

FROM **RED** TO **GREEN** TO **BLACK**:

A STEWARDSHIP INCENTIVES SCHEME FOR IMPROVING QUEENSLAND'S PASTORAL LANDS



Edited by Geoff Edwards

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A submission to The Royal Society of Queensland

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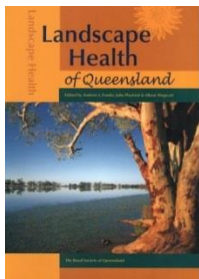
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This paper is a submission to The Royal Society of Queensland from the lead author acting in his personal capacity.

PRELIMINARIES

OVERVIEW

In reviewing the literature on the management of Queensland's pastoral zone, one stands in awe at the depth of scholarship held by scientists and others who have committed their knowledge to paper over at least the past five decades. The ten pages of references in Appendix 7 are a fraction of the available sources. Not least is The Royal Society of Queensland's own publication *Landscape Health of Queensland*, 2002, of 258 pages, co-edited by Past President Dr Julia Playford. Scientific knowledge has far outstripped the capacity of the policy community to apply that knowledge towards a sustainable future for the pastoral zone. Can yet another paper achieve anything at all? One can only hope.



One looks in vain for any adequately funded forum to translate the enormous body of available scientific knowledge into property-specific terms for landholders, or policy-specific terms for parliamentarians and other thought leaders.

Deriving from evidence of both poor land condition and systemic financial hardship in Queensland's rangelands, the purpose of this report is to present a model for reimbursing Queensland's pastoral landholders in return for a refreshed contribution to regenerating and maintaining these landscapes.

The State's broad acre pastoralism is unsustainable in all dimensions – *environmental, economic, socio-cultural* and *institutional*. The regressive trends cannot be resolved within the frame of reference prevailing within Queensland's policy community: based upon free markets, small government budgets, big mining or infrastructure projects as the main source of regional employment and disregard of the environmental limits to economic development and production.

Even if all these 'regressive trends' were regarded as manageable or unimportant, climate change, with unknown and probably widely varying consequences across the inland, is coming; and this will force comprehensive adjustment upon all stakeholders. No model to prepare for this emerging reality is known to exist.

¹ Adjunct Research Fellow, Centre for Governance and Public Policy, Griffith University. Address inquiries to g.edwards@griffith.edu.au. This paper is not written in the capacity of President of The Royal Society of Queensland.

EXECUTIVE SUMMARY

Scientific evidence is that the land condition of Queensland's pastoral estate is suboptimal and deteriorating. The pressure of grazing by stock and kangaroos is not being relieved sufficiently in the periods between droughts to maintain the resilience of these landscapes. Neglect of catchment health costs the community dearly, though the effects are delayed and often indirect.

This evidence parallels economic evidence that the financial health of Queensland's pastoral industry is also suboptimal and deteriorating. A high proportion of rural properties carry financial debt that cannot be serviced through income earned by producing commodities of food and fibre. The prices that farmers receive for many commodities are capped by international prices set in US dollars, but their costs are set in Australian currency and rise according to the cost of living so they have no ceiling. Primary producers are reduced to being price takers squeezed by competition between middlemen and retailers within Australia, and yoked internationally to a national bipartisan commitment to nearly unconditional free trade and free foreign investment.

In pursuing competition policy, since 1995 governments have deliberately preferenced the interests of consumers in cheap food products over the interests of producers in receiving a fair return for their labour and investment. Producers instead are lectured to reduce costs to remain competitive. 'Reducing costs' for farmers means investing less in the regeneration of the natural capital asset on which their enterprises are based, as these expenditures can be deferred.

The resultant of these forces means that graziers in Queensland's pastoral zone typically cannot look to market forces to reimburse them adequately for the cost of producing commodities sustainably, let alone for the cost of regenerating landscapes that need rest and restoration. After a run of dry years, many farmers have nothing left in reserve. This is not to deny that some grazing businesses are reliably profitable, use advanced technology, are managed by optimistic, energetic and enterprising operators and are actively working towards sustainability. In the unimproved pastoral rangelands as defined here, however, this does not describe the typical enterprise.

Indirect evidence of rural financial distress appears in statistics of rural employment. The latest update from the Queensland Government Statistician's Office (2018) has a nominal youth unemployment rate of 62% and rising. This is a Depression-era statistic.

The State's broad acre pastoralism is unsustainable in all dimensions – *environmental*, *economic*, *socio-cultural* and *institutional*. Let's check why a crisis can develop on all fronts without adequate policy response. The indicators of *environmental* distress are well known to scientists and conservation groups, but the conservative media demonises experts who present this evidence; and opinion leaders in politics lack the scientific literacy to recognise the urgency. Indicators of *financial* distress are absorbed by private debt which can pile up behind a privacy screen and be attributed to personal business incompetence. The main indicator of *macroeconomic* distress, gross domestic product, GDP, is totally inadequate for tracking the rundown of built and natural capital. *Socio-cultural* distress surfaces in the police, health, Centrelink and prisons budgets where it is attributed to personal failure and in unemployment statistics where it is attributed to malingering. Finally, distress in the public institutions that grapple with management of pastoral lands, notably the Landcare and NRM groups, is masked by the valiant efforts of volunteers who burn themselves out trying to cope with stop-start grant funding which is never adequate to confront the root causes of unsustainability.

Here is a solution.

Most farmers (feedlots aside) are managing not just a food factory but a complex natural system of land, water, atmosphere, vegetation and animals. If managed protectively, it will produce not only a marketable commodity but what is known by the fancy term 'ecosystem services' – fresh air, clean water, carbon storage, wildlife and other ingredients of humans' life-support systems.

Farmers are usually not reimbursed for managing these essential elements of our landscapes as they are considered to be free gifts of nature. But it costs money, time and effort to keep these systems in good condition – by preventing erosion, controlling weeds and vermin, repairing previous degradation, maintaining ground cover. If farmers were paid to produce these ecosystem services, they could derive a reliable source of income at times when they can't produce commodities because of drought, fire or flood. Such payments would not be handouts or subsidies: they would be payments for tangible products that landholders generate, now usually without recompense.

The arguments for and against using taxpayers' funds to subsidise distressed farming families are well known. On the one hand, the general public has a deep well of sympathy for rural landholders, who are the custodians of most of our State's land surface, produce our food and uphold our cultural 'bush' traditions.

On the other hand, there is an element of injustice in offering bailouts to farmers yet not for example to city-based manufacturers who are likewise driven to failure by policy settings beyond their control, like free trade.

Economists near-unanimously oppose subsidies because they are adamant that businesses should stand or fall on the basis of their commercial success without intervention by governments. However, the markets in agricultural commodities don't conform to textbook theories of perfect commercial competition. The production markets, the commodity markets and the land asset markets are disconnected.

A number of concepts must be unpicked to establish a firm logical foundation for any remedial action. 'Sustainability' and 'stewardship' are explained, as are 'property rights' and terms of tenure. Landholders enjoy certain rights conveyed by the title that permits occupation, but these are matched by a duty of care and other obligations to the society that legitimises and recognises their title.

Clarifying what the 'duty of care' means is a precondition for quantifying the environmental services which might justify reimbursement to landholders. The paper gives no support to paying landholders to abide by the law – unless the common law not to cause any damage to anyone else's property and the statute law not to cause environmental harm were both to be applied literally and strictly. This doesn't happen. If indeed they were so applied, almost no landholder could comply. The intersection between free market forces and the general environmental duty sets the canvas for an impasse for which there is no current policy solution. This is analogous to the dilemma within Landcare as to whether taxpayers' funds should be disbursed to private commercial businesses, a dilemma unresolved after 35 years.

In other words, it is unfair to expect graziers to manage to a standard of environmental sustainability that cannot practicably be achieved through environment-blind market forces alone. This gives theoretical support for some extra-market payment in return for a contracted commitment to upgrade the standard of land management.

Further, over State leasehold land, the State as landlord has a largely unrecognised and rarely exercised obligation to periodically make good the 'fair wear and tear' that is a normal

consequence of tenants' occupation. This strengthens the case for some form of public contribution to regenerating this proportion of the rural landscape, some 50% of Queensland's land area.

The economic value added by investing taxpayers' or public funds in land restoration can be shown to typically far exceed the economic benefits of, say, large transport infrastructure projects, at present a major sink for public funds. Public budgets are paying the cost for suboptimal land management, but this happens by disconnected stop-start programs such as Great Barrier Reef rescue and the repair of silted up rural infrastructure rather than through more efficient preventative programs.

Two major challenges bearing upon pastoralists make a brand-new approach to rural sustainability imperative: climate change and unserviceable rural debt. Both are now pressing themselves into public and rural consciousness. Both are already well recognised in the rural community but yet to gain traction with policy makers. The proposed scheme, being an extra-market payment, cannot entirely overcome those challenges, but can make a modest contribution to strengthening the resilience of Queensland pastoralists in facing them.

A scheme like this does not need to be administered by governments. Queensland is covered by 14 regional community catchment bodies that have already been accredited to administer state and federal grant programs.

Precedents are available. In 2008 South West Natural Resource Management, the regional NRM body based at Charleville, successfully ran a pilot stewardship program in the pastoral mulga lands. The objective was to reduce grazing pressure at the critical time when drought-breaking rains arrive and native pastures need time to regenerate. In return for regular monthly payments, participating landholders surrendered their right to graze stock for a defined period. They retained their sovereignty and responsibility for every other aspect of their enterprise. More than 10 per cent of the pastoralists within the study area expressed interest in the scheme. Participants were chosen by tender. The public interest was served by improving the health of the catchment – less erosion, more infiltration of rain, more regrowth of native tussock grasses.

Any payment for ecosystem services logically should be contributed by the beneficiaries, which includes all Queenslanders (so can be procured via general taxation) or consumers of food and fibre (so can be procured by a levy on consumption). There are several logical sources of funds for a stewardship scheme. First, the payments could be structured around carbon management. Carbon-rich soils are more productive, erode less and make more efficient use of rainfall when it comes.

Second, payments could be toggled with Centrelink entitlements. A back-of-envelope calculation suggests the cost of an effective stewardship program might not be much greater than the welfare outgoings now distributed to support distressed families in inland Australia. And of course, stewardship payments have dignity – they are real reimbursements for real production, not handouts. Farmers understand stewardship: that's what they do.

Third, a 'sustainability levy' of a few cents could be added to the price of a litre of petrol, or a half percent to the top tier of income tax. Fourth, a simple line item could be created in the state budget, just as there is for police, education and health.

Several procedural steps must be taken before payments can be made under a stewardship scheme of this kind. The first is to negotiate a bipartisan commitment to support a scheme for twenty years. The second is to settle on a source of **secure** recurrent funding. The third is to grant a mandate to a coordinating agent that has the confidence of the rural community to

administer the scheme. Rural trust in the Queensland Government as a benevolent agent has been so damaged during the era of downsizing and restructures that this coordinator arguably best lies outside government. The regional natural resource management bodies are the most suitable candidate in sight.

The fourth procedural step is multilateral, consultative landscape planning, overseen by the coordinator, that translates scientific, practical, cultural and policy knowledge into guidelines for each catchment and sets the context for property-scale management planning that in turn can specify desired practical works. The fifth is a property-specific voluntary accreditation scheme that negotiates commitments, specifies standards to be reached and calculates payments.

Finally, a strong research capability must be re-established. Scientific and policy research is required. into the implications of climate change, the meaning of duty of care, carbon stocks and flows and how sustainability in all its dimensions can be achieved. Given that the rangelands cover most of the continent, rangeland management should be embedded in the training of agriculturalists and veterinarians.

This paper does NOT recommend:

- subsidies for production;
- compulsory property management planning;
- access to graziers' books of account;
- new rural debt or loan subsidies;
- welfare payments;
- encumbrances on landholders' title;
- new regulation (except upon consumers or taxpayers as necessary to raise revenue);
- compensation for lost property rights (as it would not restrict property rights);
- a general policy on clearing vegetation (should be dealt with under law and consensual property planning);
- payment for site works that would or should be done otherwise under landholders' duty of care.

Nor does this report assign *blame* for the current poor condition of pastoral Queensland to the graziers. The scheme honours the role of pastoralists as producers of both commercial and non-market products and services. In any case, even if all their previous management was faultless, global warming for which they cannot be blamed will force a comprehensive rethink of their pasture management and business models. Nor does it *blame* governments of either major persuasion, for the current canvas is a resultant of many forces and events over more than a century. Rather, it challenges governments to solve the twin problem of poor land condition and economic unviability that have resulted from a range of disparate forces.

Contrary arguments advocating reliance on market forces or avoiding costs to government budgets overlook the vital role farms play in maintaining the health of our land. A healthy countryside has both private and public benefits. Even if we assume that market forces will take adequate care of the private or commercial aspects of farm production, by definition market forces will ignore the non-commercial production.

Farmers without adequate discretionary income cannot be expected to tend for those elements of their production system that don't return a profit. If the price system doesn't return adequate discretionary income, then a system of direct payments is required. Otherwise the soils and rivers and pastures of our state will continue to suffer, along with the well-being of the people who manage them on our behalf.

Society elects representatives and pays taxes to enable governments to solve collective problems on its behalf. Despite overwhelming scientific consensus developed over more than 30 years, this twin problem has not been solved and it is the duty of governments to solve it.

As a non-partisan, non-activist, multi-disciplinary learned society, The Royal Society of Queensland on behalf of Queensland's scientists urges all stakeholders to recognise the scientific and financial evidence that the current economic model by which pastoralists are reimbursed through market forces is unsustainable, that it is incapable of accommodating rapidly advancing climate change, that it is imposing heavy unfunded liabilities on the future economy and that a new approach is both vital and urgent.



TABLE OF CONTENTS

PART 1: INTRODUCTION AND BACKGROUND

Scope, purpose, acknowledgements, disclaimers
Dictionary

PART 2: THE CANVAS

Biophysical canvas: condition and trend
Social canvas: condition and trend
Economic canvas: condition and trend
Tenure canvas: condition and trend
Policy canvas: previous reports and current institutional arrangements

PART 3: EXPLANATION OF KEY CONCEPTS

Property rights
Tenure as a tool of policy
Landholder sovereignty
Duty of care
Public versus private interest
Environmentalism: science plus wilderness
Carbon flows and stocks
Trade and free trade
Sustainability and the limits to growth
Stewardship
Feasible paths

PART 4: CHALLENGE ON THE HORIZON

Climate change

PART 5: FUNDAMENTAL PRINCIPLES

1. Rural land must be managed sustainably.
2. Landholders are stewards on behalf of future generations.
3. Commodity markets under free-trade are disconnected from the cost of production.
4. Market forces will not achieve sustainability or stewardship.
5. The economic payback for investing in environmental repair is very large.
6. Constitutionally, the State is responsible.
7. To achieve sustainability, the pre-conditions must be nourished.

PART 7: THE MODEL

Vision
Theory
Feasible path:
 Coordinating authority
 Legal authority
 Knowledge
 Skilled personnel
 Funds

Application

- Strategic regional planning
- Regional planning for property management
- Accreditation
- Disbursement of payments

PART 8: CONCLUSIONS

Recommendations

APPENDICES

- 1 – Summary of State of Environment Reports – 1990-2011
- 2 – A Pilot Stewardship Scheme in the Pastoral Mulga Lands
- 3 – Landholders' Perceptions
- 4 - The Delbessie Agreement- A Framework for Sustainable Land Management
- 5 – Extracts from Relevant Authoritative Reports
- 6 – References, Further Reading and Endnotes.

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Member Fred Tromp produced the first conceptual framework for the report.

The inspiration of Russell Holland in briefing on feasible path theory and Richard Sanders on sustainability theory is acknowledged.

Economist and grazier Ben Rees of Dalby has contributed extensively through drawing attention to his published papers and subsequent correspondence. His analysis of the current financial stress in rural Australia is persuasive because of the strength of the theory – explanation of cause and consequence – that lies behind it.

Some lines of text have been abstracted from the author's previous magazine article "Caring for our country... Or for our budget?", *Public Administration Today*, April-June 2009; and others from Edwards (2003).

All photos except the one following the Conclusions are by the author. The concluding photograph is by Alan Lauder. This work is copyright. Excerpts may be quoted for the purposes of critical review or advocacy, provided that due acknowledgement is given.

Contributors

Heather Douglas contributed the basis of the text on "Social canvas: condition and trends", Michael Gutteridge the basis of the text on "History of settlement"; Chris Kahler the basis of the text on "Biophysical canvas: condition and trends"; and Alan Lauder the basis of the text on carbon stocks and flows. All are members of The Royal Society of Queensland.

