more rain, and consequently Australians are innovating solutions sooner as well - in a horse race between the forces leading toward collapse and those leading to sustainability.

Innovations include:

- South Australian Tax to raise 300 million to undo damage to the Murray River
- NSW government 406 million agreement with farmers to end land clearing
- QLD agreement with Commonwealth to end land clearing by 2006
- Cell grazing – livestock forced to eat unpalatable plants as well as palatable
- SA 42 year leases and 'duty of care' obligations
- Australian Landscape Trust – bottom up community management
- Potter Foundations Potter Landcare Plan – helping 15,000 farmers pass on their farms in decent conditions to their children
- New diet of Kangaroo – less methane produced and soft footed

**Dart J. Drysdale G, Cole D, Saddington M. (2000) 'The most significant change (MSC) approach for monitoring an Australian extension project' in *PLA Notes, International Institute for Environment and Development*. vol 38 , 47 – 53.**

Described the target 10 Dairy Extension Project initiated in 1992, a complex project involving multiple stakeholders that aimed to increased productivity through collaborative reflective practice and organisational learning. The project evolved into a story based approach by which stakeholders evaluate the project.

The MSC was developed through the work of R. Davies, and also referred to as ‘The evolutionary approach to organisational learning’, ‘the narrative approach’ and ‘story approach’. It is considered monitoring without indicators.

Methodology:

1. establish domains of change
2. set in place process to collect and review stories of change
3. hold an annual round table meeting with the project funders

This evolved into a more elaborate six step process:

1. taste test to become familiar with the approach (used pro forma to help guide emergence of stories)
2. establish four domains of change (these were found using an iterative Delphi)
3. establish a learning set, which includes *champions* of each region
4. set in place a process to collect and review stories of change
5. hold an annual round table meeting for the project funders to review the stories
6. conduct a secondary analysis of stories *en masse*

It is a departure from conventional evaluation approaches, as there is never a final outcome, it is aimed to move toward better understanding and more desirable outcomes, develop a ‘rich picture’ (it does not aggregate and analyse results, dissect into a final report, but rather a way for stakeholders of getting a *gestalt* regarding stakeholder experiences in change processes).

One of the key points of success was the development of new communication spaces by which stakeholders were engaged in sharing their stories, evaluating what counts as significant change, making judgments, and acknowledging people’s leadership and initiative. It was a morale boosting experience for most, with practical benefits as well.

**Gill, N. (2005) ‘Life and death in Australian ‘heartlands’: pastoralism, ecology and rethinking the outback’, *Journal of Rural Studies*, v21, 39-53**

Outback mythologies are employed to promote distinct interests and manufacture a sense of unity. This article critiques the mythologizing of the outback as a constructed narrative, in particular in the case of the recent Australian Governments Year of the Outback in 2002, which re-enforces a nostalgic pastoralism that in practice is a ‘geography of death’. It seeks to evaluate a number of mythologies, including eco-mythologies (the notion of the empty land), and others, to form a more multi-dimensional understanding of geographical narrative. Such narratives are used to construct visions of the desirable use of land, mobilise resources and maintain / distribute power.

*Pastoralism* - This is the nostalgia of the cattle and sheep regime – this symbolic complex is linked with nation building, national identity, promotion of constructed unity and suppression of difference, and is also linked to productionist agri-science. Notions of authenticity (real man) tours to the centre, see the ‘real’ Australia – ie the Stockman’s Hall of Fame in

Longreach and Outback Heritage Centre, and nostalgia of the great cattle drives.

Characteristics include:

- neatly bounded spaces that conform to an imagination of empire as certainty
- Monological self underpins colonising practices and needs to be put aside to dialogue with social and natural others
- dead centre and dead heart notions
- cattle and sheep are the shock troops for colonisation and reshaping the landscape
- pioneer myth
- use of the term 'farmer' by PM obscures corporate Grazier interests
- delineation of civilisation from savagery

*Conservationist - Environmental* – is a geography of death and conservation, which concerns itself with land degradation and bio-diversity. It is the counter narrative employed by educated urbanite populations of European descent. Assumptions include:

- cattle brings death to the interior
- settlement challenged by native title claims as opportunistic, destructive and unethical
- characterised as absentee owners with tenuous links to the land or as self promoting trans national corp. (TNCs)
- Eco-mythology – death caused by pastoralism can be shifted to a 'living heart' - also invokes an Australian essence. But farmers and people are largely absent from this vision
- farmers will only be tolerated if they can prove they are sustainable
- image of outback is repackaged as ecological resource and confrontation with ugly past of aboriginal dispossession
- also a simplified version of reality – especially when there are assertions that inland pastoralism only brings death
- also uses imagery of the empty land like pastoralist narrative
- this opening up of 'empty land', or land untouched is a projection of White Australia generally
- idealises an untouched outback

*De-colonising* – this is a space of aboriginal culture and land use, as well as post-European narrative of land habitation.

Articulates a moral *post colonial Australian geography* (perhaps also post – productionist?) New morality is created through new sense of vision, 'variety and complexity', understanding the consequences of our actions, perceiving interconnections, enriched geographical reality that preserves diversity . 'actions that promote opacity, insular singularity of place, perspective and life, and diminish variety and complexity by homogenising places are immoral' p 42

Asks : who is constructed as the Other in rural mythologising? And can this be embraced to achieve a fuller vision of it?

Need to have many geographies of the outback, many mythologies in conversation, in order to transcend the blinding quality of the single mythology.

