A new agricultural landscape in Australia – is land use change the answer to environmental degradation?

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As is the wont of political organisations, I have been quoted by one as having described Australia's landscapes as "Buggered! And if we don't do anything about it, we'll go to being more buggered!" These days, I ask myself the questions: "What is buggered? And what does it mean to be more buggered?" I have no doubt that there are sociological, political, scientific, financial, theological and deeply personal answers to these questions, and we would be none the wiser for knowing them.

I start this presentation this way, because the question posed to me by this conference has no single answer. Perhaps it doesn't have any answer. I know that good friends of mine like Dr John Williams, recently retired from CSIRO, advocate a revolution in agriculture as the only means of overcoming environmental degradation. If only it were that simple.

This somewhat confusing position from which I start, hopefully will unravel during the course of this presentation to provide a conclusion that will be meaningful to most, if not all of you. Its basis is built on my personal experience having managed the National Dryland Salinity Program for the past eleven years and with working with industries, catchment groups and governments on many other national research programs focused on the environment.

Sociologists are often described as "flaky". We tend to receive teddy-bears or books like "Politics, sociology and social theory: Encounters with classical contemporary thought" as farewell gifts when we pass from one job to the next. But, to be honest, it's a bit of a flaky world in which we live. What's 'buggered' to me, may not be buggered to you, or to most of the society in which I live. Both views are legitimate, and I know this drives politicians and bureaucrats nuts in their quest for policy certainty.

The connection of this point to my experience with the National Dryland Salinity Program is interesting. Indeed, it was at a salinity workshop about two years ago that I heard in the space of two days, four different people stand up and say, "Let me paint the big picture……" or words to that effect. I was hardly surprised that there were indeed four big pictures presented, none of which remotely resembled the other.

If I recall correctly, a bureaucrat painted his big picture based on how catchment management fitted into a broad, macro policy setting. A catchment manager showed how policy was only one perspective within a big, diverse view of community relationships. A researcher, newly acquainted with emerging tools to integrate economic, social and biophysical data, argued that policies, relationships and 'hard fact' could indeed be quantified and structured within complex systems models (generating, I guess, virtual big pictures) from which good policies, decisions and

practices would flow. And finally, a farmer simply said, “This is the big picture: I’ve got to eat, got to pay bills, got to educate the kids, got to replace the machinery, got to second guess God about the weather and got to look after not just the farm, but the catchment and the rest of the country too!”

If I only considered these four perspectives, I would certainly have very different notions about what new agricultural landscapes might look like. And although I will mightily agree with Dr Williams and others that land-use change is the answer to environmental degradation, I would almost certainly get a different perspective about what the land use change might look like and how we might go about moving forward.

This experience, you might say, is in fact an everyday one that you as policy makers have to deal with. I would like to think that the push for regionalism, catchment management, bottom-up processes and the like is based on the notion that landscapes are indeed heterogeneous, and that within these landscapes, stakeholder views are also heterogeneous. True, but it is easy to underestimate the complex nature of this heterogeneity. In the context of the Grain & Graze program I currently manage, I have found that many of my government stakeholders see catchment management as a bottom up process, while my farmer stakeholders see it as a top down one.

Moreover, heterogeneity does not have borders posted around farmers, local councillors, bureaucrats, and so forth. Different individuals have different perspectives on issues, depending on their own world view and on the context in which they have an association with an issue. Again, looking at salinity for example, a local government in Rockhampton, a football club in central Victoria and a farmer in the wheatbelt of Western Australia may all look at the salinity problem in entirely different ways. But so might the different Councillors in Rockhampton, the different football players in central Victoria and the different farmers in the wheatbelt. Indeed, I can promise you that they do.

Perhaps it’s not our landscapes that have us buggered, but all the different perspectives that we need to deal with!