Geoff Edwards is qualified in ecological science and public administration. He worked in parks and land management in Victoria and was a local government Councillor and Shire President in the 1980s. From 1991-2006 he was Manager Land and Regional Planning in Queensland's

Department of Lands/Natural Resources. From January 2007-June 2008 he was Chief Executive Officer of South West NRM Ltd, based at Charleville, Queensland. Following retirement in July 2011 he was appointed as an Adjunct Research Fellow at Griffith University's Centre for Governance and Public Policy and a Research Associate of the TJ Ryan Foundation. In June 2013 he was elected President of The Royal Society of Queensland.

This paper has been compiled in his scholarly capacity and does not purport to represent the views of The Royal Society of Queensland.

Heather Douglas is a social scientist interested in how change and development occurs. Her career spans the public policy, health, business, research, and community sectors in Queensland, Victoria, the ACT, and the World Health Organisation in Geneva. She is a qualified health professional, has an MBA, Masters of Social Welfare Administration and Planning and a PhD. After working as a health professional in the ACT, she moved to Queensland during the 1990s where she managed a community education service and then directed a state-wide support service. After working in government transport and regional services policy, she worked as an academic in Melbourne from 2009 and then returned to Brisbane in 2015. She is now associated with the Centre for Social Responsibility in Mining at the University of Queensland.

Michael Gutteridge is a social scientist with qualifications in physical geography and politics. He has worked as an environmental scientist and project coordinator with the Queensland Department of Natural Resources and Mines and more recently as an independent researcher and consultant. Research and development work has ranged from landscape and agro-economic statistical and GIS modelling, fossil energy resource depletion rates, electric transport technology and economics, through to paleoclimatology.

Chris Kahler is a field botanist and ecologist with more than 15 years' experience in field survey work. After graduating from the University of Queensland and working with the Brisbane City Council's Bushland Rehabilitation Unit in on-ground projects, Chris spent a number of years with Greening Australia before moving to the Queensland Herbarium. While working with the Herbarium's Regional Ecosystem mapping team, Chris visited many of the State's bioregions, becoming familiar with their vegetation communities, plant groups and management issues. More recently Chris has worked for consulting firms, State agencies and NRM groups on a variety of projects involving managing the balance between human use and the protection of environmental values.

Alan Lauder was a successful rural producer with thirty years' experience of property management in Queensland's south-western pastoral zone. He built extensive networks in the scientific community to gain a 'big picture' understanding of how landscapes function and how different regimes for managing livestock affect landscapes. This understanding extends to greenhouse outcomes and water catchment outcomes.

In 1997, he was funded to conduct a \$272,000 Drought Regional Initiative project on his property. The project perfected a method of building the health and resilience of grazing landscapes. While a woolgrower, he produced the world's first guaranteed prickly-free jumper, supplying David Jones and Country Road. While still on the property, the Queensland Government used him as one of ten case studies in their publication, *Graziers' Experiences in Managing Mulga Country*. He spoke at the 1999 International Rangeland Congress and was invited to speak at the Grootfontein Research Institute in South Africa. He was lead author of the peer-reviewed paper "Offsetting methane emissions – An alternative to emission equivalence metrics". Alan was nominated for the McKell National Landcare Award and was a Deakin Lecture series presenter in Melbourne in 2010.

Disclaimers and explanations

Responsibility for the content is taken by the corresponding author Geoff Edwards. The opinions herein are not necessarily endorsed by any of the other contributors, The Royal Society of Queensland (Royal Society) or NRM Regions (Regional Collective). Specifically, members of Council of the Royal Society of Queensland have not been involved in writing the text.

PART I: INTRODUCTION AND BACKGROUND

Scope and purpose

The witty observation, ‘You can’t be **green** if you’re in the **red**’ frequently heard in rural Queensland asserts that graziers cannot be expected to manage their properties in an environmentally sustainable manner unless they can be financially sustainable. Like all such popular slogans, there is a core element of validity, but the real situation is more nuanced. An unprofitable business by definition does not have sufficient cash flow to invest in maintenance of those capital assets that don’t in the short term directly generate income. Such businesses ‘mine’ their capital and survive by running down their assets or accumulating debt. While depreciation of the hard infrastructure (fences, waters, plant and equipment) is obvious and takes first call on available cash flow, depreciation of the land surface is not always apparent and is more easily deferred.

A more robust observation would be ‘You must be **green** to remain in the **black**’. A business relying upon natural capital assets must maintain those in healthy condition if they are to yield commodities on a *sustainable* basis. The underlying biochemical processes that drive a healthy landscape are mostly the same that drive animal production.

The evidence indicates that many pastoralists in Queensland do not receive sufficient income from commodities to maintain profitability while simultaneously restoring and maintaining their pastures into a healthy condition. If this opinion is borne out by evidence, then the objective of policy should surely be to move producers from **red** to **green** so that they can remain sustainably in the **black**.

The area of focus is Queensland’s *rangelands*, the broadacre unimproved native grasslands and woodlands on which grazing of sheep, cattle or goats is the primary land use. They are commonly of relatively low fertility or low and erratic rainfall or both. We use the terms *pastoral lands* as a synonym and use *pastoral zone* when referring to the entire region, including the towns, as shown in Figure 1. Although the principles presented could also be applied to the more fertile and better-watered cropping and grazing country closer to the east coast, farmers and graziers there face different environmental and economic constraints and greater flexibility to vary management practices. The analysis here could apply to rangelands in other states, such as the Western Division of New South Wales.

The report first reviews the evidence of systemic deterioration in land condition, social health and economic prosperity in Queensland’s rangelands; and second presents a model for reimbursing pastoral landholders in accordance with their contribution to regenerating these landscapes.

The paper is short on practical details of the model but long on the theory and principles that lie behind it. This is deliberate, because the practical details can be managed more or less readily by skilled operatives if they have secure employment and secure funding. Most powerfully lacking at the present time is a theory robust enough to counter the prevailing market-driven model of prosperity which is careless of the fate of individual producers and of the natural assets on which their livelihoods depend. Rural Queenslanders aspire to the ideal of a permanent population, regular income, reliable civic services and a share in Australia’s prosperity and progress. Market-focused policy undermines all of these conditions.

From the date of European colonisation, Australia’s inland population grew until a high point in the 1950-1960s. Thereafter, with increased mechanisation, the pastoral zone’s population, investment and services relative to urban areas have been in steady decline, except as referable to mining and in some locations, tourism. Custodianship of these vast tracts of landscape falls

to fewer and fewer people. This is just one indication that business-as-usual reliance on market forces is inadequate.

The most worrying aspect of this analysis is that our society doesn't seem to be learning from history or scientific research. That is, long experience on-farm as well as very extensive science is simply overlooked, so episodes of degradation recur and the underlying causes remain unresolved. As long ago as 1988, the Warrego Graziers' Association was claiming (based on 20 previous years' work by DPI and CSIRO) that the mulga lands were being managed unsustainably.

A depressing observation reached by the authors as they worked through the policy and scholarly literature was that a staggering volume of thoughtful and well-informed science-based reports has gathered dust in the past three decades or more. For example, a fully justified recommendation for a stewardship incentive scheme was included lucidly in the Wentworth Group's ground-breaking report of 2002:

"Pay farmers for environmental services (clean water, fresh air, healthy soils). Where we expect farmers to maintain land in a certain way that is above their duty of care, we should pay them to provide those services on behalf of the rest of Australia." (p.4).

The inability of our system of governance to remedy broadscale land degradation can hardly be better described than by Toyne and Farley (2000):

"A clear deficiency with the policy environment of Landcare has been the failure to properly articulate its place in the bigger picture. Structural adjustment, market systems, macroeconomic policy and economic incentives are all disconnected from Landcare policy. So too are issues such as State government responsibilities, regional structures, service provision and incentives." (p.vii).

The Australia Institute in the preface to Toyne & Farley wrote that it is hoped the report "may act as a circuit breaker. The hand wringing has gone on for too long." That was in 2000. The same plaintive hope can be expressed today.

Citizens elect governments and pay taxes so that systemic problems are solved. Unprofitability and land degradation in the pastoral zone are problems that have not been solved. The current economic and biophysical condition of our pastoral lands is testament to inadequate governance and a myopic, accountancy-led approach by the central agencies to their responsibilities. The production markets, the product markets and the land asset markets are all disconnected. The causes of market failure are systemic and the remedies must lie outside the market: the market is a legal and social construct and cannot heal itself.

Dictionary

Ecologically sustainable development is the concept explained in the intergovernmental *National Strategy for Ecologically Sustainable Development* 1992, which is Queensland Government policy. Also see 'sustainability'.

Economic is used to describe macro-economic conditions; *financial* describes conditions at the scale of the enterprise. *Mainstream economics* means the currently dominant neoclassical macroeconomic interpretation. *Neoliberalism* is a pro-business, anti-environmental political ideology based on and shaped by mainstream economics that disparages public sector activity and approximates the Australian term *economic rationalism*.

Ecosystem services are useful services delivered by healthy environmental assets. They are supplied when natural assets (soil, plants and animals, air and water) are converted into goods

or services that humans need or value. For example, the transformation by plants, fungi, worms and bacteria of the raw ingredients of water, sunlight, carbon and nitrogen into fertile soil is an ecosystem service. Other examples include pollination, moderation of river flows, regulation of climate and insect pest control.

Farming embraces all agricultural production, including pastoral and cropping activity and intensive animal husbandry. We refer to the broadacre producers and their families as *graziers* or *pastoralists* or, when considering land ownership, *landholders*. *Landholders* includes owners of freehold land and lessees.

Land sometimes includes, sometimes excludes (depending on context) all the biophysical resources of a landscape, including soil, water, vegetation, fauna and minerals.

Landcare is the name of a specific national program of outreach and land repair; but with lowercase 'l' is also a generalised term for a land-focused ethic of protective management.

Rangelands are extensive unimproved pastoral lands. They generally include the native grasslands, scrublands and woodlands which cover a large proportion of the arid and semi-arid regions of western Queensland and the monsoonal lands of northern Queensland. These lands are generally unsuitable for cropping. The rangelands occupy some 81% of Australia and are popularly known as 'the outback'.

Concepts such as stewardship requiring more expansive elucidation are explained in the text.

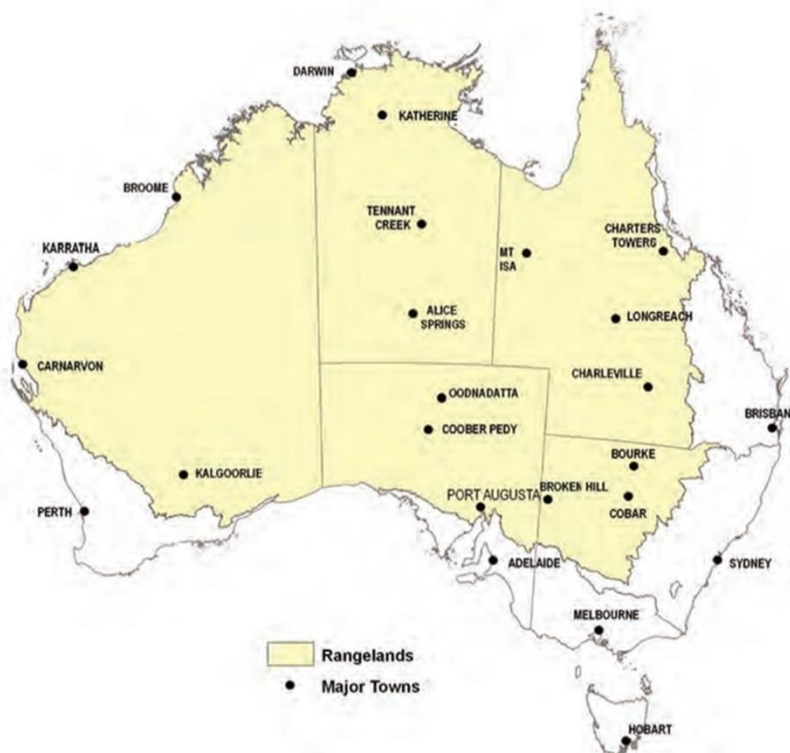


Figure 1. Australia's rangelands.

Source: National Land and Water Resources Audit 2007.



PART 2: THE CANVAS

This section presents data on condition and trend in the pastoral zone, seeking evidence for or against the proposition that there is a systemic shortfall in sustainability.

Biophysical canvas: condition and trends

The industries conducted on Queensland's grazing lands are chiefly beef and sheep production and tourism. Ideally, the lands should be maintained well enough to support not only existing industries, but also conceivable potential future industries or land uses. Are Queensland's grazing lands improving in condition or declining? Although the questions are simple enough, the answers are complex and nuanced.

The impact that European settlement made on the pastoral land surface is in part recorded in streambeds. Sedimentologists characterise the post-colonisation era as one of increased erosion and sedimentation. Other effects include reductions in numbers and ranges of various species of plants, birds, mammals and other living things. The pastoral productivity of the land has been directly affected by changes such as thickening of woody vegetation, decline of palatable, productive and perennial (3P) grasses and forbs and soil decline, whether by wind or water erosion, compaction, loss of carbon or other processes.

In an effort to answer questions relating to condition and trend in Queensland's environmental systems, the Queensland Government has compiled a series of State of the Environment (SOE) reports, first released in 1990. The foreword of the first report cites increasing community and government awareness of declines in a range of environmental systems – from local to global in scale – as justification for taking stock of Queensland's situation at the time. Some of this concern may have stemmed from the memory of the severe and distressing land degradation episode in Queensland's mulga lands during the 1970s and 1980s, or the similar and more recent event in the State's northern grazing lands. This and subsequent reports in 1999, 2003, 2007 and 2011 attempted to track and quantify the nature of the damage that the State's environment was enduring, to gain an appreciation of its condition and to identify changes or trends in condition.

A summary of the results in each report relating to the pastoral lands is given in Appendix 1. Reviewing the reports in sequence reveals a deepening understanding of the issues the State's environmental systems face and increasing sophistication in the techniques used to assess and track them over time. Results reinforce the conclusions of early studies into localised degradation episodes: that improper land management (typically overgrazing) in combination with natural drought events leads to land degradation. Indicators of land degradation include loss of topsoil via wind (especially via dust storms), sheet or gully erosion by water, as well as declines in pasture condition, possibly long-term. Where they affect the capacity of the land to absorb rainfall, produce herbage and cycle nutrients, they are regarded as contributing to loss of landscape function.

It seems easy to establish through State of the Environment reporting that landscape function has been lost over time. However, quantifying condition and trends is more difficult. Partly this is because of the patchiness of the data. Trends in environmental systems are often masked by natural variability. Consequently, trends in condition may be revealed only in data collected over several decades. In reviewing condition-monitoring systems in Australian grazing lands generally, Watson and Novelty (2002) ask us to consider what benefits today's land managers would find in 50 years' worth of historical monitoring data, had we collected it.

Condition is difficult to quantify also because to do so requires well-defined benchmarks, which are difficult to specify. Considering rangelands in eastern inland Australia, Silcock and Fensham (2015) observed that “Assumptions of detrimental change due to abrupt management upheavals are compounded by the ‘degraded’ appearance of rangelands for much of the time.” They examined records from the 1840s and recent research and concluded: “We found no evidence of unidirectional change in vegetation structure, irreversible degradation of plant communities or loss of plant species, although some palatable species have declined at a landscape scale. ...The main unequivocal examples of degradation are the loss of a suite of medium-sized mammals, extinction of Great Artesian Basin springs and their dependent organisms through aquifer drawdown, and invasion of prickly shrubs and buffel grass which have altered ecosystem structure and function”. They reserved judgement on the mulga lands. Their analysis appears to exclude the deterioration of river systems and the downstream effects of soil erosion such as on the Great Barrier Reef.

In 2008, the National Land and Water Resources Audit (NLWRA) on behalf of the Australian Collaborative Rangelands Information System (ACRIS) published *Rangelands 2008 – Taking the Pulse* which examined the change in condition of Australia’s rangelands during a 1992-2005 monitoring and reporting period. The report found that Australia-wide “Landscape function – a measure of the landscape’s capacity to capture and retain rainfall and nutrients – increased or remained stable between 1992 and 2005 at a majority of pastoral monitoring sites.” (p.xvii). However, this does not mean that the baseline condition was satisfactory; and in any case the seasonal conditions were variable across the continent. Inexplicably, NLWRA was abolished by the Commonwealth in 2008 and funding for ACRIS was cut in the 2014 budget. Our society has no hope of remedying the distress in rural Australia if it fails to collect the information necessary for good policy and wastes the time and skills of those who know how to do this but at budget time are declared redundant.

Despite these limitations, State of the Environment reports and related publications do bring attention to at least three broad parameters from which we may draw conclusions: soil erosion events; status of populations of native plants and animals; and land cover (including extent of Regional Ecosystems).