**Gleeson, T. Turner C. and Douglas R. (2002) *Beyond Agriculture: Changing patterns of farm household income*, Rural Industries Research and Development Corporation, p7-10**

‘Most Australian households have multiple income streams and Australian farm households are no exception. In fact Australian farm households are increasingly broadening their income streams through agricultural diversification and through non-agricultural activities, both on and off farm. Almost universally the trend towards multiple income streaming in the farm sector is perceived negatively. It is perceived as an undesirable ‘last option’ response to financial adjustment pressures. Similarly ‘lifestyle’ farm investment from the non-farm sector is rarely perceived positively, a common view being that it is taxation driven and unproductive. These negative perceptions reflect the economic and agricultural-centric views of farm and rural adjustment prevalent in the Australian research literature, and in rural policies and programs. While overseas research has analysed the phenomenon of multiple farm income streams within a broader context, there is little Australian literature that takes a multi-faceted view of the increasing reliance of Australian farm households on non-agricultural income. Additionally various past and present adjustment support programs, for instance the Rural Adjustment Scheme and FarmBis, discriminate against households with multiple income streams’.

- Most farms are sole traders or partnerships, and family owned
- New farmers tend to be young
- Farmers are more likely to be married: 73% versus 56 % (urban) respectively in 1991
- ‘over 80% of farm establishments have at least one female actively involved in the farm’
- off farm (non agricultural income) in 1990’s about 28% three time the level of early 1980’s
- ‘off farm income between 1995-96 and 1997-98 for commercial broadacre farms categorised by gross farm receipts is summarised in the following table.’

<b>Farm size by gross farm receipts</b>	<b>Proportion of commercial broadacre farms (%)</b>	<b>Off farm income as a proportion of pre tax household income (%)</b>
<b>Small: \$59 000</b>	<b>50</b>	<b>69</b>
<b>Medium: \$176 000</b>	<b>25</b>	<b>19</b>
<b>Large: \$477 000</b>	<b>25</b>	<b>8</b>

Taxation provisions:

- ‘current taxation policy as possibly being a major driver for farm households to retain an agriculturally derived income stream’

Farmer case studies

- ‘many farm households adopting innovative agricultural practices participate in off farm income earning activities
- ‘A high proportion of farmers selected for their innovative farm practices were members of farm households with multiple income streams.’
- ‘Earning off farm income may be perceived as a way of reducing the financial risks associated with innovation.
- Contact with people within the non-agricultural context provided by off farm employment may assist in the development of innovative farming and management practices.

- Off farm income may be viewed as providing a source of funds to invest in innovative ideas that may not yield immediate profits.
- Off farm consulting may help extend innovative farming practices to other farmers.’
- ‘This study indicates that multiple income streaming, particularly but not exclusively for farm households is now an important determinant of the future economic, ecological and social health of rural Australia.’
- Patterns of household income, including of farm households reflect the balance between the needs and aspirations of household members, their capabilities and the availability of paid employment and self-employment options.
- earning off farm income may result in an increase in mutual understandings and cohesion within rural communities, and a better use of skills and knowledge both on and off farm
- help to reduce the isolation and loneliness that can adversely affect the mental, physical and spiritual health of farm household members
- also create the stresses experienced to varying degrees by families, farm or non-farm when most or all family members are occupied in paid employment and/or in managing a business
- multiple activities and income streams of farmers have important implications for future social, ecological and economic policies for rural Australia
- policies have largely neglected these factors, and have instead allowed a narrow, agricultural view of rural issues to predominate’

(taken from executive summary)

**Greene, G. (2004) *The end of suburbia* (film), Barry Silverthorn (producer)**

’Peak oil’ may have a large impact on rural sustainability. Between 2005 - 2015 we will pass the 'Hubbard Peak', the point at which we start to get diminishing returns for the various sources of oil around the world. From the point of this peak we can expect supply to slowly but invariably decrease. If we factor in the emergence of new economies like China and India, we get an asymmetrical relationship, supply goes down but demand goes up - so prices spike. Petrol is used in everything from plastics, fuel for cars and jets, to pesticides and fertiliser. The impact on the DU might be the high cost of travel due to increasing costs for fuel. For industrial ‘productivist’ agriculture in general the impact may be higher costs for fertiliser and pesticides, and higher distribution costs. The peak oil assumptions generally favour localist / localisation proponents (IFG).

Cuba may be seen as one case study of a country that has passed through an artificial ‘peak oil’ scenario, which required significant restructuring, the promotion of urban gardening, permaculture, and the implementation of sustainable agriculture.

Also look at <http://www.peakoil.net/> for more info.

**Gunderson L & Hollings C. (2002) *Panarchy: Understanding transformations in human and natural systems*, Island Press, Washington**

Gunderson L & Hollings provide a comprehensive approach to complex adaptive systems research and management for resilience in socio-ecological systems. Their Panarchy

framework is 'To understand the underlying principles in complex adaptive systems, in particular relating to systems balance and resilience'. The worldviews we hold in relation to nature are fundamental. This mediates our own capacity to take responsibility for our place and approach to 'Nature'. (12) They characterise the worldviews we hold about nature in five ways:

**Nature Flat** – this is the linear (Newtonian) view of nature, presupposing no feedback systems: 'nature is infinitely malleable and amenable to human control' (Gunderson 11). Such a view sees no limits to what humans can achieve, and what nature can give.

**Nature Balanced** – this presupposes nature as maintaining constant equilibrium, always pushing back through negative feedback and thus infinitely forgiving of human intervention. 'It imposes a static goal on a dynamic system.' (Gunderson 12)

**Nature Anarchic** – presupposed that nature is essentially unstable, fragile, and subject to great disturbance at the slightest perturbation. The precautionary principle dominates because catastrophe is eminent in human intervention. 'Small is beautiful' because collapse is around the corner. (Gunderson 12)

**Nature Resilient** – this presupposes nature as alternating between various multi-stable states. In economics this view was developed by Schumpeter (1950). This view accepts discontinuous events and non-linear processes as part of change: 'There are periods of exponential change, periods of growing stasis and brittleness, periods of re-adjustment and collapse, and periods of re-organisation for renewal. (Gunderson 12)

**Nature Evolving** – this is derived from the emerging evolutionary and complexity sciences. 'Nature Evolving is a view of abrupt and transformative change...and exposes a need for understanding unpredictable dynamics in ecosystems and their corollary focus on institutional and political flexibility.' (Gunderson 13)

An integrative theory that combines all five traditions aforementioned is developed which explains adaptive changes, resilience and stability in social, political, institutional, economic, ideational and ecological systems. They explain that each of the five myths mentioned are not totally wrong, but incomplete, and attempt to draw insights from each one through a broader framework.