There is, as I suggested when commenting on bottom-up processes that are becoming *de rigueur* across the country, recognition of social diversity by those within our political system. But why on earth do we tend to forget it at the all-important level of implementation. Our extension and education systems should know better, but when dealing with on-ground change, the systems are designed as if everyone learns in the same way and at the same pace as everyone else. Recent work by Dr Kate Roberts and Dr Jeff Coutts suggests that all government and industry programs aimed at landscape change should have at least five different kinds of learning processes in place to be effective.

Before this inadvertently turns into a critique of Australia’s extension systems to facilitate landscape change, I wish to say that there are more critical issues that need dealing with first. These issues are strategic issues that I believe see diversity as a conduit rather than as a barrier to change.

Implicit in the title of the talk I was asked to address is the notion of the future. None of us know what the future is going to be like. We acknowledge trends that give us clues about the future, but these trends are only as good as the interpretations we give them. And even then, we are really only placing bets on possible outcomes. Multiple perspectives could means multiple bets, but I'd prefer to think that they might result in more intelligent bets.

So what do we know about the future and how it will shape landscape scale change? I have plundered many thoughts about this from another good friend of mine, Dr Steve Cork, and have attached them at the end of this talk for your enlightenment and consideration.

Exhausting …but by no means exhaustive!

Many of us in this room may have some vague vision of new agricultural landscapes emerging across the country, and indeed many people on the land may also have some vision to that effect. Between us, we no doubt have many different views and perspectives not only about what a new agricultural landscape might look like, but also about how the many conduits and constraints to change will affect the achievement of change. In all likelihood, the conduits for change for some will be constraints for change for others. Emerging biotechnological solutions is one example where this may be the case,

Thinking about the future throws into sharp relief the many uncertainties that are faced right here, right now by different people required to make decisions about land use change. In reality, not everyone needs to think about all these questions, and to some extent it is the role of our different institutions to be thinking about them on our behalf. But these questions are no more perplexing to people than ones they already face. Simple questions including:

- Do I have a problem on my farm or in the catchment?
- What is it costing me?
- I am better off responding, or doing nothing?
- What are the options that I have before me?
- Do they really work?
- Do they fit my system, my aspirations, my life-cycle?

Simple questions, but with complex answers. Take salinity for example. The National Dryland Salinity Program has recently concluded that producers driven by the profit motive have very few management options available that are beneficial at the catchment scale. Here we have a fundamental dilemma at the heart of whether land use change is the answer to land degradation. In pursuit of landscape change, Australian governments have essentially opted for a catchment management-based approach. Yet no matter how scientifically rigorous a catchment plan, and how well resourced a catchment authority, decisions on the many, many individual farms that make up a catchment are in the hands of individuals. For better or worse, it is the decisions of these individuals that presently determine whether there will or won't be landscape change. And at present, while profitable solutions are extremely limited, the prospects for wholesale change are bleak.

The dilemmas don't stop there. Regulatory options exist, but what are they meant to achieve? On the one hand, we value our rural citizens and show concern as their numbers dwindle (see Table 1). Will regulation see an improvement in landscape health on the one hand and an increase in rural migration on the other? This is a major consideration for policy makers when considering the concept of a new agricultural landscape.

Table 1: Farm numbers, Australia (Source ABARE)

	1960	1975	1980	1990	1996
Number of farms in Australia	204,000	193,000	179,000	128,000	115,000

And what is it we want to regulate landholders to do? We know from our salinity experience that changing to perennial-based farming systems is only profitable to an optimal point, beyond which the catchment may gain but at the economic cost to the landholder. Profitable solutions at the scale we require are still a long way off.

To throw more kindling onto the complexity fire, it can be the case that the solution to one landscape problem may be the cause of another. Work by CSIRO and some State water authorities show that the estimates of the perennial vegetation required to control watertables in some catchments would also see alarming reductions in surface water flows in those catchments.

One might conclude from my talk thus far that I am pessimistic about the future prospects for landscape change. I am not. My expectations are certainly tempered by scientific, economic and social considerations; but I refuse to surrender to fatalism.