Soils

In Australia, formation of soil from bedrock proceeds at a very slow rate, between 0.1 and 1 tonne per hectare per year (roughly equivalent to 1mm of soil formation every 14 to 140 years). Any loss of soil above the locally applicable rate is an indicator of unsustainability.

Losses due to wind and water erosion are difficult to estimate State-wide, but significant erosion events are sometimes documented. One major dust storm in 1987 stripped between 0.28 and 0.32 tonnes of soil from each hectare from a vast area of land, which included parts of western Queensland. Water erosion from hillslopes in north Queensland stripped as much as 3.1 tonnes per hectare from one site in a single wet season of below average rainfall (Bartley et al. 2006). Other ongoing losses are certainly occurring, as is demonstrated by sedimentation studies documenting soil and nutrient loads that some northern rivers are delivering to the Great Barrier Reef lagoon.

On 22 June 2016, the Queensland Government announced that it had bought the gully-eroded Springvale Station to stem the estimated 500,000 tonnes of sediment transmitted annually by the Normanby River onto the Great Barrier Reef. The catchment delivers about half of the total run-off to the northern part of the Reef.

In July 2016, consultants Alluvium estimated the costs of achieving two key regional water quality targets set out in the *Reef 2050 Long-term Sustainability Plan* by 2025 – reduction in anthropogenic fine sediments and dissolved organic nitrogen – at \$8.2 billion. The targets were

not based on some pre-colonisation nirvana but on what ought to be achievable given modern settlement.

Plants and animals

Queensland's plants and animals have not only inherent but economic value: as subjects for scientific studies, as sources of genetic information with potential to improve domesticated animal and crop lines, in attracting tourism or in securing human health. Populations of native plants and animals respond to changes in land use; some benefit from changes in the landscape, others don't.

Declines in the diversity and abundance of ground layer plants can be strongly associated with increasing intensity of grazing, especially where water points have been distributed. Certain species disappear altogether from the ground layer once cattle are introduced and ongoing overgrazing leads to an eventual reduction in the density of the valuable 3P grasses.

Competition between native species and introduced pasture species usually leads to a decline in abundance of the native plants. Buffel grass in particular, established widely over grazing lands in central and other parts of Queensland, is now aggressively invading conservation areas and causing changes in the composition and abundance of even woody species, by fuelling hotter-than-normal fires (Melzer 2015).

(Buffel grass offers an example of how the worldviews of graziers and environmentalists can diverge. Buffel has been widely regarded as highly valuable fodder by graziers but a menace by scientists and environmentalists. It can of course be both, depending on the primary land use of the area being studied. Buffel ignores administrative boundaries).

Changes in bird populations too, including declines in some sensitive species and increases in others, have been linked to grazing practices, including vegetation management, in parts of north Queensland's grazing lands. The nationally endangered Southern Black-throated Finch, a once common resident of grassy woodlands and forests in the grazing lands of Queensland and New South Wales, is now threatened with extinction due to destruction and fragmentation of its habitat through land clearing, as well as by changes to food resources (grass seed) brought about by grazing pressure from domestic stock and rabbits.

While some native mammals, especially macropods, respond positively to grazing land developments, such as increased availability of waters, others decline. Small mammals weighing between 35 grams and 5.5 kilograms are in steep decline Australia-wide. The threats to these uniquely Australian animals are typically given as changes to burning patterns in their habitat (which can be attributed to pastoralism) and strong predation from introduced carnivores: foxes and cats (which largely cannot, although artificial waters can allow feral cats to extend their ranges). Various larger mammals are also in trouble and some of these, such as the Northern Hairy-Nosed Wombat, are the subject of recovery plans. The decline of this animal, which appears for now to have been halted, has been attributed directly to competition with cattle and sheep.

Population decline, if left unchecked, ultimately leads to extinction. Since European settlement, one bird, three frogs and six mammals are known to have suffered extinction in Queensland. More are listed under the *Nature Conservation Act 1992* as either Endangered or Near Threatened due to declines in their population size and range.

Land cover

Clearing destroys native plant and animal habitat, can lead to accelerated erosion (depending on land management practices following clearing) and disrupts water cycles, including soil water infiltration and possibly even rainfall patterns. SOE reporting has tracked the rate of clearing in Queensland since 1990 and the most recent figures have been published as part of a

State-wide Landcover and Trees Study report (Figure 2). Scientists have expressed concern over the high rate of vegetation clearing in the State and especially at the increase associated with the 2012-15 government and its relaxation of legislative restrictions on clearing.

Explanatory note: for the purposes of this paper, the lawful removal of trees to enhance growth of pasture on land whose primary purpose is grazing is not inherently regarded as degradation. Regional NRM planning and paddock-scale planning are required to determine whether clearing in accordance with law should cease or be allowed to continue on particular properties.

There are serious concerns based upon scientific evidence about the continued clearing of native vegetation by Queensland pastoralists. However, this paper is not the place to address them and the incentive scheme must not be seen as a source of payment for landholders who clear or who are refused permission to clear.

WOODY VEGETATION CLEARING

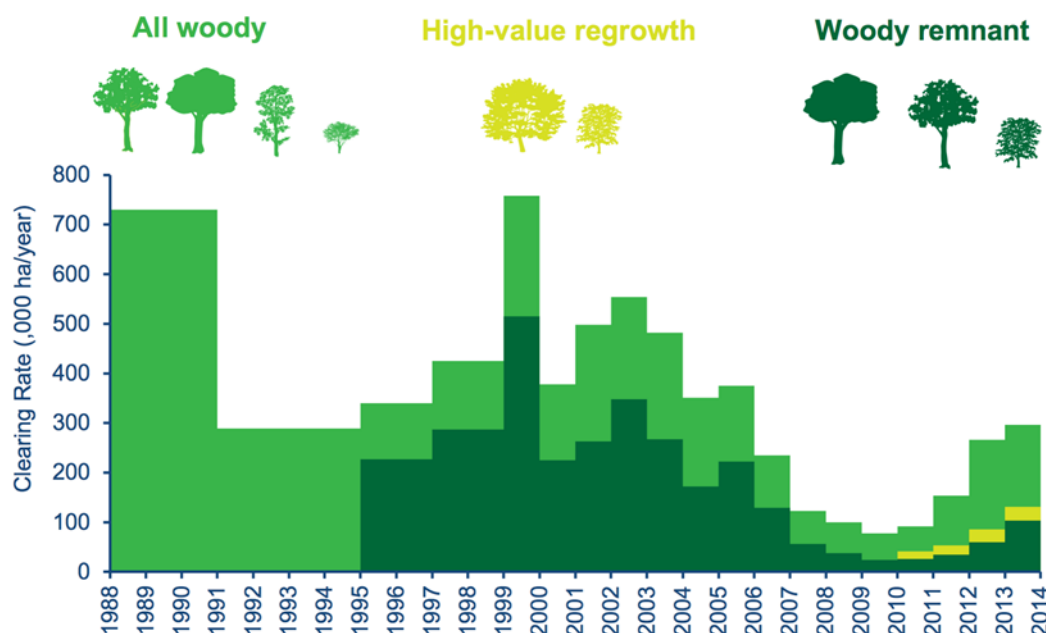


Fig. 2. Rates of clearing native woody vegetation in Queensland.

Some types of woodland or forest are cleared for grazing in preference to others. Since 1999, SOE reports have included information on the number and status of Queensland's naturally occurring vegetation types, or Regional Ecosystems (REs), as they have been progressively mapped across the State. Most recent figures list a total of 1383 REs, 531 classified under the *Vegetation Management Act 1999* as Of Concern; and 89 classified as Endangered because they are either naturally rare or have been cleared to near extinction.

Summary

The gaps in understanding of the condition of Queensland's grazing lands are significant and governments will need to invest in assessment for many years before scientists will be able to quantify condition and track trend comprehensively. However, sufficient information exists to show that:

- overgrazing (by domestic, native and feral herbivores) in conjunction with natural droughts continues to cause unsustainable loss of soil and of the landscape's ability to function productively;

- land management practices, including grazing, burning and feral animal control are causing declines in native fauna populations that are likely to lead to even more extinctions;
- land clearing is pushing some ecosystems and species to the point of extinction and is reducing the landscape's ability to maintain functions as fundamental to productivity as water retention and cycling.

Condition in Queensland's grazing lands overall would appear to be trending downward. Additionally, management actions can have measurable off-site impacts, on aquatic systems or marine environments such as the Great Barrier Reef, where additional nutrients from grazing lands are implicated in initiating outbreaks of Crown-of-thorns Starfish.

Given that the landscape-scale effects of some management practices take years or decades to become manifest, the damage done today may not make its effect felt until a new generation of managers walk onto the land. Some of this damage may be irreversible. In other cases, land management improvements are thought to be reducing our impact on the grazing lands. Dust storm severity in 2011 was thought to have been reduced as a result of changed grazing practices. Best Management Practices and other responses are critical to slowing and perhaps even reversing worrying trends in Queensland's grazing land condition.

Degradation of land in Queensland is a local manifestation of a global problem, well articulated in the March 2018 summary released by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. "Combating land degradation and restoring degraded land is an urgent priority to protect the biodiversity and ecosystem services vital to all life on earth and to ensure human-well-being".

Social canvas: conditions and trends

Queensland settlement patterns

Australia is one of the most urbanised countries with almost 70% of Australians living in major cities (ABS 2015), and no major urban centres in pastoral districts. Yet this high degree of urbanisation does not reflect the rural nature of most of Australia, and especially Queensland. Queensland is the second-largest and third most populous State with a land mass of 173 million hectares and a population over 4.8 million. Rurality is an important feature, with a very large proportion of Queensland categorised as outer regional, remote, or very remote by the Queensland Government Statistician's Office (see Figure 3). It is the most decentralised Australian State with less than 60% of the population living in urban areas compared with over 70% in other States (ABS 2008).



Figure 3. Rural and remote areas of Queensland.

Source: Queensland Health, based on ABS 2014.

The population is declining in 22 Queensland shires, especially in remote areas (see Figures 4 and 5). There has been a steady population drift from rural to urban locations over the past 60 years, resulting in an ageing rural population (Hutson et al 2008). The median age of rural people has increased to 38.5 years which is 3.4 years higher than the median age (35.1) in the Greater Brisbane area. Yet this figure masks the rapid ageing of rural farmers: in 2011 almost 25% of farmers were aged 65 or more, beyond a reasonable retiring age for a physically demanding occupation.

There has been a noteworthy deterioration between the statistics for 2006 (Figure 4) and for 2016 (Figure 5). This matters, and is emphasised here, partly because population decline is an indicator of despair and ill thrift in a community; partly because it is an indicator of the type of remedies that government should launch. Construction projects such as mining projects are followed by or at least are not preventing population decline even in mine-rich statistical areas. Remedial programs should be labour-intensive and land restoration is the obvious candidate.

Queensland's population growth can more efficiently be accommodated in the regions than in the fringes of Brisbane, given the existence of underutilised infrastructure and services throughout the State. (Population decline inevitably leaves civic infrastructure underutilised).

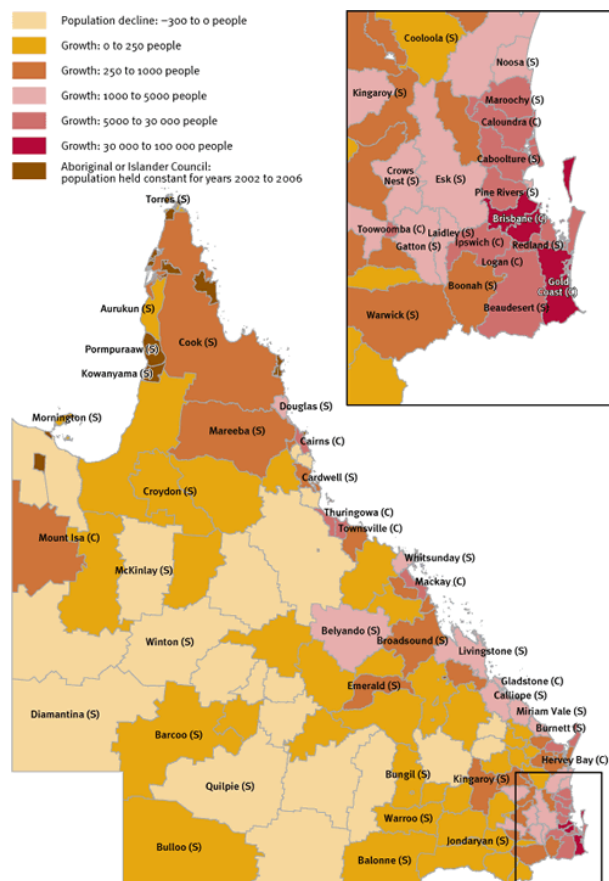


Figure 4. Population growth by Local Government Area, 2001-06.
 Source: Department of Environment and Heritage, from DLGPSR 2007, based on ABS 2007 data.

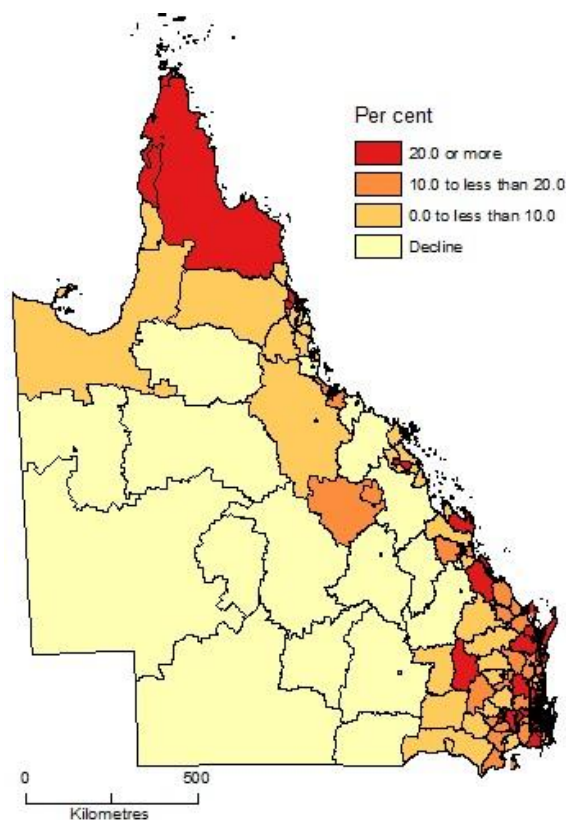


Fig. 5. Population Growth by Statistical Area 2, 2006-2016.

Source: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/3218.0Main%20Features302016>.
 Rural lifestyles

Compared with other Australian States Queensland has the highest proportion of land (81%) devoted to agriculture (ABS 2012). Some rural land is owned by very large (family and corporate) businesses, but the majority of Australia's farms are comparatively small, often family-owned businesses, and more than half (56%) of Australia's farmers are self-employed owner-managers. A cohesive community and an independent lifestyle are components of the attraction of rural living. Rural communities have a strong sense of place, higher levels of social connections, higher rates of volunteering, and stronger feelings of safety (AIHW 2016).

Yet farming is hard work, and half of all farmers work 49 hours or more each week (ABS 2012). Despite these long hours, the average weekly disposable income of Australian farmers is considerably lower (approximately 60%) than for people working in other occupations. This difference is significant even though it is difficult to classify farm income in weekly terms given the considerable seasonal variations in income which are an unavoidable aspect of farming. Weather is the core of rural life, and the effects of flood and drought result in stress, anxiety, financial loss and fear. These effects contribute to decreased individual and household well-being and reduce community resilience (Ng and Vetch 2015).

With unpredictable incomes and other challenges, few young people are taking up family farming. Over decades, there has been a general movement of people from rural areas to coastal cities where there are more jobs, better access to services and an easier lifestyle. This population drift has contributed to a hollowing out of skills and opportunities in rural localities. It has also reduced community strength and household resilience to manage prolonged adversity, especially droughts. Australian farmers can insure against hail, fire and similar perils, but not against the greatest single risk – drought (Khuu and Weber 2012).

Rural well-being

Well-being in rural areas has declined steadily over several decades (NHRA 2014). Social and economic disadvantage is strongest in the more remote communities of Australia – a 'tyranny of distance' operates (Roufeil and Battye 20018). People living in rural areas have less access to employment, health, education, justice, government, housing and support services than urban Australians. Access to ICT services is severely limited. In remote areas, access to goods, especially fresh food, also is reduced, which has flow-on consequences for physical and mental health. People living in rural areas have higher levels of unemployment, shorter lives and higher levels of illness and disease risks¹. Rates of domestic violence are higher. Financial hardship during droughts (Edwards and Hunter 2009) produces a cascade of other effects including poor health, relationship issues, increased suicide risk, along with reduced social capital and family well-being (Hegney 2007). Many women have taken an off-farm job to supplement family incomes, yet this challenges the social norm of self-reliance for rural men, leading to increased tensions in rural families.