### **Hames R, et al (2003) *Memories of the Future: Australian Landscapes 2050* Release 1.0**

This scenario development uses an axis which provides 4 extreme worldview positions. On the X axis the two extremes are deep, narrowly (reductive) focus opposed to whole systems, broad and holistic. The Y axis contrasts empirical focus (single epistemology), with all ways of knowing (multiple epistemes). By contrasting these two axis, four scenarios emerge for landscapes:

My backyard – multiple epistemologies and narrow / particular focus (not systems thinking); envisions ideological conflicts across community lines, for example environmentalist vs industrialists. 'My community has the answer'. This is the view of groups ideologically committed to their own agendas, under the assumption that they have THE answer. This is a future in which the Business Council of Australia and Friends of the Earth battle each others respective future to the bitter end. This person is a **lobbyist**.



Country – whole systems and multiple epistemologies; envisions integration and collaboration, as control is not possible, we must communicate and relate to adapt. In this view no-one is right or wrong, all variables and perspectives interpenetrate. This is similar to the Action Research perspective of Robert Flood and Peter Checkland in its emphases on inclusion of broad stakeholder perspectives / frames of reference, and whole systems thinking. In this future, there might be interpenetrating networks of networks (meta-networks) that create a new noetic space in which sustainability is imagined and achieved. This person is an **action researcher**.

Botanical gardens – empiricism and systems thinking; this view is very grounded in the physical and biophysical processes that determine the conditions for sustainability. This is the view of ecological science, with both its commitment to understanding systems and tradition of empirically based research. This future might have a policy and research elite which is able to have a modicum of control in creating ecological sustainability, but which marginalises human values in the process. This person is an **ecological scientist**.

Hothouse – empiricism and narrow / particular focus (not systems thinking); this view seeks knowledge and control over particular component / aspects of life. It often gets breakthrough results, but is blinded by its own success to the counter-intuitive effects of its own breakthroughs. This view is reflected in biotech / genetic research and engineering, advancing new levels of control over aspects of life through empirical means. This future might see advances in ICT and biotechnology which allows us to deal with sustainability issues in new ways. This person is an **engineer**.

**Hazell D. and Williams M. (2003) ‘Development of Guidelines for the delivery of conservation incentives by regional organisations’ Workshop Summary 21-22 July 2003, Adelaide, South Australia - [www.deh.gov.au/land/publications/incentives-sa/section2.html](http://www.deh.gov.au/land/publications/incentives-sa/section2.html)**

This workshop was an effort at wider state coordination in South Australia to integrate NRM programs and NRM incentive schemes.

#### Outcomes

- Integrating for TBL outcomes is still a challenge. While the group accepts TBL, it is an abstraction much harder to achieve
- Current NRM efforts are fragmented, and a coordinated NRM approach that emphasises communication across agencies and regions is needed.
- Flexible and tailored approaches are best for NRM, especially flexible time frames. Also important are flexible communication approaches, and more dispersed intervention, not just with landholders, but with the CWA, hardware store owners etc. Devolved grants, and specialised extension for different audiences. Generally a nuanced and locality sensitive approach is called for.
- Community involvement, values and diversity needs to be integrated into projects. Projects need to value local knowledge, be sensitive to indigenous issues, and balance local burdens with support.
- Interventions and extension needs to be more sensitive and supportive of the diversity of farm types, especially small farms which are being squeezed out of business due to structural changes
- Need to get the urban public involved, and find roles by which they can be integrated into NRM efforts

- NRM programs need to reflect realistic time scales and not be tied to political election cycles, administration and bureaucracy need to be reduced, especially applications, to make it easier for a variety of stakeholders (landowners, NGO's, NRM support staff, community groups and regional NRM bodies) to get involved into NRM programs.
- Government expectations for change are too great
- Existing programs need to be enhanced through auditing / evaluation

**Holt JE & Schoorl D. (1989) 'Putting Ideas into practice', *Agricultural Systems* 30 , 155-171**

Looks at the epistemology of technological diffusion / extension, and advocates for a new model closer to a heuristic experimental process, as opposed to the natural science or agri-science model of theory building. Argues there is a shift to an engineering approach. The engineering approach is iterative, and reflects a commitment to design as opposed to inquiry, and practical problem solving vs abstract discovery.

Large contrast between the science world view (extension and diffusion processes) and engineering / design worldview .

Three paradigms at work in extension:

1. hard systems – oriented toward goals, systems can be controlled, problems have solutions, models are ontology (reflecting the world)
2. soft systems – oriented to learning, complex world, models are constructs, not essentialist
3. appreciative systems – most fluid, flux of events, systems thinking is context making, to appreciate and judge, mediates between reality, values and actions – brings in perceptions plus the empirical

first stage was hard systems, next was soft, and now appreciative, which incorporates both. The key shift is from a science WV to a system ideology. Need to move past hard system ideology and incorporate appreciative approach of Vickers.

**Hudson, B. (2005) 'Structural and Demographic Changes in the Australian Farm Sector', in *Australian Farm Sector Demography: Analysis of Current Trends and Future Farm Policy Implications*, Synapse Research & Consulting Pty Ltd and Bob Hudson Consulting Pty Ltd**

Second phase of a project to examine farmer demographics and implications for farm workforce policies / farm policy issues.