And some good things are happening. I hope we are seeing the tip of an iceberg.

I will declare my conflict of interest in having a close relationship with many of Australia's rural industry research and development investment organisations. Having worked with Land & Water Australia for many years, I can tell you that I have often been frustrated at the lack of investment made by industries directed towards the kind of land use change that would benefit both industry and the wider community. I am pleased to say that this is now changing, and indeed in some areas, this turn-around is occurring at a rate faster than our government institutions can cope with.

For many years industries have been asked to work with the wider community, yet from an institutional perspective, what does this mean? The wider community has many faces; the many faces of individuals that collectively represent our social diversity. For all the limitations discussed previously about catchment management, it has at least given the amorphous notion of 'community' at least one face, one structure, one venue with which industries can relate.

And as a result of these relations, I am beginning to see catchment management working from a level that is non-threatening, yet still challenging to industries. I invite people to consider the directions that the Grain & Graze program is taking, the new

directions for the Cotton CRC and the growing catchment focus of the dairy industry as just a few examples to show how industries can in fact contribute to making the difference between catchment management working or struggling. Who would have thought that the grains industry would insist that industry programs such as Grain & Graze must include components dealing with the management of native vegetation and biodiversity!

I am positive about the future for landscape change because I know that the processes of engagement between industry and the wider community are running at a pace that is socially and technologically consistent. And behind the personas of industry and catchments are the personas of many, diverse individuals who can exchange their different interpretations about the issues before them.

In 1996 a paper written by my colleague and namesake, Dr Phil Price, lamented the unfortunate perception prevalent at the time, and inadvertently perpetrated by the Landcare movement, that government looks after natural resource management, while industry looks after production. Land use change inextricably links decisions about production with decisions about what is best for landscapes. This is not just a scientific link or a financial link, but even more importantly, a critical social one.

I believe it is the role of government to facilitate links between industry and community, and not to deal with them as though they are different sides of different coins or even different currencies. This means ensuring that signals about production and land use change are consistent and preferably intertwined. Catchment management is part of this process, and I have given some examples of where it is working. But catchment management has spacial, and therefore social, limitations.

Attachment A

Future Challenges for NRM in Australia

(Steven Cork and Kate Delaney)

Demography

- Global population will increase, more in developing countries;
- Growth surges will be challenges for developing countries, aging populations will be challenges for developed countries, migration pressures will be challenges for all;
- The Australian population is predicted to increase by 30% by 2042;
- Numbers over 55 will grow faster than those under 55, placing increasing demands on welfare and health services;
- There is a steady movement of young people from the land;
- The size of households in decreasing;
- Shortages of skilled labour might eventuate as “baby boomers” leave the workforce; and
- Australia may well develop a population policy within the next decade.

Environment

- Deteriorating components of land quality include:
  - salinity (affecting 1% of agricultural land in Australia);
  - water borne soil erosion;
  - widespread soil and nutrient redistribution and loss;
  - increasing soil acidity (threatening 25% of agricultural land);
- These processes are diminishing the health of streams, estuaries and adjacent inshore waters with further uncosted impacts on fisheries, ecology, biodiversity and recreational amenity;
- Overcoming salinity alone would cost annual investment of $6 billion;
- Australia is the fifth largest consumer of water in the world on the driest continent on earth;
- Agriculture remains the single largest driver of land and water issues – its productivity is at risk – it contributes 18% of export earnings;
- Energy sector emissions are likely to grow;
- Australia is a large generator of waste;
- Recommended actions from NLWRA include:
  - A more integrated approach to the complexities of sustainable land and water management;
  - Better access to information on the relationships between farming practices, natural resources, and change opportunities;
  - Incentives to promote the adoption of improved NRM, including greater water use efficiency;
  - Improving decisions on water resource use considering the hydrology of the entire catchment, alternative water resources, and an evaluation of all alternative economic and social uses and users; and
- Strategic and protective management (cheaper than remediation).