Rural Queenslanders have higher rates of alcohol consumption and other self-harming behaviours than their urban counterparts. Compared with urban populations, Indigenous people have higher rates of chronic health problems and unexplained deaths. Of all Australian States, Queensland has the highest poverty rate beyond the capital city (15%) (NHRA 2013). The proportion of Queensland farmers with post-school qualifications has increased in recent times, but farmers are still less likely than urban residents to hold non-school qualifications. This not only reduces employment prospects, it also decreases the capacity to access information. Poverty and hardship in the towns follows from unprofitability on the farms.

All these manifestations of ill-health and poor quality of life feed into higher fiscal costs for health and welfare services.

The role of government

In part, the increasing inequality in Australia is due to the prolonged commitment by successive Australian governments to neoliberal economic policies. ACOSS (2015) observes:

In the past, a strong set of institutions in Australia have kept income and wealth inequality in check while still making room for steady economic growth. This 'Australian economic model' included full employment policies, universal access to public education, a unique system of wage regulation, progressive income taxes, and a well-targeted social security safety net. As a result we were able to place limits on inequality within an open economy with relatively low taxes and public expenditures, and a flexible labour market.

Over the past two decades, this social compact appears to be unravelling. The benefits of our world-leading economic growth have been shared much more unequally than in the past. (p.8).

Ragusa (2014) laments that rural Australia receives only a disproportionately small portion of government funding for healthcare and social services and importantly, infrastructure. It is undoubtedly expensive to support sparsely populated areas; however the lack of attention to rural distress stems from a broader cause. Urban populations have little contact with the rural population, leading to detachment in political and policy circles and the media to rural issues (Keogh 2015).

Resilience in rural communities

Rural people are stoic and have always coped with adversity – isolation, poor seasons, low incomes and stereotyping by city folk. Rural communities in Queensland have bounced back from many economic and environmental challenges; however, the combined effects of successive long droughts and problematic social trends have accumulated and rural communities now are struggling to respond to conditions that are largely beyond their control.

Resilient communities take intentional collective actions to enhance the capacity of individuals and institutions to influence changes in social and economic life (Colussi and Radcliffe 2000). Some Australian government programs have attempted to build resilience in rural communities but in the main, these have been stop-start programs which have had limited success in sustaining well-being.

There appear to be links among resilience, well-being and the capacity for communities to prosper. Loose networks among residents can challenge standard approaches, create new ways of thinking about how to address issues, and bring new ideas and important resources into the community. This linking capacity appears to have the potential to improve prosperity in rural communities (Brooks 2006). Yet change networks are precarious. They may struggle if facilitating agents are funded on insecure or short-term grants.

The presence of respected, confident leaders is associated with the capacity of a remote community to adapt (Plowman 2003). These are less likely to appear in an ageing, declining community. Lack of financial capacity feeds on itself. Corporate Australia and major potential investors, such as superannuation funds, have little interest in supporting rural communities given the low potential for return on investment in all sectors other than mining. The recent trend in investment by foreign corporations does not contradict this conclusion. Investment by absentee – especially foreign – landowners and fly-in-fly-out miners can worsen alienation.

The landscape needs labour

The Queensland Government Statistician's Office's table for regional youth unemployment (15-24 age cohort) in January 2018 (QGSO 2018) shows an alarming increase from the 36% of January 2017 to **sixty-two per cent** a year later². The unemployment rate for all ages >15 in the Queensland Outback is also the worst in the State, at 13.2%. If family farmers were profitable

or approaching profitability, unemployment figures would not be this bad. The figures reflect regional instability, low income and poverty and will not be remedied by seizing on the coattails of mining projects in Central Queensland. A level of unemployment at 62% and rising is a Depression-era statistic. Unless the figures are statistical anomalies, they represent serious policy failure.

Many of the land improvements necessary to regenerate restore grazing landscapes – such as droving offsite, stock fencing along rivers, rotational grazing and Yeomans or Andrews techniques of restoring watercourses – are labour-intensive and require stockmen, boundary riders and general hands.

The recent trend to building exclusion fences (mainly to exclude kangaroos and dogs) may result in a revival of sheep grazing, which could increase substantially the amount of employment available. Sheep have a shorter production cycle than cattle and this is more consistent with Queensland's variable climate.

Labour may be attracted inland to rebuild these capacities if there is the prospect of an appealing career. This will require a reinvigorated vocational education sector and a career service within the NRM regional bodies. Neither of these can be realised without secure lines of funding. Housing and schooling are pivotal considerations for candidates with family responsibilities and require security of tenure. Income stability is a priority.

Summary

Inequality accentuates mainly because of government policies – of what they do and do not do. In Australia, government traditionally purposively set out to moderate inequality through industry and drought support programs, tax concessions and welfare transfer payments. Yet government focus on rural Australia has declined as a narrative of equality has been replaced by a narrative of instrumental budget insufficiency. The civic notion of a community's obligation to all of its citizens, whatever their current circumstances, is breaking down. Perceptions of neglect add to existing burdens for rural people (Herbert-Cheshire 2003).

The Pew Charitable Trust's *Modern Outback* document (Woinarski et al 2014) advocates that we must retain populations in the outback if we want to conserve its financial, social, cultural and economic contribution to this nation. This rationale challenges the rural perception that environmentalists want to 'lock it up and remove the people'. The opposite is true.

Economic canvas: condition and trend

In a prescient paper in 1994, Professor John Holmes predicted that extensive pastoralism in the arid and semi-arid unimproved rangelands of northern Australia would be progressively superseded by other land uses yielding a higher economic or societal return. His forecast is in part being fulfilled, as select properties are acquired by proprietors whose primary interest is not grazing but conservation, mining or indigenous culture (Pew 2014:211). Considering conservation alone, a single non-profit organisation, the Australian Bush Heritage Fund, now holds tenure over Carnarvon Station (59,000 ha), Goonderoo (593 ha) and Edgbaston (8,100 ha) in central Queensland, Ethabuka (215,500 ha), Cravens Peak (233,000 ha) and Pullen Pullen (56,000 ha) in the far west's Simpson Desert and environs and Cape York (45,590 ha) and Yourka (43,500 ha) in the far north-east – 661,283 ha in total or 0.4% of the State's land area. Considering Indigenous occupancy, in a single recent case the Wanyji people are celebrating their accession of the remaining interest in Lawn Hill and Riversleigh stations (Boodjamulla), 539,000 ha.

However pastoralism remains the pre-eminent land-use and properties held by mining or Indigenous interests are commonly still grazed. Historically, pastoralism legitimised occupation of the land and was the primary reason for establishment of townships and

infrastructure that also service other activities. Pastoralism is deeply embedded in the culture of the 'outback' and a presumption that pastoralism will continue to be the primary economic driver frames policy debate in Queensland and nationally.

Viability of pastoral enterprises

Grazing in the low-fertility rangelands is marginally economic and has been for some decades. Return on capital, even in good years, hovers little above zero, debt loads remain high and prices received for commodities are not improving in line with inflation of costs.

It is widely understood in scientific circles but not widely admitted in policy circles that conventional pastoralism is not well adjusted to the capacity of Outback landscapes to sustain grazing production. Factoring in drought relief, welfare and transport subsidies, there may well have been a net subsidy from taxpayers to the pastoral industry for a long time: in other words, the industry may not be paying its way, even in simple headline financial terms. Novelly & Warburton (2012a,b) estimated that at least 30% and possibly up to 60% of pastoral leases in Western Australia are no longer commercially viable as grazing enterprises. Their analysis has been contested (see Varischetti & Bell 2014) and relates to Western Australia not Queensland so is not necessarily a reliable guide to the Queensland situation. However, Holmes (2015, drawing on McLean et al 2014) estimated that 80% of family businesses across the northern beef regions were financially unsustainable: "There was no evidence that there had been any significant change in this finding over the twelve years examined." (p.2).

If 80% of the family-owned businesses in the subject region are financially unsustainable, then it is reasonable to describe the industry as economically unsustainable.

The Queensland State Government of 2012-15 under Premier Campbell Newman identified 'agriculture' as one of the four pillars of the Queensland economy deserving focused government support (along with tourism, resources and construction). However, agriculture cannot be a 'pillar' unless it is financially viable on an ongoing self-managing basis, that is, without having to rely on subsidies or stop-start grant programs.

Pastoralists now compete in a globalised economy without many of the tools that would help them to do so, or some of the favourable conditions enjoyed by international competitors. Their costs, set in Australian dollars, rise in accordance with domestic economic forces outside their control, while the prices they receive are set in international commodity markets trading in US dollars, also outside their control. Land prices are high relative to the capacity for the land to service interest-bearing debt. The size of the average property needed to sustain the basic family unit has been rising so that a large number of pastoral properties no longer have sufficient land to accommodate the ebbs and flows of seasons.

Authentic statistics on the profitability of individual enterprises are difficult to obtain, partly for reasons of privacy and partly because many properties are not run as stand-alone entities but are operated in conjunction with other businesses, with off-farm income or with family partners. There are other ways to assess financial viability through indirect sources, such as the level of access to social security benefits or support services provided by civic agencies. Confidential anecdotal evidence in 2007 from a financial planner familiar with the south-western mulga lands was that 85% of properties in the region were marginally profitable and that only 5% of the properties with which he was familiar were in a favourable financial position. Parents 70 to 80-years old were running properties because the children could not afford to take over (though unresolved estate planning is an accompanying factor).

Valuable statistics from a confidential survey managed by AgForce have been summarised by Eves & Blake (2013). The data relate to the period 2006 to 2010 and were segregated according to year, enterprise, type of tenure and gross farm income band. Over the five years, average

income returns varied from -1.8% for the smaller properties to -0.14% for properties with gross farm income of \$500-750,000. The average masks annual variation, such as in three years of low profitability in 2007-09. Income returns in 2010 for leasehold land were better: they ranged from 1.41% for sheep properties to 4.2% for mixed farming properties. Ranked according to length of ownership, in 2010 the average income return was 1.9% for properties held less than five years, 3.0% for properties held more than 20 years. The average of 2.9% that year compares with investment in the residential property sector (4.9%) or industrial property (9.7%).

Separating short-term fluctuations from enduring conditions is difficult. In 2010, after extensive summer rains, graziers could have been excused for being optimistic that perhaps the good times had returned.

Holmes (2015:2) described a number of improvements to infrastructure, breeding and husbandry techniques such as vaccination over the past 40 years that ought to have improved herd productivity in the northern beef regions at little or no cost to producers; and further that “Although there were regional differences in average herd productivity, indicating that landscape productivity played a part, most herds in all regions performed well below the potential shown by the minority of highly productive herds in those same regions.” He concluded that the primary cause was lack of “financial literacy and business skill”.

Yet Rees (2014) demonstrated that prices received for farm commodities have deteriorated more or less steadily for 40 years, suggesting that there is a systemic problem that cannot be remedied by more education:

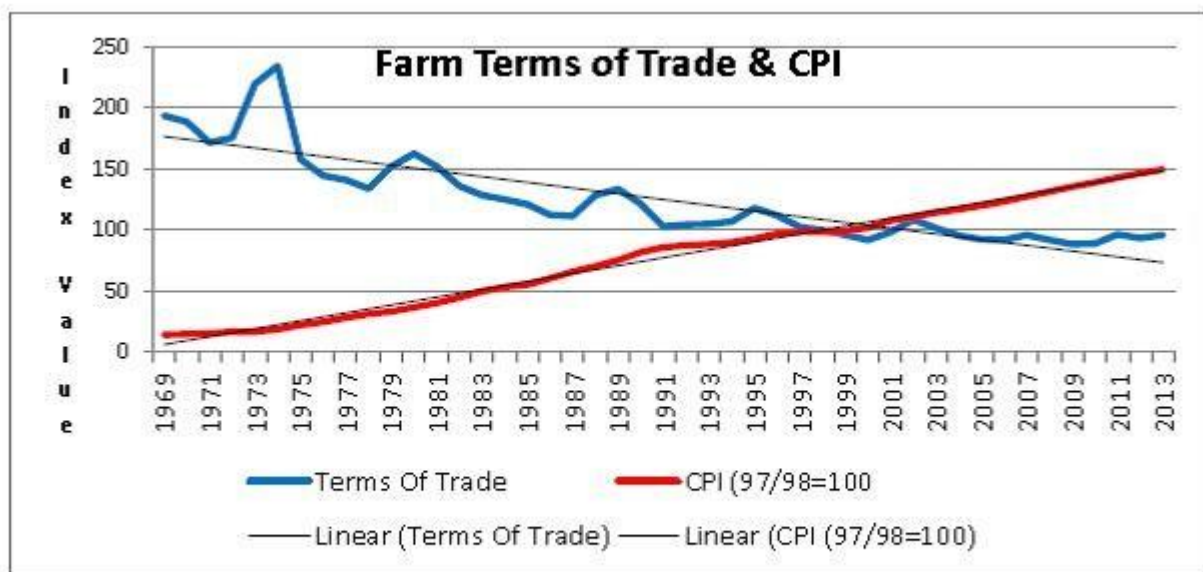


Figure 5. Farm terms of trade and inflation

Source: ABARES Commodities Statistics 2013, Table 13

Low income and debt are two sides of financial incapacity. The situation may be different for large corporate enterprises with foreign partners or clients, but an analysis of their financial structures is outside the scope of this report.

The net effect of banking practices and inappropriate means testing of support payments has seen significant numbers of productive farmers reduced to relying on urban charities for food and sustenance. Katter opined (2016: ix) that “Without the generosity of urban dwellers, some

parts of rural Queensland would have collapsed into third world poverty.” It is no argument against the statistics presented by Katter that many farm businesses are profitable; or that optimism prevails in some sectors and some towns. Yet trucking convoys of hay bales and baked beans from the coast across Queensland’s vast horizons is no pathway to sustainability.

Rees observed that drought and the live cattle export ban compounded global financial crisis (GFC) dislocation. “Pastoral Queensland became engulfed in events beyond farm gate control. Those events were strongly policy related resulting in falling farm real incomes, collapsing land values, and [declining] enterprise solvency.” The malaise is readily explained in terms of orthodox economics: “Farmers purchase inputs in markets that are also similarly monopoly structured. Consequently, agriculture operates under a hybrid market system in which purely competitive sellers experience severe disadvantage selling into and purchasing from monopoly structured input and output markets. Real farm income must decline under such market power imbalance” (Rees, Appendix 4 to Katter 2016).

Pastoralists have no ready defence against bad policy settings other than better policy.

An economic primer

Rees (2014) explained that general equilibrium models deriving from neoclassical economics have institutionalised market theory as the analytical basis of policy in Australia. These models assume that agriculture operates in a purely competitive economy in which all markets clear. In flexible markets, supply creates demand (Say’s Law). This assumes away any deficiency of demand. As the growth model assumes constant returns to scale, if inputs are doubled, output doubles, so productivity and competitiveness become the only important barriers to a profitable agricultural sector. This approach quickly elides into pressure to reduce input costs, otherwise known as ‘blame the victim’.

Engel’s law observes that as income rises, the proportion of income spent on food falls, even if absolute expenditure on food rises. Engel’s Law establishes declining returns to scale. Declining returns to scale counters mainstream economics’ solutions of efficiency, productivity and international competitiveness. Engel’s Law explains why steps to improve economies of scale render farmers prone to generate indebtedness as they borrow to apply technology and capital. The result is over-capitalisation and an inefficient production base, without a rising income flow to support the additional debt.

It is conceivable that demand for food and especially animal protein in underdeveloped countries may lead to improvement in prices for the commodities that Australia can produce, but Queensland farmers cannot rely on this prospect for sustainable income. Climate change is already reshaping world agriculture with a great deal of future adjustment already inevitable. The best preparation is to strengthen the sustainability credentials of Queensland farming and to increase the productive condition of the asset base.

Rural debt: The Katter report

The report of the Queensland Government’s Rural Debt and Drought Taskforce of April 2016 (Katter 2016) gives the best modern summary of profitability and debt loads. The report is well informed by rural sources and clear-sighted about the gulf between the interests of the financial services sector and those of the farming sector. The report identifies four limbs of the financial squeeze into which pastoralists have been wedged. These are inflation of asset prices (with concomitant lending practices); inadequate farm income; incompetent policy remedies such as household support schemes; and drought. The following graph from page vi summarises one limb of the challenge, bank lending practice.