- Diversity is a key feature of the Australian farm sector, and this is a key strength
- A lack of growth in real gross value of agricultural production highlights the need for innovation and sources of diversity for farm incomes.
- Sourcing human resources is increasingly becoming a major issue, especially in relation to creativity, knowledge, skills
- 'as the economy matures the relative price inelasticity of agricultural products inevitably leads to a decreasing relative economic importance of the sector's agricultural outputs'

- ‘institutional arrangements need to be reflective of and responsive to the broad array of beliefs and values in the farm sector and in the community more broadly to help guide policy’
- ‘needs to be a deeper and more fundamental basis for policy development, an approach based on understanding the diversity of beliefs and values both within and beyond the farm sector.’
- In contrast to other industries, the farm labour force is often piece meal, part time, casual, unskilled or semi skilled and with low opportunity for career advancement. There need to be a shift to make being a farm labourer a rewarding career path.
- ‘Only farmers can break the cycle of low pay for basic labour inputs aligned to marginal productivity. This will entail a paradigm shift in the industrial relations posture of farm organisations to one that is more collaborative.’
- Recommends a farms union compact to modernise the labour force and stay on top of market forces – ie ‘professionalise’ the workforce.
  
- *‘Improve the people and change management knowledge and skills of farm employers, managers and operators leading to accreditation of farm employers.*
- *Develop and implement community-based employment and training brokerages to manage the continuous employment and lifelong skilling of the labour force in rural regions.*
- *Determine how to introduce a broad certificate of rural or farm operations that better enables trainees to gain continuous local employment.*
- *Design and implement localised multi-faceted strategies involving teachers, students and parents to improve the intake of talented students into agriculturally related secondary and post secondary education.*
- *Extend the eligibility for Farmbis support and the available courses to encompass the needs of permanent, contract and short-term casual employees irrespective of the extent of their responsibility for farm management.* ‘
  
- ‘authors **recommend** that the Australian Farm Institute initiates a project to develop a topology of landholders that is embracing of the diversity of beliefs, values and aspirations of landholders’ and also to promote innovation

Critical points for review include:

- ‘The extent to which the industry-by-industry structures limit innovation across existing industries and in alternative industries and other farm based activities.
- Whether existing innovation systems, in particular in regard to risk management, enable creativity and the production of other than incremental innovations within the parameters of existing systems.
- The nature and extent of transaction costs inherent in existing project funding arrangements.’
- ‘The cost and complexity imposed on those who are trying to ‘do the right thing’ should be of concern. The hard work and commitment of many who want to achieve an environmentally sustainable future for Australia is likely to deliver less benefit than it ought, unless they are provided with a credible and easy-to-use legal framework.’
- ‘need for industry groups, government agencies, catchment management authorities and conservation groups to work with motivated and capable landholders to develop and implement a national, third party certified and internationally acceptable environmental management system that could be applied across most if not all agricultural industries’
- ‘need for a substantial national investment in monitoring the condition of the natural resources and the associated need to clarify the responsibilities of relevant agencies.’

- The need for a critical examination of the feasibility of implementing State based integrated NRM legislation.
- The need to support and strengthen current efforts to make available to landholders spatial NRM data in ways that assist in ongoing property level planning and environmental management.
- More substantial gains could be made through greater support for landholders willing to adopt a planned and comprehensive approach to environmental resource management.
- ‘Changes in demand chains present a classic challenge for farm policy, and importantly an opportunity to approach this emerging issue creatively from several complementary angles. For instance not only is there a need to ensure traditional product chains operate effectively, efficiently and equitably but, reflecting the multi-functionality of rural landscapes, there are also priced and unpriced product chains for biophysical, *aesthetic* and spiritual ecoservices.’
- competition policy and competition policy instruments need to reflect as much as possible changing and varied community beliefs and values.
- support is provided for, or at least there be no constraints to, the development of a diversity of farm to consumer pathways, including those enabled by domestic and global web based food chain arrangements.
- Multi-functionality of landscapes needs to be considered within an agricultural /farm sector policy framework
- With the issue of land tenure - shifts in policies and procedures in relation to this issue may be required to enable diversity to be expressed.

(Taken from executive summary, p7-17)

**Koro-Ljungberg, M. (2004) ‘Displacing metaphorical analysis: reading with and against metaphors’, *Qualitative Research* , vol4(3), 339-360**

A comprehensive account of the use of metaphorical analysis in qualitative research. Examines how metaphors are used in textual and post-structural analysis.

**Pierce J. (1994) ‘Towards the reconstruction of agriculture: paths of change and adjustment’, *Professional Geographer*, Blackwell Oxford, 46(2) 178-190**

This paper looks at structural shifts in the Canadian farm sector, summarizing contemporary theories of change / re-structuring, and examines alternatives development paths.

Key shifts

- Consolidation of farms, and increasing farm size, pointing to increasing hegemony of agri business
- Increasing indebtedness of farms through 80’s (debt to asset ratios)
- Attempts by gv to de-couple itself from program payments

Alternatives paths to development (Bowler 1992)

- Type 1 – continuation and increase in the agro-industrial model
- Type 2 – diversification of income base through off farm and non-farm activity
- Type 3 – declined / marginalised farming
- Type 4 – (hypothesis sustainability model) (Bowler 1992)

- diversified
  - low input – out put
  - organic
- Type 5 – post industrial, through either / and redeployment to noncommodity / nonfarm goods and services and new (diversified) commodity / farm good / services

Status quo is *productionist* (since 1930's)

- Rapid growth in yields
- Increase in external inputs
- Capital intensification

**Robertson A. and Watts R. (1999) *Preserving rural Australia : issues and solutions*, CSIRO Publishing, Australia**

*Robertson A. and Watts R. 'Scientific and social impediments to restoration ecology as applied to rural landscapes'*