Economy

- The Australian economy is based more on natural resources than most other OECD economies;
- Australia is very good at producing new technologies for primary production and processing;
- Improved productivity as a result of economic and policy reforms of 80s and 90s place Australia among the top performers in the OECD;
- In the past decade, exports, national income, average weekly wages, and net household wealth have grown rapidly, but complacency is a danger;
- Some economists argue that the expansion of a global economy [based on oil, chemicals, steel and consumer durables] is coming to an end and, for the next fifty years, expansion will be achieved through growth in the information and biotechnology sectors and advanced materials sectors;
- At present, the momentum from past reforms is slowing and various factors are set to demand higher levels of productivity;
- Australia will necessarily grapple with the dichotomy between the resource-based economy and the knowledge one;
- Even with active diversification, Australia's major export industries in 2020 will be mining, agriculture and tourism and the real prices of commodity exports are unlikely to rise. This may intensify economic pressures on the environment;

- Australia ranks very highly in terms of international competitiveness, productivity and economic growth per capita but does not rank well in terms of R&D and has a mixed report card on education and training;
- Today, globalisation is occurring on multiple fronts: Economic; Political and social; Technological, and Environmental;
- Globalisation potentially acts as a risk multiplier by bringing formerly unrelated global-sized sectors together;
- Demand for agricultural products:
  - increases in overall food requirements as the global population increases;
  - increased preference and demand for meat in the diet in developing countries as people become more affluent;
  - a global increase in cereal consumption by humans and livestock of around 40%;
  - potential for export driven expansion in production of Australian grains, beef, , pork, sugar, cotton and dairy, wool and sheep meat;
  - growth in demand for most horticultural products and poultry largely tied to domestic markets and the size of the Australian population;
  - markets for agricultural products are becoming increasingly differentiated;
  - Australia well placed to take advantage of product differentiation due to proximity to Asian fruit and vegetable markets, disease-free status, a "clean and green" image, and excellent product quality, but risks include avoidable negative incidents involving diseases and chemicals or injudicious adoption of GMO varieties;
- Many regions in Australia, including even the most productive, are facing significant pressures, including:
  - a growing rural-urban divide;
  - declining services;
  - a continuing cost-price squeeze;
  - declining economic importance of agriculture;
  - growing issues of natural resource management;
  - increased responsibility for delivering on state and federal natural resource policy;
  - an aging workforce and movement of young people, especially women, to the cities;
  - a decreasing number of farms due to agglomeration of small family farms into larger agribusiness;
- Despite these trends, regional Australia has a growing number of new opportunities, considerable internal drive and commitment from government to help regions re-establish themselves.

Technology and science

- Up to 2030 the developed nations are likely to continue their historic domination of innovation in science and technology;
- Australian Government expenditure on R&D is high in international terms, but business investment in R&D is low;
- Future innovations may arise from the integration of existing technology in new ways and through new applications of existing science, rather than new breakthroughs in basic understanding;
- While Australia has areas of technical advantage there are concerns about: the rate of adoption of technology; equity of access to technology, and public attitudes towards specific technology;
- Acquiring and protecting key knowledge will become increasingly costly, and intellectual property is a potential source of international conflict in the future that could lead Australia to make hard decisions about who it forms alliances with;
- Surprises will be increasingly common;
- Nanotechnology; biotechnology and biomedicine; advanced computing and information technologies; cognitive neuroscience, and; new materials have potential to fundamentally change industry and society;
- Convergence (combinatory and synergistic effects across technologies) has been growing and will continue to grow, and the most socially disruptive innovations will likely occur at the intersections of technologies;
- Convergence or synergy is expected to lead to such capabilities as:
  - Expanded human communication, possibly rapid learning;
  - Improved human health and physical capabilities;
  - Better [and distributed] sensors for control, monitoring and surveillance;
  - Intelligent systems to support decision-making;