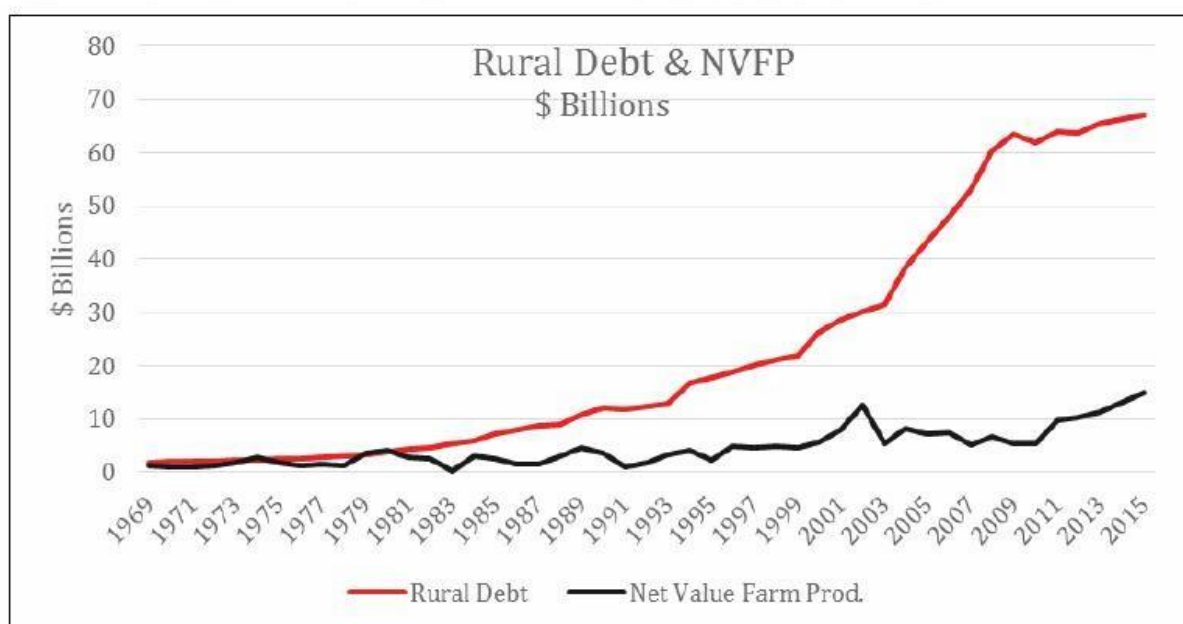


Figure 6. Rural Debt and Net Value Farm Production, Australia 1969-2015.

Source: ABARES Australian Commodity Statistics 2015 and earlier editions. Debt from RBA Statistics.

The Senate Rural and Regional and Transport Committee pointed out in a report in December 1994: “There is little doubt that following deregulation in 1983-84 the banks, in pursuit of market share in the face of heightened competition, made loans based on security levels offered by existing equity but without sufficient regard to the capacity of clients to repay.” (Rees 2015a:1). This propelled lending practices on a trajectory disconnected from the needs of the clients and rendered farm loans vulnerable to asset price inflation and not serviceable by normal farm incomes, that is, the sale of commodities. Rees continued:

“The policy assumption was that rising asset values increased wealth of asset holders. Increased wealth was expected to encourage investment and improve economies of scale, lift on farm efficiency, increase productivity; and, achieve international competitiveness. The converse of this policy approach is that collapsing land values confiscates wealth as asset values fall. Meanwhile liabilities remain constant to rising. The post GFC imbalance between assets and liabilities is now the policy problem. Political wishful thinking that contemporary historically low interest rates will somehow restore wealth levels and rescue the sector is fanciful.” (p.4).

Holmes (2015:5) observed that “the financial institutions were complicit in inflating this bubble [from 2004-11] by relaxing lending standards and are now paying the price, along with the pastoralists who did not understand what they were doing at the time.” The unserviceability of this debt was also confirmed in Bastin et al (2008:xvii): “Land values increased appreciably between 1992 and 2005 across most of the grazed rangelands – far more than could be accounted for by increases in real productivity.”

While asset values have subsequently been widely revalued downwards, the outstanding loans have not followed suit, leaving some producers who have never missed a payment exposed to accusations of insolvency. A survey of participants in the Taskforce deliberations

(farmers and business people) indicated that 57% would require to renegotiate finance during the following year (2016) and 25% had been requested by their financier to sell assets.

How will the unserviceable load of rural debt be annulled? This challenge is not further addressed in this report. The cash flow that the stewardship scheme would direct towards producers would not be intended to ameliorate legacy debts, but to cover current running costs. The debt burden is mentioned here primarily as it is evidence of financial unsustainability, or at least a disconnect of the financial markets from land productivity.

Costs to the public purse

The above analysis identifies the financial cost to individual enterprises. But there are large costs to public budgets which are framed in accounting terms without systematic attribution to causes. A report by the National Farmers Federation and the Australian Conservation Foundation (NFF 2000) identified “problems like salinity, habitat loss, soil degradation, and river degradation and pollution” as being “clear warnings that landscapes are not being used or managed sustainably.” As well as causing production losses that undermine farm viability and turn up as costs to the welfare system, degradation causes “the corrosion of rural and regional infrastructure such as roads, railways, pipes and buildings. These problems also impact upon biodiversity and natural places, and upon industries, such as tourism, that depend upon these values.”

Tenure canvas: condition and trend³

Rangelands properties in Queensland are mostly held as pastoral lease or perpetual lease, although there is a smattering of freehold and freeholding leases. Traditionally the more remote and more arid stations were held as pastoral leases while the better quality soils through Central Queensland were held as perpetual leases. Most arable (cropping) land such as on the Darling Downs is held as freehold. The table below sets out the statistics but contains some ambiguous classifications. Some broadacre leases for grazing are classified in the records as simply ‘term lease’. Pastoral leases have traditionally been a form of term lease, for 30-50 years. ‘Leases’ may have been issued for not only pastoral purposes but also residential, business, government, charitable, clubs and communication purposes. For the purpose of this paper, the total of Pastoral holdings and GHPLs, 51% of the land area, can be deemed to approximate the pastoral zone.

Tenure	Number	Area (ha)	% of State
<i>Pastoral holding</i>	<i>1,077</i>	<i>69,422,314</i>	<i>40.3</i>
<i>Grazing homestead perpetual lease</i>	<i>2,410</i>	<i>18,559,795</i>	<i>10.8</i>
Term and misc. lease (some for grazing, some over NP or SF)	8,483	18,763,503	9.5
Permit to occupy, occupation licence (insecure)	4,615	1,173,051	
Road licence	4,288	28,905	
Freeholding lease (contract to freehold)	1,105	2,546,849	1.5
Reserve (community purpose)	29,175	733,356	0.5
Reserve (operational, incl. rail corridors)	9,701	901,422	0.5
Dedicated road		3,438,315	2
National park & State forest	1,626	10,579,293	6.2
<i>Freehold</i>	<i>1,606,623</i>	<i>48,415,144</i>	<i>28.1</i>
Unallocated State land	18,984	971,992	0.5
TOTALS		172,354,219	100

Figure 7 Land Tenure in Queensland.

Source: <https://data.qld.gov.au/organization/natural-resources-and-mines?q+tenure>. (17.6.16).

Government attitudes towards the respective merits of leasehold and freehold see-saw as administrations change complexion. Labor has traditionally viewed the leasehold system as a tool for achieving public policy objectives such as retaining flexibility to reassign land use; conservative administrations have traditionally not only encouraged freeholding, but from time to time have offered generous terms by surrendering some of the State's equity for little or no financial consideration.

The stewardship scheme outlined here can be applied to all tenures, although the case is stronger for leasehold. The scope of the scheme is on-property management within the existing statutory framework, meaning that it would not rely upon any changes to tenure or regulation.

A number of instruments including caveats, statutory covenants, common-law covenants and contracts, administrative advice agreements, *profits à prendre*, mortgages, carbon abatement interests, lease conditions and subleases are available to share elements of ownership. For example, s.97E of the *Land Title Act 1994* makes provision for a profit à prendre by which the ownership of a product such as carbon can be separated from the ownership of the land. These instruments are given effect more or less only with the consent of the landholder whose property they encumber.

Any of these encumbrances on title could be used to secure a stewardship grant from the public purse against non-performance, but this legalistic step is not considered necessary. An incentives scheme can be run effectively on the good faith of the participants, fortified by regular monitoring. At all stages of the process, the risk of non-performance would be low.

Policy and governance canvas

History of settlement

Australia's pastoral lands were originally allocated by generous and semi-arbitrary grant or negligible rent, a legacy of the periods when the convict colony faced starvation and later, when the colonies needed income. Grazing rapidly outgrew administratively legitimised boundaries and led to squatting. The British administration termed unsurveyed areas beyond settlement as 'wastelands' of low economic value.

Although more egalitarian and diverse than English class distinctions of the era would have allowed, pastoralism was ranked above agriculture and most other pursuits. Squatters followed explorers, timber cutters, whalers and sealers and other agents of pioneering. The landed class and squatters were often the one entity, pushing out the boundaries of existing tenure, growing rapidly in power and influencing early colonial governors to their advantage (Kingston 1965).

A relatively small number of enterprising people in the right place at the right time acquired vast properties and fortunes for themselves and descendants. Most of the best grazing lands were taken up by the mid-1800s, with many of the policy settings in place before Queensland separated in 1859. The Indigenous inhabitants were displaced and marginalised through extensive and bloody conflict at the frontier. Government reined in pastoral expansion a little to retain land for stock routes, water reserves and towns. The leasehold regime allowed discretion for the State to retrieve land for such public purposes, even during currency of the leases. (This provision survives today – s.208, *Land Act 1994*).

Stock levels rose rapidly on soils with fertility accreted since the end of last Ice Age, especially during runs of wet years. Recurring droughts (normality) had devastating effects on rapidly degrading land.

During the first half of the 20th century, Australia became proud of its pastoral production, particularly as a source of food and fibre for the mother country and a source of foreign

exchange. Soldier settlement schemes were instigated, some large holdings were subdivided and railways were extended far from the coast. Pastoralism embedded itself in the national consciousness and became an integral element of Australia's self-identity.

Pastoralism's pre-eminence fades

After the 1950s, the status and profitability of pastoralism began a decline which continues to this day. The proportion of the national income attributable to rangelands pastoralism fell, competition with other producers intensified, the United Kingdom entered the European Economic Community (1973) and anti-protectionist sentiment built up within the policy community, including opposition to charging domestic consumers more to subsidise exports. Australia signed up to the General Agreement on Trade and Tariffs (1947) and then in 1995 the World Trade Organisation. It led the Cairns Group which – largely successfully – advocated abolition of production subsidies and exposed farmers in compliant countries to international market prices for farm commodities. The National Farmers Federation took an unambiguously free trade position. The terms of trade continued a relentless decline, in common with other producing countries around the world.

Abolition of the round robin that saw producers earn higher prices was collateral damage in the removal of export subsidies and reduction of prices for consumers.

Pastoralists still have political power, but their political representatives wield it in sometimes incoherent or mutually inconsistent ways such as to secure government assistance (for enterprises supposed to be proud of their self-reliance) or to squash policy responses to climate change (accepted by most landholders to be a significant threat – ABC *Four Corners* Episode 5, 5 March 2018).

Appendix A to NRMMC (2010) constitutes a table of national rangelands initiatives from 1999 to 2009. The final action listed was the preparation of a list of principles, reproduced here in Appendix 5. The principles are consistent with those espoused in this report, but in sum are lightweight. They do not address the failure of market forces to address these decade-long shortcomings; and they do not plead for new funding.

The National Rangeland NRM Alliance was established as a network of the 14 rangelands natural resource management bodies. In c.2011 it led the development of the Australian Rangelands Initiative, a collaboration with rangeland organisations, authorities, land managers and interest groups. The Australian Rangelands Initiative proposed a focus on:

1. Building a national rangelands agenda to create awareness of their importance and a commitment to implement the 'National Principles for Sustainable Resource Management in the Rangelands'.
2. Demonstrating how this can be achieved by targeting groundcover as a driver of soil loss, biodiversity and carbon storage.

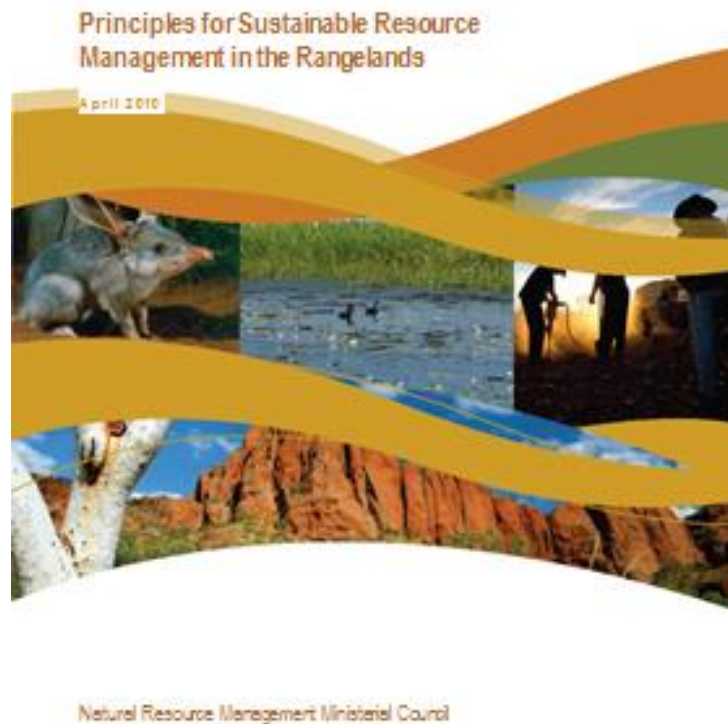
Little progress has been made as no funding has been made available to allow the participants to do anything much more than they previously were able.

The 2016 *Final Report* of the Great Barrier Reef Water Science Taskforce (GBRTF 2016) recommends actions to achieve the Queensland Government's reef water quality targets (reduce nitrogen run-off by up to 80 per cent and sediment run-off by up to 50 per cent) and the priority areas for investment. This is one of the latest prominent examples of pressure to spend public money to improve the management of Queensland's landscapes on account of off-site externalities from farming (among other causes), particularly those carried to the Reef

via watercourses. The findings align neatly with the analysis in this report. Extracts are included in Appendix 5.

Interestingly, stewardship payments are mentioned in the report under the category of “market-based incentives”. This usage is unusual, as incentive payments are commonly dismissed in economic analysis as merely inefficient and poorly targeted grants by government. However, the usage is quite correct, as these are payments for goods and services rendered; and they would be voluntary, negotiated personally and contractual. The payments described in this report are indeed market-based, with a public organisation upholding one end of the exchange.

In the 2018 federal budget, some \$444 m was allocated to the Great Barrier Reef Foundation to tackle crown-of-thorns starfish, reduce pollution into the reef and mitigate the impacts of climate change, demonstrating that taxpayers’ money can be found for a purpose enjoying official blessing.



PART 3: EXPLANATION OF CONCEPTS

Any analysis needs a solid logical foundation if it is to yield trustworthy conclusions. In science, the foundation comes from the peer-reviewed canon built up since the publication of the first refereed journal (in English by the Royal Society of London, 1665) by individual scientists piecing evidence together. In socio-economic affairs, human behaviour is heavily influenced by established institutions, social norms and personal values and beliefs and it is difficult to establish a normative foundation. These influences vary from place to place and evolve over time. In this section we explain some concepts that are pivotal elements of the foundations of the model.

Property rights⁴

Colonisation proceeded in Australia from 1788 on the assumption that the Crown held title in each colony and was entitled to allocate land and resources to persons and companies for development, production and private enterprise. The recognition in 1992 of prior rights under common law (native title) has not disturbed the fundamental pattern of settlement: private title (freehold and leasehold) is superimposed upon a fabric of land held by the State on behalf of the citizens, even if now known in turn to have been imposed by force upon a canvas of Indigenous custodianship.

Superimposed upon title is a raft of regulatory restrictions enforced by governmental authority – State, local, Commonwealth. The legal canvas reflects the community's norms or expectations, expressed in various disaggregated and sometimes contradictory ways – such as through peer pressure, journalists' commentary, neighbourly practices and local customs.

Property at a site consists of a bundle of entitlements to occupy a natural resource, often separated for administrative convenience into land, water, vegetation and other elements. Title holders then have the prerogative to manage within the terms and conditions of their title, also subject to other restrictions imposed by regulation, contract, common law and community norms. By principles of English common law evolved over several centuries and applicable in Australia, no landholder has the legal right to inflict damage on other persons' property. This includes the residual or neighbouring commons such as roads, water frontages and public land as well as private land held by neighbours, downstream users and State lands such as national parks. It places limits (rarely litigated) on creating pollution such as salinity or mine tailings dam runoff.