Discuss the next 50 years for preservation efforts in rural Australia

- Rising demand for Australian produce due to global pop boom
- Greater farming efficiency through ICT, marketing and economies of scales
- Biotech will offer new products and higher yields applies to specific environmental conditions
- Corp investment by fund managers

On the flip side

- This economic expansion will put greater stress on Australian ecosystems, and create more profound challenges
- Greater demand for water and use of soils will put pressure on vegetation
- Four major challenges are:
  - Greed
  - Ignorance
  - Institutional arrangements
  - Fashions in government
- Design of tertiary courses for next generation scientists / restoration ecologists
- Ecological sciences to merge with social sciences – so graduates have the skills to place their work in a context meaningful to producers
- Long term research sites in diverse regions
- Partnerships between primary producers, scientists and management agency in ecosystem management at different scales of space and time relevant to both farmers and ecological processes

***Cullen P. (1999) 'Water, politics and power: Can we integrate natural resource management in Australia?'***

Analyses the key drivers of change for rural Australia:

## Social

- Population – rural pop is aging and also declining,
- Health concerns – likely community and market pressure to insure against risk in the use of technology (anti-biotics, chemicals, etc)
- Ecologically sustainable development – popular support for this notion will grow, putting pressure on communities to change
- Community ownership – gov not able to deliver a sustainable future, so communities will need to take responsibility for it.

## Economic

- Globalisation – will open opportunities to some, but make competition fiercer to others – increase in pest and disease risk
- Weakening of government – in addressing NRM issues through state intervention, and the need for private interests to get involved
- Economic rationalism – will continue to favour short term payoffs vs long term interests
- Price signals – will be increasingly used as tool for allocating scarce resources

## Technological

- Infrastructure – is aging and needs investment
- Discharge rules – will become more stringent, but ‘Best Management Practice’ will stifle innovation
- Remote sensing and data capture will increase with ICT, and will be linked with greater decision making capacity
- Innovation in assessing crop water needs and timing and improvements in systems level delivery

## Environmental

- Improving knowledge of aquatic ecosystems, how they interact with other systems, influencing allocation
- Rising groundwater – will continue to make water saline across much of Australia
- Increasing dryland salinity on western slopes will lead to loss of productivity
- Loss of bio diversity in systems will lead to loss of resistance
- New agricultural chemicals – their release into systems will continue to have alarming effects

## Described an emerging paradigm for water management

- Catchment based understanding of the sources, stores and sinks for water and contaminants
- Identification of the key ecological processes and determinants for waterways
- A scaled and nuanced understanding of water quality as appropriate for different uses – all water does not need to be drinking quality to be used
- Pricing and education to change community perceptions of water
- Biophysical integration needs to be reflected in an integrated approach to water management

Three propositions follow:

1. Ecology sets what is possible, we need to move past human preferences and ask what ecosystems can take, and design interventions with this in mind, testing this.
2. Learning community – all interventions are community experiments. So NRM knowledge needs to circulate within communities for community decision making. Experimentation takes place with leading farmers through community initiatives
3. Integration is fundamental – disciplinary integration, whole systems thinking, are needed to solve these problems

**Robertson, H.A. and McGee, T.K. (2003) ‘Applying local knowledge: the contribution of oral history to wetland rehabilitation at Kanyapella Basin’, *Journal of Environmental Management*, Australia (web)**

This oral history project was part of a larger study looking at rehabilitating wetlands of the Murray and Goulbourn (VIC) rivers floodplains. Considerable historical ecological records exist for the area including flora and fauna records (1990 – 2000), aerial photography of the site (1945 – 1992), digital elevation models, daily water level records (1957 – 2003) and overviews of flooding of the region, however, significant knowledge gaps exist with regard to the management history of the site. Oral histories were used to determine if local knowledge was a valuable and valid resource for obtaining information about the flooding, ecology and environmental management history of the site.

Interviews were held with 9 local landholders - 5 of whom lived adjacent the wetland; 8 of whom had been or still were agricultural farmers indicating a close association to the land; and all of whom had lived in the area and regularly visited Kanyapella Basin for at least 10 years. 11 local NR managers with past or present management responsibility were also interviewed. Results – local landholders recalled experiences dating back to their childhood and observations passed down from their parents or previous residents in the area – essentially they presented observations of long-term change in the environment (such as decline in water quality) whereas, the managers generally presented information relating to specific management activities. The two perspectives were combined to provide a better general overview of the history of the area.

The authors report that the oral history method was effective in obtaining information, however they note that significant environmental occurrences such as major floods were usually well remembered in comparison to less destructive events. They note that ‘erroneous ideas can often be given legitimacy simply by being quoted frequently’. This brought into question the participants recollections of the smaller floods; however comparison with existing records validated much of the oral history information. The oral histories only described a small component of the entire system and the multiple sources of information were needed to construct the environmental history. The authors believe that the local knowledge obtained from the oral histories was especially important as it provided much of the fundamental information as to determining ‘what needed to be restored, why it was lost and how best to make it live again’ and besides information relating specifically to water, local knowledge on many other topics contributed to the planning of the rehabilitation.

The authors suggest that positive outcomes for managing the wetlands are now likely due to local participation – managers of the area have gained important information and local knowledge and a communication medium between locals and managers has been established (which will be particularly important for future environmental management decision making for the area).

Reflection by the authors on the use of the oral history methods suggests that in this case the oral history was well suited to the environment since water changes are the driving factor behind ecosystem dynamics and thus hydrology changes are likely to be well recollected by human observers. The authors suggest that oral histories are also valuable for applying to other environmental disturbances or to less extreme events. Secondly, the oral history methodology in this study also allowed local values to be gauged and presented stakeholders with the opportunity to raise concerns (an outcome that is applicable across disciplines). Suggestions raised against the oral history methodology - (a) the percentage of the total history that interviewees have compared to the total history of the wetlands is quite small - the authors believe that the close association with the land that, particularly, the farmers had, the fact that 4 of the interviewees were from multigenerational families and a number of the managers had been actively involved with the area for more than 30 years invalidates this question; (b) scientific credibility of information – authors believe that cross referencing of information with multiple sources provided effective validation; (c) over-interpretation of oral history information may have stemmed criticisms in the past – care was taken by the authors to accurately represent information during analysis.