- At the farm level, four types of technology that are in the process of coming to market in the coming decade are:
  - technology to manipulate growth processes of plants and animals;
  - technology for monitoring and measuring systems;
  - automated process control technology, and
  - their commercial convergence;
- There is evidence that the pace of technological change is accelerating and there are fears that we might 'out-drive our reaction time' – though some dispute this contention;
- The future trajectory of crop yields in Australia will depend heavily on the continued maintenance of disease resistance, development of innovations in breeding and crop management, and the choice of regions cropped;
- Challenges for the future of technology include:
  - Addressing the many environmental challenges of agriculture;
  - Improving adoption of technology by land managers;
  - Improving measurement and monitoring of the costs and benefits of technology;
  - efficient institutions for knowledge transfer, learning and capacity building;
  - technology for predicting and helping to manage climate variability;
  - managing the potential for disease and pest problems to increase with trade liberalisation, increased movements of people across borders, intensification of agriculture, and increasing use of biotechnology to increase yields; and
  - dealing with concerns about human health, ethics and aesthetic considerations.

Governance and (geo)politics

- Australia's political style will remain feisty and combative, open and democratic;
- The two-Party system will stay powerful;
- Structural change of the political system will be difficult, but there might be changes to the Senate and the number of levels of government;
- America will remain dominant, but by how much?
- Globalisation might strengthen or weaken;
- Technology opens new opportunities for access to electors and for the delivery of services;
- Economic growth, complacency and demands on the economy for internal and external security will determine the scope for change;
- Australia's role in the region could be demanding;
- It is uncertain how China (and India?) might develop as economic powers;
- Regional (in)stability will be an issue;
- Proliferation of weapons of mass destruction is an uncertain possibility;
- Will there be significant Senate reform?;
- How far will the current community disaffection with politics and political Parties go?

Attitudes and values

- The ten most common expected trends in attitudes and values globally:
  - Increasing social freedom and more choice for the individual;
  - Increasing standard of education and literacy, and more widespread education;
  - Increasing deferment from politics and institutions;
  - Growth of individual values and the decline of traditional values; more empowerment for the individual;
  - More stress on the individual;
  - Shifting social structures; decline of the family and more remote (virtual) communities;
  - Continuing importance of the media in shaping perceptions;
  - Increasing international awareness;
  - Declining feelings of national identity;
  - Diversification of religious beliefs; drift away from traditional religions;
- Change in Australian attitudes and values is more influenced by gradual change than specific events;
- Change in societal views of marriage and family;
- Decreasing participation in community issues;
- Increased personal wealth and freedom driving individualism;
- Australians do and will continue to recognise 'shared values', including egalitarianism, democracy, tolerance & a 'fair go';

- There is a measurable decline in trust in institutions – including business and science;
- Generation Xers and boomers may be developing a new value set;
- Continued economic prosperity is uncertain and a decline could reduce individualism and see a return to earlier value sets;
- Reaction to globalisation is uncertain – we could see dilution of Australian values or strengthening;
- American versus Asian influences on Australian attitudes is an area of uncertainty that could produce quite different futures;
- The way in which regional Australia deals with current and future challenges could influence the role of the "bush culture" in Australian attitudes and values;
- In Australia, people are becoming overloaded by the amount of contradictory information they need to assimilate, wary of so-called "experts", wary of all institutions, especially politicians;
- They are starting to accept the world as it is and to stop hoping that a better world is possible;
- Questions are being asked about whether economic growth increases people's perception of well-being;
- These trends have major implications for people's enthusiasm for achieving difficult objectives like sustainability, especially if it is not clearly articulated and made to seem possible and if it is seen as a political tool;
- There is a trend towards more parties being involved in the sustainability debate in Australia, due to the growing emphasis on diversity and devolution of decision-making;
- In international environmental affairs, the power of NGOs has risen exponentially;
- Over time this blurring of distinctions between the public sphere and the private may continue.