The absolutist property right does not exist, and never has. Even in the traditional village, long before representative government, rights were held subject to the consent of the customary owners, and therefore the community as a whole.

Every entitlement in the bundle is a social construct, a complex mixture of rights and obligations, with the obligations being inherent in the property itself and not simply nuisances imposed after the State has granted entitlement.

For each element there are many stakeholders. Some will have a proprietary legal interest; many more will be directly and tangibly affected; many more again, arguably all Australians, will have an intangible stake in how that property is managed. Also, nowadays the descendants of the local Indigenous peoples have a legal stake in property wherever native title has not been validly extinguished, as well as a cultural stake everywhere.

Governmental activity is critical to the protection of the freedoms and rights that owners cherish. It is legislation that defines property, preserves the entitlements and specifies the obligations. Legislation constrains the expectations that others might have had. Without

government, there is no property and no market to accept intervention⁵. Legislation (the *Acquisition of Land Act 1967*) and the common law protect owners from expropriation without compensation, even for a specified public purpose.

Most of the natural resources and ecosystem services which underpin the continued productivity of land are not identified in the property title. These include the atmosphere, climate, connections with bush remnants, common resources such as fish and fauna, catchment conditions and groundwater.

A stewardship conception of property draws the mutual obligations held between the title holder and society *within* the boundary of the property right rather than deeming them to be *external* to the title, as assumed by property rights advocates. Ownership of property is dependent on acceptance by non-owners (Gleeson and Piper 2002).

The stewardship conception also casts environmental regulation into its proper perspective. Instead of being an infringement on private rights, it is an attempt by society to ensure that the obligations it desires or requires are met. The stake that the landholder has in the ecosystem services from broadacre properties is less than the stake the community holds. Private property regimes derive from the common property, which is owned by all citizens collectively (subject to native title). Damage caused by poor management practices is an infringement of the residual property rights of the community. Reeves (2002:ii) noted that “The claim that farmers ought to be compensated for restraints on their freedom to use their land as they see fit can be readily opposed by a claim that those who receive ecosystem services ought to be compensated for reductions in the supply of those services brought about by agricultural practices”. This lose-lose debate is bypassed if farmers are compensated not for negative restraints on freedom but for positive production of (environmental) goods. Reeves goes on to argue that a reframing of the debate as a “structural adjustment issue” may provide the best way forward. The Queensland Government took this approach when it allocated funds for property management planning and adjustment in association with tree clearing controls in the early 2000s – not compensation for imposition of new laws.

Note that the obligations are genuinely mutual: just as a title holder has an obligation to care for the natural assets, so society should make available to the title holder the tools necessary to facilitate stewardship as well as to create private wealth that can feed into general prosperity. The tools include, as well as a reliable title, the best possible multi-disciplinary information about the natural assets and how to manage them. The corps of translators who used to perform this service have been declared redundant from successively the public service and the NRM regional bodies. The most recent tool, the NRM Spatial Hub, has been shifted to cost recovery which kneecaps its ability to serve the landholders for which it was designed.

Global warming gives a sharp edge to this logic. Given governments’ capacity to digest information, construct infrastructure and apply penalties and incentives, government has a duty to help the community cope with external forces such as increasing climate variability, successive natural disasters and peak oil for which landholders cannot be expected to take personal responsibility. Society also has an inherent obligation not to trap landholders into continual unprofitable servitude by ceding oppressive powers to other entities such as financial institutions, trade agents or foreign corporations.

To recapitulate: the scheme proposed here is not compensation for lost property rights, as no property rights (the rights inherent in the land title) would be infringed. In any case, ‘compensation’ implies a one-off windfall whereas what is required is a steady stream of earned income based upon steadily improving land condition.

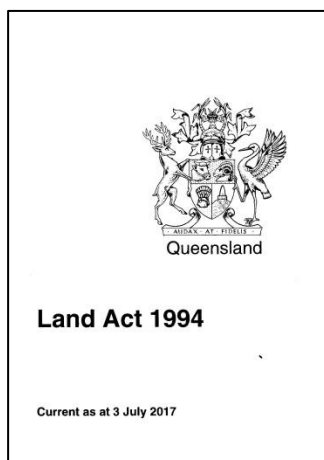
Tenure as a tool of policy

From the earliest days of European colonisation, leasehold tenure was viewed as a method of allowing occupation and economic investment while retaining the government's flexibility to allocate the land for different purposes as settlement expanded and community needs changed. Upon freeholding, this flexibility evaporates.

Tenure as an instrument of policy has dropped from policy discourse since the *Land Act 1994* was passed in a climate of optimism that the State could be a benevolent and environmentally supportive landlord. This is partly because of Treasury's relentless cost-cutting. Also, tenure is absent from the prevailing economics' typology of government activity, commonly classified three ways into regulation, market instruments and suasion. (This classification is muddled: tenure is missing and it overlooks that markets are a creature of regulation).

The leasehold system with its voluntary acceptance of individually tailored contracts spelling out direct and transparent mutual obligations in a landlord-tenant relationship is more of a free-market approach than a system of government regulation imposed by third party authorities regardless of tenure. Commercial property is widely held under leasehold from private landlords and is understood in this light.

The justification for leasehold has not rested on any notion that the State is a 'better manager' than private landholders, for the lessee is unquestionably the manager. Rather the justification rests on the capacity of leasehold to serve both landholder and public policy objectives which cannot be satisfied through market forces. Leasehold with a public landlord is fundamentally distinct from the primarily economic relationship between a private landlord and tenant.



Stewardship provisions in the *Land Act 1994* include:

- duty of care (s.199) – itemised for pastoral leases
- land use restricted (s.199A)
- noxious plants condition (s.200) – distinct from the tenure-blind regulatory obligation
- lessee must give info on request (s.201)
- may be tied with another parcel (s.205)
- may be resumed without compensation (s.208)
- non-performance is ground for forfeiture (s.213)
- land management agreement (s.176U-XA)
- remedial action notice (s.214).

The discussion paper *Queensland State Land – Strengthening Our Economic Future* issued by the Newman government late in its term (2014) outlined an agenda to wind back the State's role in protecting Queenslanders' public estate. It portrayed the 'economy' as the overriding concern of government; suggested that lack of security of tenure is hobbling investment in agriculture, tourism and other commercial enterprises; equated 'security of tenure' with freehold; and proposed that a range of statutory functions designed to protect the public interest in public roads, stock routes and reserves be abandoned by the State Government to local government. None of these assaults on the public interest dimension of the leasehold system will do anything to reinvigorate the rural economy, as the causes of rural decline lie elsewhere.

Paradoxically, the proposed reforms risked stifling economic activity. The money required to finance freeholding of leases would transfer financial capacity from graziers inland to bankers on

the coast along with a short-term 'sugar-hit' injection to the State's budgets: a form of asset sales, rather than a long-term investment in productive economic activity.

Conservative governments' long-standing preference for freehold over leasehold, supported by AgForce and much other senior agricultural opinion, has been intensified by a number of contemporary trends. Pre-eminent is the cost-cutting and downsizing within the Land Administration branch of the Department of Natural Resources. Some transactions within the leasehold estate take years to consummate, leading to justified frustration by applicants. Given that most applications are approved eventually (approval is administratively easier and avoids arousing the hostility of applicants), to outsiders the mechanical procedures seem pointless. The network of District Land Officers and Inspectors who in an earlier era used the tenure tools to achieve public policy objectives has been largely dismantled.

Another contemporary trend has been the increase in scope of regulatory controls over land use. Vegetation management controls dating from 1999, the Commonwealth environmental legislation, environmental regulation generally, heritage controls and town planning schemes are mostly tenure-blind. These have narrowed the gap between the controls over land use on freehold and leasehold proprietors, making leasehold seem redundant.

Further, the neoliberal preference for market-mediated rather than public agency-mediated solutions has placed advocates of the leasehold system on the defensive. For example, restrictions on ownership of grazing homestead perpetual leases by corporations, intended as a social justice bulwark against overweening commercial pressure on family farms, now seems quaint in the face of the nation's almost unrestricted invitation to foreign corporations and governments to buy up Australian rural real estate.

Two major impediments have prevented wholesale alienation of the leasehold estate: the advent of residual native title from 1992; and the cost of conversion. Market prices of similar leasehold and freehold properties in the same district have long been comparable⁶, indicating that leasehold is viewed as a secure tenure and that renewal is viewed as more or less automatic (which it is). The price differential has eroded over time, obscuring and subtly weakening the State's residual interest. The requirement to pay the State again, even at a discount rate, to buy out its interest, when the pastoralist can continue occupation with payment of only a small annual rent, is an obstacle to doing so.

The above trends, which have accelerated since the Land Act received its last major revision (1994), warrant a reconceptualisation of the purpose of leasehold and its value in the neoliberal era. However, the leasehold system even in its current form has two features relevant to a stewardship scheme.

Terms and conditions of tenure

Although as mentioned much new regulation applies across all tenures, leasehold remains fundamentally distinct from freehold. Apart from the obligation to pay rent, leases are limited in purpose, are subject to mandatory conditions in the *Land Act 1994* as well as specific conditions in the lease, and may expire after a period. Many of the mandatory and specific conditions, such as s.199 (duty of care) and s.201 (requiring lessees to report upon the condition of the land if asked), are aimed at encouraging sustainable management. Leasehold offers the potential to apply the State's technical knowledge in a coherent policy framework on a property-by-property basis. The State is able to use conditions of tenure, transfer to an incoming purchaser or looming expiry to assist tenants on their journey to sustainability as well as achieving specific policy objectives, such as retrieving land for national parks or controlling the clearing of vegetation.

Nevertheless, there is little evidence to suggest that leasehold properties have been better managed or more profitable than comparable freehold ones, indicating that despite the pro-

sustainability orientation of the Act, the State has been a passive landlord. Arguably, this has been a consequence of inadequate resourcing, lack of recruitment of suitable staff able to apply these tools and lack of political support by government.

From 2001, the Department made a valiant attempt to rise above the status of an absentee landlord. It launched the *State Rural Leasehold Land Strategy* with a *Discussion Paper* in 2001. The initiative is explained in DERM (2011a) and AgForce (2016). The proposed strategy was later consulted extensively with peak rural bodies and graziers, including by way of public meetings held throughout Queensland. It culminated in signing of the *Delbessie Agreement* in December 2007 by the Queensland Government, AgForce and the Australian Rainforest Conservation Society. The purpose of the agreement is outlined in Barker (2008) and in Appendix 4.

In the absence of grant funds to reward improved management, the Department could offer only improved security of tenure and obstacles to transfer of non-participating properties. Nineteen million dollars were allocated over four years, but this was largely for the cost of administration. Nevertheless, these were solidly grounded and potentially appealing incentives with a strong prospect of eventually rippling through the pastoral zone. Delbessie was abandoned by the Newman Government in November 2012. The present scheme aims to revive the broad scientific rationale of the Delbessie project, with the addition of economic analysis to justify injection of public funds; an enhanced role for the regional NRM bodies; but without a role in reviewing conditions of tenure. Had governments continued supporting Delbessie, for all its bureaucratic overheads, this paper would not have been written, at least in this form.

Under the present scheme, the reward for improved management would be financial, not tenure security. If the authorities revive Delbessie as an entirely State-run project, that reward system could operate in parallel and the two systems could be complementary. This paper adopts the stance that tenure administration should be quarantined from negotiations over non-market financing of improved management. Enforcement of the contractual conditions of lease is a compliance matter for the authorities. The administrators of this stewardship scheme need have no role in reviewing the status of title or compliance with its terms.

To achieve its potential, a revived Delbessie should include two new features. First, it should be preceded by regional and district-wide strategic land-use planning (discussed later) to confirm grazing as the most appropriate long-term use of the subject property and that the property isn't going to be required for, say, national park or mining. Second, financial incentives under a stewardship program should be separated so that the lessee is not rewarded twice. Delbessie should be seen as giving effect to the landlord-tenant relationship; a stewardship incentives program is a program to earn income from otherwise unacknowledged production. Paying landholders as well as extending the leases for a similar improvement in management amounts to a free gift of the State's equity.

A modest legislative change may be required to permit lessees who hold a lease for grazing to destock. Legislation could specify that any lease for pastoral purposes can be deemed also to be a lease for landscape restoration or conservation.

Landlord's responsibility for periodic renovation (lessees' perspective)

When private houses or commercial properties are let, normally the tenant is responsible both for routine maintenance and for making wilful damage good. However, the landlord is responsible for making good 'fair wear and tear', such as results from continuous occupation over time by reasonably careful tenants⁷. Rents cover the cost of this renovation, commonly carried out periodically such as when the tenancy changes hands or when re-painting is due. Nominally some 10% of total rent income might be placed in a trust fund to make good this depreciation from time to time. Wikipedia explains that "Wear and tear is a form of depreciation which is assumed to occur even when an item is used competently and with care and proper

maintenance". The distinction between maintenance and wear and tear is well-established in case law.

If this same principle were applied the pastoral estate, the State would monitor the condition continuously and continuously inform the tenant of the performance indicators. It would oblige the tenant to repair acute damage or abuse, but would itself be responsible for periodic rejuvenation of the property. This can be conceptualised as a *landlord's responsibility to maintain the quality of their asset* rather than a gift to a private commercial occupant, consistent with the common law. Given that fair wear and tear is inevitable on any pastoral property – such as when an irruption of kangaroos descends from nowhere, overwhelming the pastoralist's conservative stocking rate – here is a justification for allocating taxpayers' money to leasehold farms for Landcare-type works – in other words, stewardship incentives.

This would not be the only justification for a public payment, for as explained elsewhere, the inability of market forces to reflect the true cost of sustainable production legitimises some remedial action by the state for freehold and leasehold properties alike. However, the landlord's responsibility strengthens the case for payments to leaseholders and steers toward giving them priority in the scheme over freehold owners.

Landholder sovereignty

For both leasehold and freehold land, landholders have wide powers to manage their properties and to decide whether and how to develop them. Under both classes of tenure, a landholder enjoys possession (subject to native title), is entitled to peaceable enjoyment of the property and can eject trespassers. This fundamental *sovereignty* or authority to manage has its roots in common law and originated as a protection for landholders against capricious or unjust exercise of force by mediaeval kings. It is however overlain by various positive obligations to undertake certain activities; and negative obligations to refrain from certain activities, as explained above.

This sovereignty has both favourable and unfavourable implications for our quest. It means that landholders generally cannot be forced to carry out works (such as fencing watercourses) against their wishes unless it is already a condition of their lease or some new statutory permit. So, changes in community expectations or tangible incentives may be necessary to persuade landholders of the merits of certain works. Also, improvement works cannot be negotiated *en masse*: they must be negotiated one by one; no single spokesperson can bind every landholder; they are all independent proprietors. Conversely, if landholders agree with the proposed scheme, they bring their own sovereign powers to support it. It is, ultimately, landholders who decide whether to undertake works on their properties.

Duty of care

Duty of care is a concept well understood in law. It is best to confine the term 'duty of care' to the *legal duty* and not to draw the broader voluntary standards of stewardship into the definition. The legal, mandatory duty of care takes two forms:

- *common law duty of care*: requires that each person takes all reasonable and practicable steps to avoid causing foreseeable harm to another person's property or their use or enjoyment of it. Centuries of case law underpin the principle. Note that unlike the statutory duties, it is not a duty to the *land* – the doctrine of *environmental* duty of care is undeveloped at common law (Reeves 2002);
- *statutory duty of care*: gives the common law duty statutory force and extends it in new directions. In Queensland there are four relevant duties of care by that name: a statutory general duty on all Queenslanders not to cause environmental harm (s.319,

Environmental Protection Act 1994); another on occupiers of State land (s.199, *Land Act 1994*); and duties of care under the *Aboriginal Cultural Heritage Act 2003* and the *Torres Strait Islander Cultural Heritage Act 2003* to protect and conserve areas of cultural significance.

The duty of care also requires observance of all relevant regulatory restrictions. It is highly circumstantial but that does not render it insubstantial or vague. As one scans the State, regional, catchment, district and locality scales to focus on the property scale, the duty of care develops increased meaning and precision.

Defining the duty of care is a central challenge in any proposal to grant public funds to landholders. Critics of incentive payments should keep in mind that while the duty of care sets a high standard in principle, it sets a quite low standard in practice. Probably a majority of properties satisfy the expectations of their local communities, even if they don't satisfy the expectations of scientists and conservationists observing continued deterioration of environmental indicators state-wide. Properties cannot be evaluated against the conservation ideal, which is arguably no grazing at all.

Another dilemma is that the worst-managed properties, the ones infested with weeds or riddled with eroding gullies, are the ones that most need remedial expenditure, but are most guilty of failing to meet the duty of care. The dilemma is best resolved on a property-by-property or even paddock-by-paddock basis. One solution is to contract payment of public funds once the landholder has improved the property to a minimum standard.