(from Emma Patterson / web)

**Ross H. Abel N. Herbert, A. Manning, M. Walker P. Wheeler H. (1999) “Mental Models and Communication in Agriculture” (98/140, UCA-1A) Rural Industries Research and Development Corp. Short Report No 43**

Summary:

The work involved people from three occupational group (farmers, scientists and extension officers) and looked at ways to have them share the way they view the world (mental models) when looking at the same piece of land.

Three groups each with farmers, scientists and extension officers in them went to a piece of land where they stopped at three different sites to each respond to some questions of what they saw. Within each group as the farmers, scientists or extension officers responded to the questions, the others listened to understand how they described what they saw.

The idea is that different stakeholders need to understand each other’s frames of reference if they are to communicate well with each other.

The study showed variation between the three occupational groups and did not show that a person's view of the world can be accurately predicted by know their occupational group.

The main questions used:

Can you describe what is happening here?

What do you see as important about this place?

Why do you think it is like this?

At later site:

How is this site different to from the last?

The research showed the sharing frames of reference is practical and useful. As well, it appears that:

1. Identifying mental models has potential for resolving conflicts and setting agendas for action



2. There is a large degree of respect among each occupational group for the other's insights
3. It seems that generating a common frame of reference can create ownership of the problem by all groups and improve the chance of successfully arriving at a suitable outcome.

(from Emma Patterson / web)

**Scheffer, M. Westley, F. Brock W. & Holmgren M. (2002) 'Dynamic interaction of societies and ecosystems – linking theories from ecology, economy and sociology' in Gunderson L & Hollings C. *Panarchy: Understanding transformations in human and natural systems*, Island Press, Washington**

It is argued that arid and semi arid regions are typified by three types of vegetation states. Semi arid regions fluctuate between these states depending on various factors. Changes are typified by non-linear dynamic shifts to a new state. They are discontinuous shifts (non-incremental) that are difficult to reverse. They represent 'alternative equilibria separated by critical thresholds' p200 These include (in order of descending biomass):

**Woodlands** – woodland regeneration only occurs after herbivore populations collapse, because these herbivores eliminate seedlings of woody plants

**Perennial herbaceous vegetation** – vegetation allows water retention which then supports further plant colonisation. In instances where too much vegetation has been lost, water seeps to deeper layers of the earth too quickly to be used by plants, and increases runoff.

**Desert** – when too much vegetation is lost, the wind and runoff erode the fertile remains of soils, making re-colonisation very difficult. What ensues is the stable state of 'desert'.

**Shulman A.D. and Price R.J. ed. (2000) *Case studies in increasing the adoption of sustainable resource management practices*, Land Water Resource Research Development Corp**

*Case study 1: Barriers and constraints to the adoption of sustainable farming techniques in the sheep / wheat industry*

'A key finding was that farming practice is nested in a cultural context as well as an economic one, and that farmers can describe those contexts and explain how they affect what they do. One important finding is that cultural 'influences' can be very local and can help determine what is 'good farming' in the area. From this it is inferred that proponents of sustainable farming practices who wish to promote their 'model' should recognise existing 'indigenous' views on the question and that differences are likely to exist between all agencies and interest groups involved in promoting change' p14

*Case study 2: Decision support for sustainable management of grazing lands*

'This report presents a history and discussion of the effectiveness of an inter-organisational R&D project that focused on the collaborative development of a decision support system (DSS) for sustainable use and management of the extensive grazing lands of northern Australia'

‘The fragmentation of responsibilities and the diversity of approaches relating to resource management and environmental stewardship across multiple stakeholder groups can provide fundamental barriers to the adoption of integrated action to collectively address sustainability issues.’

‘An iterative and evolutionary R&D process emerged through a facilitated participatory process of stakeholder interactions focused on joint activities to develop a technology innovation....An iterative and prototyping approach to the DS technology innovation development process provided a capability for constant adaptation to changes in targeted stakeholder needs, as well as technological advancements that occur over the live of the project. This approach proved to be effective for experts, stakeholders, and systems developers to reassess and confirm the objectives of the DSS technology development in a ongoing way.’

‘These findings invoke a new paradigm for the role of science based decision support technology innovations in sustainable resource management. This paradigm encompasses a shift from a primary concentration on the correct solution, or a limited choice of management options, in tactical decision making (problem solving) to one that uses a focus on tactical decision making as a tool to provide a process for interaction. This process is one in which (a) increased learning about the decision environment and the problem context can take place; and (b) impacts on the organisational environments within the stakeholder group operate and interact are facilitated’ p57

*Case study 4: Effective strategies for increasing the suitability and adoption of complex technologies for sustainable grazing management*

This case study looks at efforts to introduce technology in two tropical regions of QLD used for cattle grazing. Key learnings:

- Escalation of commitment is a naturally occurring part of project development that can reinforce unwarranted allocation of funds.
- Not only is sustainable land use characterised by ‘complexity’, so is the process of RD&E to address these. More understanding of the complex processes to address NRM issues is needed.
- An inability to distinguish between human and technical infrastructure leads to problems in duplication / replication
- Multi-disciplinary RD&E is still not sufficient to address complex NRM problems
- Too much complexity within project elements can hinder the effectiveness of projects
- Be careful when ‘tacking’ extension and commercialisation strategies into pre-designed R&D projects
- Existing state based extension infrastructure is inadequate to deal with sustainable land resource issues
- Norms with the culture or R&D agencies is a source of failure in technology transfer.