The Direct Action system of paying landholders for carbon sequestration has been criticised for gifting money unnecessarily (q.v.). The proposed incentive scheme will not and must not be used to pay landholders not to clear.

The task of preparing a property land or water management plan consultatively helps to clarify just what the duty of care really means on a specific property and helps to overcome the unavoidable generality of industry codes of practice and state-wide official guidelines. It can help to reconcile the multitude of signals generated by regional plans, legislation and policy by all levels of government, data about resource condition and trend, industry standards and local community expectations.

To adjust the duty of care, or to amend landholders' behaviour, a community and its government have a range of tools at their disposal: policy pronouncements, tenure, regulation, contract and education (Vanderduys 2003). Unilateral withdrawal of rights under tenure or contract warrants 'compensation'; the others normally don't. However, a 'reimbursement for a different form of production' can be consistent with any of the five classes of tools.

Tree clearing and compensation

When the Queensland Government introduced tree clearing controls in the early 2000s, it resisted pressure from rural industry to pay compensation to landholders unable to improve their properties' productivity. It did however establish funds to purchase properties that could be shown to have been rendered unviable; and to support property planning to help landholders recalibrate their enterprises. *No compensation was payable for the introduction of a regulatory control. No compensation should be payable to people for simply obeying the law.*

The Queensland Parliament is entitled to pass legislation to restrict without compensation the rights and privileges that landholders would otherwise exercise. Worldwide, it is unusual to pay people affected by new regulatory restrictions. Compensation is almost universally restricted to the expropriation of the real property. This principle will not be breached by the proposed incentive scheme.

Public versus private interest

The 'public interest' is the stake that society has in an issue under consideration: the interests that individual citizens and residents have collectively. Government's pre-eminent role is to secure and advance the public interest. The private interest is nominally the concern of individuals and their families, but the two concepts are intertwined. For example, it is in the public interest that commercial farming enterprises be profitable, as private profit feeds through into public prosperity. However, this does not equate to the proposition that every individual enterprise must be profitable or that profitability should predominate over all other objectives.

The public interest does not equate to just the interest of the economy. A wide range of civic, social, individual and environmental values are not achieved automatically by the market; the market is simply one mechanism amongst many⁸.

A major dilemma for policy is whether normal pastoral occupation by private family or commercial entities should be subsidised by taxpayers and if so, by what instrument. Various grant programs, such as the Natural Heritage Trust have been conceived to support land repair and remedial measures. However, the lack of a clear formula to differentiate public from private interest has hamstrung these programs and weakened their bargaining power at budget time. Toyne and Farley (2000) argued:

"Funding of works on private land has always encountered resistance within the Public Service, and particularly within Treasury, due to resistance to the idea that public funds should be used to generate private benefit. As a result the acquittal requirements for funding today are rigid, and the most practical skill of Landcare members today is often their ability to write submissions." (p.vii)...

"What obligation will there be on land managers if they are to receive the billions needed for remediation, structural adjustment and other initiatives? Surely the concept of 'mutual obligation' must be extended beyond the welfare system to the much greater personal financial benefits to be received in future by landholders. If a land manager is to receive a private benefit from public expenditure on the scale required, he or she must accept the goal of sustainable land use and accept independent verification of progress towards it." (p.viii).

However, it is not clear that there will always be a substantial, directly measurable private financial benefit in repairing land degradation. Some forms of land degradation weigh down commercial production, but some produce primarily public goods and their effects are mainly off-site.

A market-based justification

This logic explains how to overcome the objection to public funding of activities on private property. If land restoration is conceptualised as an ethical obligation alone, then it will suffer from the difficulty of convincing Treasury at budget time to fund private ethical obligations for pastoralists any more than any other sector in society. Rather, this paper conceptualises land restoration as a distinct market, which has to be funded at the consumer end because the non-commercial products are public goods with no other customer in sight. As with markets for commodities, the public goods can be measured (as either inputs or outputs in some form) and the producer paid accordingly. This rationale sits entirely within orthodox economics.

Regional government employment is a public good – as well as good economic investment

In previous times, publicly funded on-farm advisers such as soil conservation officers acted as intermediaries to advise and support landholders on their journey towards best practice. Under managerialist reforms during the 1990s and continuing to this day, the functions were allowed to wither. Partly this was a result of relentless cost-cutting within State departments,

but there has been an underlying rationalist view that as farms are private businesses, they can resort to commercial consultants if they need support.

Yet farmers will be reluctant to pay commercial fees for advice that is non-commercial in nature and may or may not produce a commercial return within a foreseeable payback period. A chicken-and-egg dilemma operates: the private consultancy industry is more or less well provisioned to supply agricultural and accounting advice but not sustainability-ecological advice. If governments wanted to withdraw from this public interest responsibility, they needed to allocate secure funding several years in advance to allow private consultants to build capacity. This hasn't happened so we now have a worst of all worlds.

As the States withdrew, publicly funded regional NRM bodies stepped in to the vacuum and served as facilitative switchyards to connect place managers with planners, the policy community, regulators, scientists and funders of various persuasions. Yet even this alternative is now withering as the funds are annually squeezed more and more.

Every business enterprise experiences pressure – through good conscience if not legal obligation – to allocate a proportion of discretionary income for measures that don't directly help their bottom line but maintain their reputation as a good neighbour or good corporate citizen. In principle, graziers are no different. In scale and significance, there are large differences.

First, farmers are directly managing our nation's land and environmental infrastructure. This is at least as fundamental to the nation's well-being as the production from most commercial firms and government-provided public infrastructure such as schools, roads and the police force. Second, if the farming business fails, the land remains and must be managed by some other entity, which no doubt will face similar challenges.

Third, if the nation's land resources are not managed effectively, Australia's capacity to be self-sufficient in producing food is significantly reduced. Since food is a strategic resource, rural land is a strategic national resource. Australia is not the food bowl of Asia and for some categories such as fish – and grain during extended droughts – it does not even now feed itself.

The incentive scheme proposed here offers a formula that allows producers to escape from the vice in which the market system has wedged them, but only for tangible production from their land and only according to measurable standards. Under some previous grant schemes, projects with high public benefit have been rejected because the private benefit was higher again. Given that this scheme is not a production subsidy, improved private production benefit needs to be and is ancillary to the public benefit gained through improved land condition. The carbon grazing theory of landscape health (q.v.) points the way to achieving these twin outcomes simultaneously.

Role of private banks

When a bank lends money it tacitly becomes jointly accountable for the rural operation. Under current settings in the financial sector, the bank extracts a private benefit from the income stream (interest payments) but contributes little or nothing to the regeneration of the natural capital asset base except indirectly if the borrower partitions their loan. A diligent bank may become involved in the economic production aspect of the business (to protect their stake), but cases where they accept accountability for the rundown of natural capital are rare. It is time for the banks to become involved. This can be presented as an ethical imperative – banks are a unique public service; or as a risk management imperative – the correlation between profit and environmental outcomes should be embedded in their risk management policies. A farm that is sending less nutrient and sediment onto the Reef is potentially a more productive farm. The banks should be required, by regulation if necessary, to employ experienced scientists to help

them discharge their under-recognised fiduciary responsibility for the environmental health of their properties.

Carbon flows and stocks

The element carbon, the pre-eminent building block of all life, is pivotal to any stewardship scheme, in several important ways. Carbon is a component of all living material, a component of the organic compounds that drive cellular maintenance and growth and a carrier of energy and nutrients. Soil carbon makes clay soils less sticky and sandy soils more sticky. It improves water-holding capacity in dry soils and drainage in waterlogged soils. It buffers both alkaline and acid profiles. It renders water and nutrients accessible to the roots. It neutralises methane. It increases the landscape's capacity to respond to rain events. It lowers flood peaks and raises dry-season flows. It feeds microlife – soil is a living, breathing entity, not just a physical prop. None of this is new: home gardeners have known it for centuries. The critical role of tree roots in bringing compacted soils and then streams to life is also part of folklore (Louis Bromfield *Malabar Farm*, 1948; Jean Giono *The Man Who Planted Trees*, 1953).

Most degraded landscapes are degraded because their carbon status is low: compacted pasture, waterlogged slope toes, eroding creek banks, boom-and-bust river banks.



Figure 8 Silt-laden creek in western Queensland (450 mm country).

From a scientific point of view, energy, nutrients and water are the three main factors of rural production. (The economic model that views labour and capital as the factors of production is myopic by comparison). Carbon is endlessly recycled between the soil, the atmosphere and the oceans via plants and microflora. Importantly for this report, by differentiating between flows and stocks of carbon, a theory of carbon management can help bridge the gap between production imperatives and environmental imperatives.

Carbon exists in relatively stable forms (stocks) such as the trunks of trees and in relatively mobile forms (flows) such as carbon dioxide in the air or soil or root hairs. Carbon stocks are simply an outcome of a flow of carbon through the landscape. Long-term carbon starts its journey as short-term carbon, when carbon transfers from the atmosphere to the landscape.

The level of stocks measured at a point in time will reflect how well carbon flows have been managed over time. Short-term carbon reflects recent management and long-term carbon reflects long-term management. Short-term carbon may escape measurement. Flowing carbon is the carrier that keeps the landscape functioning. Long-term carbon is an outcome.

As grazier Alan Lauder, formerly of “Woodstock”, Cunnamulla explained in his book *Carbon Grazing: The Missing Link* and subsequent presentations⁹, better management of carbon flows is the basis of a sustainable production system:

“A producer’s day job is recycling carbon... Graziers should be letting animals harvest only the surplus, not the means by which a usable surplus is generated. They should harvest what resides above ground after adequate carbon has flowed to all parts of the landscape, including below ground. This approach will ensure future animal production and ongoing resilience of the production base. It will also ensure better environmental outcomes, including better water quality in waterways.”

The paddock with the highest flows will be the most productive and more resilient, as energy and nutrients associated with carbon become available to plants more rapidly. Producers need to be able to imagine, on a multitude of scales and time frames, what is happening to an invisible element that can be measured only with sensitive scientific equipment. It is tempting to measure only what is visible, being the outcomes in terms of animal health or plant growth without recognising how they occur. Without understanding carbon flows, it is difficult to purposely steer paddock management towards facilitating them.

The relative condition of different paddocks after a drought breaks is reflective of their relative condition prior to the drought. Producers have no control over how much rain arrives but they can control the level of carbon flows generated by what rain does fall. Drought stress arrives sooner or more often in a paddock that is not resilient. Then financial resilience parallels paddock resilience. With lower paddock resilience, reproduction rates drop. Fattening animals takes longer and adds to the risk of involuntary selling into a crowded market.

Given the immense body of scientific knowledge about carbon and its compounds, one could be forgiven for assuming that there is no need to devote a section of this report to the subject. Yet just as outreach to rural producers generally is dis-coordinated (see Feasible Paths below), the author believes that reductionism in the scientific academy has been an impediment to developing quality materials to aid pastoralists on their journey to sustainability. Materials tend in perspective to the mechanical (focused on soil structure); botanical (focused on the composition of pastures); veterinary (focused on breeding and animal health); or economic (focusing on supply chain costs and prices). Although many individual farmers, scientists and agriculturalists have a broader understanding, extension is fragmented and market signals misaligned with the preconditions for sustainable profitability.

Institutional extension services focus on stocking rate, pasture utilisation rates and maintenance of a minimum level of ground cover. However, ground cover is an outcome, a product of the availability of previous flows of carbon to build vigorous root systems and capture water and nutrients especially after rain.

A simple example will suffice to demonstrate the need for a fresh holistic approach. It has long been accepted practice to put animals out on the fresh green pick that appears after fire or rain, as it tends to be high in nitrogen and particularly nutritious for animals that are already under-nourished. Yet this is precisely the wrong time to graze perennial grasses. In the few weeks after rain, tussocks inject carbon into the soil and build resilience. Grazing them at this time is like hacking re-sprouting shoots on a cut tree stump. Every time it happens, the roots shrink a little further and after several decapitations, the carbon reserves are exhausted and the plant dies.

Lauder demonstrated by practice and observation that grasses in the southern mulga lands require some four to six weeks free of grazing pressure after rain to allow the flow of labile (short-term) carbon to build biomass above and below ground level. Yet this is precisely the time when graziers are under most pressure to put stock back on to improve their condition and relieve financial pressures. In the late 1990s a Drought Regional Initiative research project was conducted in the region to perfect the use of plantations of old man saltbush as a refuge to support livestock in the short period after rain to allow the pastures to recover. The public benefit in terms of improved water catchment condition of paying to destock pastures following rain may well greatly exceed the cost to public budgets, if a true environmental accounting method were to be adopted.

Carbon as a tradeable commodity

An enduring scheme for sequestering carbon on pastoral Queensland is more or less inevitable, since no other mechanism is available to solidify carbon from the atmosphere in anything like sufficient volumes to make a difference to the nation's emissions. However, since the *Carbon Credits (Carbon Farming Initiative) Act 2011*, national policy has been politicised and compromised. An assessment of the contemporary Direct Action program has already been published (Blakers and Considine 2016) – a scathing critique – and does not need to be repeated here. Yet hope springs eternal that somehow the cost of refreshing rural landscapes – packaged as “co-benefits” of carbon policy – can be conjured up from corporations or the Commonwealth via the awkward, indirect tools of carbon credits or carbon offsets, without drawing upon the State Consolidated Revenue. There are several reasons why the stewardship incentive scheme outlined here does not rely on any traded carbon instrument for its legitimacy or its funding.

First, by their nature, and by the procedures necessary to quantify the currency, carbon credits are likely to focus on measurable stocks rather than impermanent and more-difficult-to-measure flows. However, over time, it is carbon flows that maintain the health of the landscape and that are necessary to generate carbon stocks. Second, carbon credits are essentially bitcoin-type payments for promises and therefore subject to speculation or leakage overseas without enduring benefit to pastoral Queensland. Third, to the Queensland Government, carbon credits administered by the Commonwealth are potentially insecure for political reasons.

Fourth is the extent of the transaction costs needed to make a carbon offset scheme work. Contemplating the statutory, policy and intergovernmental actions that consultancy Energetics (2017) recommended the Queensland Government implement to make a carbon offset scheme work, one doubts that it will ever happen. The state has lost the analytical capacity to implement such complex institutional arrangements.

Fifth, the explanatory materials published to date do not impart confidence that the accelerating effects of global warming have been factored into the calculations. Higher soil temperatures, even if rainfall doesn't diminish, could cause widespread death of trees and/or bushfires and consequent non-achievement of expectations as to sequestration capacity.

Finally, carbon offsets problematically rely upon markets to achieve non-market public interest objectives. They also amount to hypothecating sums generated by one purpose to achieve a different purpose. The two purposes can drift apart, distorting prudent budgeting for both.

This is not to disparage agreements like that announced between the Kullilli Bulloo River and Budjiti Aboriginal Corporations and Climate Friendly to manage 440,000 hectares of land for native forest regrowth in south-western Queensland, but simply to say that such schemes should run in parallel with the one described in this paper, not displace them. Income that

landholders earn from carbon credits would be a bonus to them, although some safeguards against double dipping might be necessary. Landholders are allowed to seek more than one source of funds for managing their properties!

Carbon as a proxy for environmental health

Lauder's carbon grazing model of strategic pasture rest offers a coherent theory of landscape health for land committed to pastoral production and a pathway to improved pastoral productivity by increasing the rate that carbon moves through the landscape. However, improved production is mainly of private benefit and would be a bonus side benefit of a stewardship incentives scheme, not its primary purpose which is focused on public benefit.

A cautionary note is necessary. It is not true that managing land to maximise carbon stocks or flows is *always necessarily* in harmony with environmental or NRM best practice. Subtleties include:

- in some land systems, environmental weeds can grow vigorously and improve soil transfer of carbon but would compromise NRM objectives. Prickly acacia in dry northern grasslands comes to mind;
- while trees can store large amounts of carbon in their trunks, grasses are better at storing carbon in soil. In some land systems, grasses will be more beneficial, but best practice NRM may require re-introducing trees to the landscape;
- techniques to enrich soil with carbon are not necessarily neatly aligned with techniques to improve biodiversity – buffel grass being an example;
- policy focus on maximising carbon credits could divert funds to coastal districts where growth rates are much faster and carbon can be sequestered more quickly (Reside 2018).

Nature/biodiversity conservation, soil/catchment health and carbon stocks are three distinct parameters, even though they overlap.

Regional, catchment and property management planning are essential to reconcile these potentially different objectives.