**Thyssen, I. (2000) ‘Agriculture in the information society’, J. agric. Engng Res 76 , 297-303**

Projects the image of a future Information Society onto farming practices. Looks at IT induced changes in farming sector. So far IT has not significantly altered farming practices.

*Agri Extension*

- Will the net replace the local extension officer, as farmers bypass them and find information directly through the internet? Or can IT augment the extension services capacity to serve the community. (Jensen 1999) describes a system by which seed varieties are selected and tested

De-centralised testing of seed varieties are brought together by extension officers into a central database and analysed, the information then goes back to farmers quickly on the internet

So extension officers shift from information pushers to information to knowledge facilitators. Extension becomes a facilitatory role

#### *Agri chains*

- From plough to plate monitoring of food production
- Traceability which is increasingly expected by super markets and health authorities
- Increasing demands by customers to know more and more about food chain and processes (ethics, chemicals etc.)
- Agri chain protects itself from loss of customers by demanding information at each link
- Farmers accept increased transparency

#### *Network society*

- Allows remote sensing
- Remote manipulation / control – auto feeding, sequestering, greenhousing
- GPS positioning of animals / cattle
- Greater data about land and seed / breed types may allow greater precision farming that allows for greater diversity without losing productivity, and reduce risk / uncertainty in the application of new techniques / inputs

This article is still firmly an extension of the agro-industrial model. It sees technology as an extension of productive capacity.

**Vanclay, F. (2002) 'Social considerations for the future of agricultural extension' *Journal of the Australian Association of Natural Resource Management*, Vol 5 number 2. (off web)**

Available at [www.soil-water.org.au](http://www.soil-water.org.au)

A social worldview is deemed best for agricultural extension. To enhance understanding of the social issues underpinning farming and natural resource management, extension needs a social worldview that promotes awareness of farming as a social activity, of diversity in agriculture, of the social drivers in agriculture and the socio-cultural basis of adoption.

Which worldview for extension?

This article suggests that ag extension could be more effective by increasing understanding of the social issues underpinning farming and NRM. The author suggests 4 different worldviews that exist in extension:

1. Agriscience – the view that farming is the application of scientific knowledge and requires a solid understanding of technical processes, that extension is the embodiment of scientific knowledge, and the job of extension is to transfer this knowledge to farmers;
2. Conventional extension – the traditional top-down approach that presumes that extension knows the answers, and that adoption diffusion curves (innovators, early adopters, middle

adopters and laggards) are a satisfactory understanding of the adoption process – ‘how can we get farmers to adopt best management practices?’

3. Farmer-orientated approach – with the key question ‘how can farmers continue to make a living on their farm without doing too much damage to the environment’

4. Socially informed approach – identifying and comprehending the social processes present in farming and how best to use this knowledge to help make a more socially and environmentally sustainable future. Social understanding changes awareness of how farmers relate to information, their motivations, how adoption occurs and how extension should operate

### Social driving forces

The author suggests that agriscience and agribusiness are motivated by a belief that farmers are economically motivated and that anything that increases their income will be adopted, however, discussions with farmers reveal that they are socially motivated to (a) do the ‘right thing’ and (b) to pass the farm onto their children. Doing the ‘right thing’ in terms of good farm management is a complex notion and farmers are influenced by other farmers, extension officers, through reading farm literature and other media. Good farm management is an individual concept that takes into account each unique situation of land, soils, debt, goals etc. The idea of passing the farm onto children in a better condition than it was makes any investment of labour, effort and money worthwhile, however, when farmers believe that their children will not return to the farm then there is a decreased motivation to invest in improvement. Other social drivers are the strong sense of commitment and obligation in farming families that may lead to uneconomic farming or problems with successional transfer.

### Adoption

Different views about environmental management and sustainability is the problem – groups such as extension staff, conservationists and ag science may regard some farming activities as destructive, however, farmers have positive attitudes towards environmental management but have different ideas about implementation of management practices. The belief that farmers’ attitudes are the problem doesn’t take into account the socio-cultural processes of change. The author suggests that there is an incorrect belief in extension circles that non-adoption of new technology is due to non-transfer of ‘science’ information (science being the only originator of new ideas and farmers are the passive receivers) or farmers inability to implement new technology, eg lack of money – and extension staff believe that non-adoption is the main barrier to agricultural sustainability. The author suggests that it is rather the lack of credibility that extension now has that is the problem – tree-clearing and use of superphosphate were extension practices that were adopted in the past that have led to environmental problems today.

### Other

- Farming knowledge is socially constructed and innovations and science must be integrated with existing belief systems to be effective. Knowledge that farmers create through theorising, hypothesising and experimenting to determine what works is also adapted to local conditions.

- Farmers need to develop ‘land literacy’ – an understanding of the land and environmental processes – media etc present extreme images of degradation that distorts a farmers perception of the level of degradation and additionally, some land condition decreases can be attributed to other factors, ie weather, pests etc.

- The language of best management practices would only appeal to a limited range of styles even though all farmers express desire to implement a notion of good farm management.

· If farmers end up implementing practices that were promoted it is probably the result of their adaptation to the ideas, their own knowledge production and the trial-ing of the practices. This could then imply that extension can only influence farmer behaviour when the practices being promoted concur with the worldview and farming style of each farmer. Extension must be more focussed on social change than technology transfer!

(from Emma Patterson / web)

**Vanclay F. (2004) 'Social principles in agricultural extension', *Australian Journal of Experimental Agriculture*, v44, 213-222**

Argues the dominance of the scientific view in agriculture has obscured its deep social dimensions. In particular understanding of economic and ecological indicators is much stronger than understanding of social dimensions of change. This is the missing link in addressing NRM and the task of sustainable agriculture.

27 principles emerged from personal reflection over 20 years of work in the area.

Principles:

1. farming is a socio-cultural practice – it is a vocation and way of life, not just technical activity
2. farmers are not all the same – diversity exists at every level: asset – debt ratios, size, modern vs traditional, pro GMO vs pro organic Thus structural variables are less important than styles (range of worldviews on how to farm)
3. adoption is a socio-cultural process – the classic extension model does not hold. Adoption takes place in a social context, with farmers discussing issues with other farmers
4. profit is not the main driving force of farmers – farmers seek a reasonable income in conjunction with other values and interests
5. it is hard to be green when you are in the red – sustainability requires an economic dimension as well as physical dimension
6. 'doing the right thing' is a strong motivational factor – farmers largely conform to notions of 'good farm management', which itself is very complex and has different definitions and assumptions depending on which stakeholders and which farmers. It is a dynamic concept
7. farmers don't distinguish environmental issues from other farm management issues – while extension differentiates, farmers see it as a whole part of 'good farm management'
8. there is a strong desire to hand the farm on to ones children – this motivates parents to improve the condition of the farm beyond economic considerations
9. sustainability means staying on the farm – sustainability only exists in the context farmers capacity, aspiration and commitment to remaining farmers on that land
10. women are an integral part of the farm – farms have complex gender relationships, which need to be addressed. Women have traditionally played important roles on farms and this is increasing.
11. stage in the lifecycle of a farming family and family composition are significant factors - this is a complicated variable that influences finances, long term commitments, image of the future of the farm,

12. non-adoption is not the cause of land degradation, rather practices actively promoted by extension in the past have significantly contributed to degradation – false assumptions by extension officers that non – adoption is an obstacle to sustainability
13. marginal farmers are not marginal because of their management ability but rather because of their structural location – structural location refers to a farms position in the shifts and dynamics around structures that impinge upon farmers, which include regulation / de-regulation, the global economy / international markets, subsidisation, policy formation
14. farmers attitudes are not the problem – farmers are not antagonistic to the environment, but differ in their view of environmental management from extension, scientists and urbanites.
15. farmers construct their own knowledge – science does not automatically translate to farm knowledge. Farming knowledge is developed through their experiences and practices
16. effective extension requires more than the transfer of technology, it requires an understanding of the worldviews of farmers – often non adoption is rational from the perspective of the farmer, and the scientific / technological extension model irrational, the farmers WV needs to be on par with the science / technology WV in adoption debates.
17. farmers have legitimate reasons for non adoption
  - a. too complex
  - b. not manageable
  - c. not compatible
  - d. not flexible
  - e. not profitable
  - f. too much capital required
  - g. too much extra learning
  - h. risk and un-certainty too high
  - i. conflicting information
  - j. don't see a problem (if it aint broke, why fix it?)
  - k. lack necessary phsysical infrastructure
  - l. lacking social infrastructure
18. top down extension is in-appropriate – it's fundamental flaws include:
  - a. uncritical acceptance of agro-industrial agriscience and agribusiness, simplistically promoting these
  - b. adoption of the above has led to sever ecological and social impacts
  - c. it is premised on commercial innovation that discounts ecological innovations (based on economic rationalist model)
  - d. farmers local knowledge is marginalised or trivialised, subordinated or ignored
  - e. extension premises on individual decision making ignored the social, political cultural and historical context of agriculture
19. the 80 – 20 rule is a self serving delusion – this assumes that 20% do most of the wealth creation, and is used to allocate a disproportionate amount of resources to larger farms. It is inequitable, and environmentally dangerous, and assumes the bottom are laggards (when they make be innovators, while many of the top 20 perpetuate harmful practices)
20. science and extension do not have automatic legitimacy and credibility – farmers are now sceptical of new proposals
21. representation is not participation – farmers representation on boards is often skewed by the fact that many are chosen because understand or they fit into the corporate culture and discourse that is dominant there, but do not reflect the variety and depth of perspectives in their region

22. promotion of awareness through the use of dramatic images is counter productive - 'land literacy' is more powerful than 'shock therapy'
23. put degradation into perspective – degradation is naturally occurring in respect to the harvesting of foods, and may be inevitable. It is a question of the rate, not whether degradation is happening
24. the best method of extension is multiple methods – when diversity is appreciated, and the socio-cultural basis of farming understood, it is clear that a multiplicity of methods is needed
25. group extension is not a panacea – effective extension requires nuanced approaches that build relationships with farmers, and which credibility is built through continuous interaction
26. extension is likely to have only a small impact – extension largely creates small scale change, expectations need to be appropriate
27. farmers need to feel valued

### **National Framework for the management and monitoring of Australia's native vegetation NRMCC dec 2001**

The national framework is an agreement between the Commonwealth, states and various agencies to work together to protect native vegetation. It builds on previous agreements, and aims to coordinate efforts toward a coherent approach to protecting native vegetation. It established benchmarks for best practice. It is comprehensive, covering many aspects of social and ecological concerns as they pertain to native vegetation:

- Protecting biodiversity
- Soil and water resources
- Hydrology
- Land productivity
- Sustainable land use
- Natural and cultural heritage
- Indigenous peoples
- Climate change

The framework sets out best practice for various roles, and activities:

Roles - Governments – national to community (duty of care, cost sharing, resource allocation):

- Community
- Local gov
- State gov
- Commonwealth

Planning and assessment

- Vegetation inventory / data collection / mapping
- Biodiversity status assessment
- Regional veg management planning
- Formal reserves system
- Communication and capacity building
  - Community education
  - Research, development and extension (emphasises an integration of theory and practice beyond the agri-science model)

- Veg management infrastructure
- Incentives / use of incentives
  - Grant programs
  - Property rights and market based measures
  - Revolving funds differential rating and taxation measures
  - Offsets and performance / assurance bonds
- Regulatory mechanisms
  - Threatened species / ecological communities protection
  - Land clearing regulation
  - Industry / land use codes of practice (environmental management systems)
- Monitoring and evaluation

<http://www.deh.gov.au/land/publications/nvf/>

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