Sustainability

Sustainability for an enterprise implies that it can continue for the foreseeable future while extracting annual production (income) without deterioration of the productive capital assets. Sustainability emphatically includes economic viability as well as the other limbs: social equilibrium, trustworthy governance and environmental health. However, *economic sustainability* must be viewed at the scale of the industry in each district and doesn't necessarily require that every single enterprise be *financially sustainable*, or even profitable, year in, year out.

Holmes (2015:2) has offered a definition of enterprise sustainability:

“To be financially sustainable in the long term, a northern beef business [across northern Australia] needs to:

1. Generate a total business return that meets or exceeds its cost of capital.
2. Fund all current operating expenses and operational capital expenditure through internally generated working capital.
3. Remunerate its owners adequately, at least to the standard of the average wage earner.
4. Have the capacity to re-pay debt principal in a timely manner.
5. Where applicable, be able to survive business succession with the business and the family remaining intact.
6. Where applicable, provide for the independent retirement of the existing owners.

7. Survive and prosper in the long-term without the erosion of environmental capital (environmental sustainability).”

The term *ecologically sustainable development* has been compromised by misuse since the publication in 1992 of the *National Strategy for Ecologically Sustainable Development* (NSESD) with its non-implementable concept of “balance” between the environmental, social and economic spheres. The notion that environmental deterioration can somehow be offset by economic profitability is a figment of mainstream economics’ belief that different forms of capital are substitutable via market exchange. If every separate application for development strives to achieve a ‘balance’, the end result can only be the continual erosion of the condition or availability of the resource. No equilibrium can ever be found and no thresholds can ever be set. Unless restrained, the economic will always prevail. Also, the notion that the ecological, social and economic are necessarily in tension with each other is incorrect. It does not make economic sense to exploit resources beyond their capacity to continue to yield products and ecosystem services (life-support). ‘Balance’ subtly disparages alternative outlooks such as conservation as being ‘unbalanced’ or ‘extreme’.

Two obstacles to a transition to sustainability in the extensive pastoral zone warrant comment. One is pastoralism’s dependence upon non-renewable minerals and fossil fuels. The energy deficit in Australian food production generally from paddock to plate has been calculated at about 5 calories of input energy (mainly from fossil fuels) to 1 calorie of food (Gifford & Millington 1975) meaning that agriculture is an industry that converts oil into food. The vulnerability of remote pastoralism to oil scarcity deserves a report by itself, quite urgently.

The second is the difficulty of defining the environmental limb for a land use (grazing domestic stock) that depends upon substantial modification of the original natural lands – through introduction of non-native animals and clearing of timber to provide for them. Our current population cannot be supported on a landscape like it was at the time of European colonisation. The dilemma can be partly overcome by partitioning each property into zones for grazing, river protection, woodlot and so on. Within the grazing zone, pristine-ness would not be necessary and some biodiversity would be sacrificed. This only partly disposes of the dilemma however, because even within a production zone, some ecosystem functions such as windbreaks, water infiltration and refuges for locust predators need to be nourished.

Nevertheless, the new configuration must be rendered functional like the previous one and ‘sustainability’ is a necessary concept. Scientists, farmers and policy analysts should collaborate to produce a modern conception of sustainability that is fair and functional – and is capable of being implemented.

Stewardship

Stewardship describes an ethic of care for an asset held in trust. It includes but is not limited to maintaining its productive potential (Wade et al). Stewardship for a farmer includes the legal obligation to abide by regulations and to exercise a duty of care, as well as wider responsibilities to society that are not codified in law. Stewardship is the world view that a landholder will embrace on their journey toward sustainability. Stewardship describes the relationship of the people with the property they occupy.

A steward is an agent or manager who seeks to safeguard the interest of the ‘owner’ in their property. The answer to the question: ‘For whom is the trust held?’ is central to this report. If land is held on behalf of wider society or the local community, there is obviously a much stronger obligation on the society and local community to support its stewards than if the only beneficiaries are the landholders’ family and successors in title.

Farmers' conception of stewardship

Most family graziers have a strong stewardship ethic, although their 'stewardship' has distinctive connotations. Their world view commonly embraces four primary themes (Finlay 2014; Appendix 3; Peterson & Horton 1995 writing of the USA):

- respect for the common sense of the practical outdoors person, dismissive of academic theorising and bureaucratic paper-shuffling;
- pride in their self-reliance, antipathy to relying upon handouts such as welfare;
- pride in their role in wrestling with nature to provide food and fibre for Australia and the world;
- a deep-seated desire to pass on their land to the next generation in 'good' condition, 'good' being conceived primarily (but not exclusively) in terms of productive potential.

Policy and commentary that is dismissive of any of these four fundamental elements of their self-worth will be rejected by the Australian farming community. In particular, an inability to be sustainably profitable is deeply wounding as it destroys the second element. And farmers are bruised by a perceived lack of sympathy by city-dwellers for the difficulty of 'wrestling with nature'. 'Nature' is not just melodious birds and pretty wildflowers, but floods, fire, drought and plagues of kangaroos. The ecological principles by which Australia's land systems function are not neatly aligned with the agricultural principles underpinning contemporary farming. Australia must learn how to adjust pastoral management practices as the ecological principles are not for changing, only for discovery.

To most Australian farmers, some combination of these elements, especially the fourth, constitute stewardship. In other words, the family farmer operates their property as a productive farm in trust for future generations. In this way family farmers 'get' or understand stewardship: it runs to the core of their being.

An environmental conception of stewardship

Since the modern environmental movement arose in the 1970s, an environmental ethic has been steadily evolving in Australian society, fed by scientific evidence of the accelerating decline of the life-support systems of the planet. Under this ethic, stewardship has a fifth limb:

- pride in their role in protecting the web of life and the ecosystem services that the land supplies; specifically in conserving biodiversity, retaining patches of wilderness, suppressing pests (beyond those that are a menace to production), preventing detrimental off-site effects, abiding by the precautionary principle and safeguarding the natural asset for future holders.

A challenge is that these environmental responsibilities, like duty of care, are partly contextual (depends on circumstances) and so are difficult to pin down.

Relentless drought and the cost-price squeeze have eroded farmers' inherent willingness to fulfil these wider responsibilities. Most farmers would strongly endorse the view that if the Australian public wants a higher level of environmental protection than landholders are currently willing to adopt, the public should be prepared to pay for it (Finlay 2014). While knowledge of ecology and sensitivity to conservation is growing, most farmers in the business of farming (as their primary source of income) by definition regard their property as a productive enterprise with protection of biodiversity and other elements of the natural environment as of subordinate importance. In this, the viewpoints of farmers and environmental scientists diverge: reflecting a pioneering ethic, most rural producers regard the environment as something to be tamed and developed to yield saleable commodities. Natural scientists regard the ecological services as pre-eminent, and the production services as dependent.

Of course farmers are correct: the economic system under which they operate rewards them for producing saleable commodities and not for producing environmental services, except occasionally, through the under-powered, under-theorised and under-resourced systems of Landcare-type grants.

Society cannot reasonably expect landholders to fulfil community service obligations unless the financial rewards system which enables them to operate transmits discretionary funds sufficient to discharge these broad obligations. Landholders are trapped in a vice: they are expected by society to operate their properties – the environmental infrastructure of our planet – sustainably, but are remunerated mainly by an economic system that obliges them to scrimp on costs by running down this natural capital. ‘Become more efficient’ the supermarkets threaten; ‘get big or get out’ opine economists, without understanding that size will not save a grazier if they do not earn an adequate margin per animal. For this reason alone, additional regulation is no solution.

So management of the pastoral land is at an impasse. Informed by steadily strengthening warnings from scientists of environmental distress, the Australian public expects that those who have gained title to land through tenure systems established according to law will manage sustainably, but the preconditions are lacking and the prevailing economic system is not conducive to that result.

A deeper understanding of ecology is required of the average grazier and the average agricultural policy officer to address the impasse. In the words of Alan Lauder again:

“When I started farming I saw sheep and cattle as the source of my income, then grass, then the soil and finally carbon flows. If education/extension can keep shifting producers’ understanding of what really drives their income until it parallels what maintains a functioning landscape providing ecosystem services, then we will be in a much better position”.

Feasible paths

To manage any asset sustainably, it is necessary to have a coherent strategy and the institutional capacity to carry it out effectively. The elements of a strategy for the pastoral lands being discussed here are:

- a *vision*, an aspirational sense of purpose;
- a solid foundation of *theory* linking causes and effects;
- *effective feasible paths* for achieving the vision. A *feasible path* comprises the following primary capacities, to be available at each locus of activity:
 - *coordinating authority*, meaning a person or organisation to serve as a champion, with a mandate to assemble others’ capacities and apply them to achieving the vision;
 - *legal authority*, includes the line command to conduct works and maintenance on subject land (exercisable by landholders);
 - *knowledge*: data, information and interpreted information;
 - *skills*: competent personnel with the time to devote to the issue;
 - reliable sources of *funds*.

Many worthy initiatives fail because just one of these capacities is absent. While it is not true that throwing money at a cause guarantees success, it is true that the absence of secure and adequate funds is highly conducive to failure. All of the other ingredients are potentially available, if only a suitable champion can be given a reliable line of funding to make stewardship happen. ‘Reliable’ is a key word here: assembling the capacities may take time. For complex programs, stop-start project funding *destroys* capacities.

These capacities can be summarised by the pithy term – powers, people and purses. Application of the feasible path then requires a suitable *suite of tools* or *delivery instruments*, sharp and fit for the purpose. Stakeholders need to align their plans, policies and work programs with the necessary capacities.

One commonly looks in vain to find any entity resourced with the necessary capacities. Many government reports written from an economic rationalist world view such as the national *Energy White Paper* (2015) or the *Queensland Plan* (2014) outline a range of aspirational feel-good objectives but with no workable strategy to give them effect, because their worldview – their *theory* – is inadequate to resolve the inherent tensions in a complex, non-linear society.

The elements of a feasible path will be used to structure the model explained in Part 6.



Noogoora Burr is a threat to both production and conservation values. As are most elements of environmental distress.

PART 4: THE CLIMATE CHALLENGE

In addition to what might be called the ill winds that have been besetting graziers for the past few decades, climate change promises to make sustainability even more difficult to achieve. As unusual weather events arrive on top of each other and previous temperature records are routinely broken, the evidence that the Earth's climate is changing can no longer rationally be denied, although high-technology instrumentation is arguably necessary to differentiate global warming from episodic variations in weather – reliance upon anecdotal observation alone can be misleading. The scientific consensus, bolstered by new evidence arriving more-or-less daily from a wide range of disciplines, is sufficiently coherent to justify urgent policy responses, as it has been since 1989 when UK Prime Minister Margaret Thatcher addressed the United Nations and urged governments and corporations to take preventative actions without delay. But these are still lacking, on any systematic basis.

A central plank of the climate contrarians' case is that a scientific field can be captured by enthusiasts and can pursue an erroneous hypothesis for a long time before being corrected by those once considered mavericks outside the field. This can happen: Freudian sex-focused psycho-analysis being a case in point. Climate science however is not a single discipline but a cluster of disciplines drawing on a very large body of scholarship in physics, mathematics, geology, animal and plant biology and many other fields, all yielding insights that triangulate each other and are converging. While one sub-discipline can be vulnerable to fundamental error or corruption for a period of time, this cluster is not.

Rural landholders have been dealt a disservice by their spokespeople in politics, business and the conservative press through the ideology of denial. By obstructing even the hesitant moves by governments towards both mitigation and adaptation, higher economic costs are being stockpiled for producers in future and planetary natural systems are being stressed to collapse.

Regional greenhouse emissions include CO₂ (bushfires, burning fuel), methane (sheep, cattle), nitrous oxide (fertiliser, transport) and other fugitive emissions (mining, energy). Significant reductions were achieved by phasing out broad-scale clearing, demonstrating the potential of policy as a tool for graziers and governments alike, but rural industry nagged the Coalition government of 2012-15 to weaken the controls: an 'own-goal' by the grazing sector.

The Climate Council has advised that "Australia's agricultural sector is showing signs of decreasing capacity and faltering productivity gains and the resilience of some rural industries is under threat." Further that "Climate change is worsening extreme weather events such as bushfires and drought and rural and regional communities will continue to be disproportionately affected." (Hughes et al 2016:ii; see also Hughes et al 2015).

The consequences of climate change for specific Outback districts are less well understood than the causes. More carbon dioxide is certainly leading to higher temperatures, greater deviation from the norm and more severe weather incidents. However, the effects on rainfall are less confidently predicted; inland Queensland, for example, could benefit from more extensive monsoonal rains but the effects will vary from north to south, east to west.

In short, significant conditions likely to press upon the rangelands include:

- higher temperature and lower or higher humidity affecting population, pests, diseases
- more extreme drought, flood and cyclones and greater variability in climate
- increased frequency and intensity of wildfires
- obsolescence of under-engineered infrastructure e.g. dams, stormwater systems, bridges
- migration of agriculture
- reduced yields from grazing, dairying and cropping
- reduced ground cover and increased degradation, soil erosion and dust storms

- higher intensity of rainfall – more erosive power, changed river flows and fish populations;
- changes in range of species and pasture composition through increased carbon dioxide;
- changes in distribution of pest plants and animals;
- extensive loss of trees...

These pressures, regardless of whether rainfall increases or otherwise on any given station, are likely to coalesce into reduced viability of arid rangelands businesses. This is why policy must focus on increasing resilience of landscapes as well as a new business model. Resilient landscapes can absorb changed circumstances whereas landscapes lacking resilience collapse with even small changes. The damage may not be as steady and incremental as the rise in global concentrations of carbon dioxide. Ecological systems – or populations of single species – that are already under stress through drought and grazing pressure could collapse through a single weather event that pushes parameters beyond the threshold of tolerance.

In other words, biological systems can absorb a considerable level of disturbance – so long as the disturbances don't pile on top of each other at a rate faster than they can be neutralised. Sometimes damage is localised, sometimes it ripples outwards across the planet. An example is the extensive coral bleaching in 2016 of the northern Great Barrier Reef under an El Nino that in earlier times would have been accommodated.

There is evidence that eucalypts are dying back over extensive tracts of the pastoral inland, far beyond the scale of the well-known dieback on the New England tablelands or that associated with Bell Miners. Higher soil temperatures increase migration of moisture to the surface and then into the atmosphere, which if associated with below-average rainfall, can push adult trees over a threshold of tolerance. A shortfall of a few millimetres of rain can turn life into death.

As Queensland's variable climate becomes even more variable, we will need better tools and seasonal forecasts. This will require funding the Australian Bureau of Statistics, the Bureau of Meteorology and CSIRO generously to ensure that the industry has the best available information to allow it to plan. Departments also should be funded generously to reinvigorate land resource mapping, regional land-use planning and agricultural extension. These are all forms of public infrastructure, with large economic paybacks (Edwards 2016 and q.v.).

Pastoralists widely acknowledge the economic benefit of 'vertical integration' of enterprises, that allows cattle to be bred in one location and fattened in another, not infrequently connected by droving along the stock routes. It is entirely possible that pastoral nomadism by non-corporate enterprises may offer a better business model than static grazing bounded by fixed titles. Public stock routes not ruined by static grazing or alienation will be pivotal to success of any model based on nomadic grazing.

In summary, as a continent, Australia has the world's most variable climate. The experience of drought or flood is embedded in the nation's psyche. What may alter in future is greater severity and duration of weather events or a shift in climatic zones, such as migration of the arid interior coastward. Traditionally, pastoralists have relied upon a run of good seasons after drought to allow their properties to recover. If the good seasons become weaker, or are longer separated, the economic model on which the industry has been built will collapse.

PART 5: FUNDAMENTAL PRINCIPLES

In this section, we will outline some fundamental propositions that are sufficiently supported by evidence or logic to serve as foundations for the model to come.

1. **Rural land must be managed sustainably.**

Any enterprise that mines or draws down the capital asset on which its production depends (environmental); or runs down the family and social networks that support it (social); or which cannot anticipate financial profitability in an average run of years (economic); is not being managed sustainably. It will require a subsidy either from the land, or other financially productive assets, or from government, or from the future via financiers and debt. Sustainability is an imperative goal, but the meaning has been compromised by careless use.

Resilience is perhaps a less nebulous concept. Pastoralists who aim to improve the resilience of their pastures – their ability to recover from (or thrive during) drought or grazing pressure, their capacity to absorb rain, their retention of a suite of palatable species – are journeying toward sustainability. Resilience in relation to financial shocks is also required.

2. **Landholders are stewards on behalf of future generations.**

More controversial is the proposition that the community has a stake in the management of every pastoral property, even the freehold ones. This is controversial because the prerogatives of private ownership are widely valued. Yet the public depends upon agricultural land for the supply of commodities (e.g. food and fibre) and the supply of non-marketed ecological services (e.g. fresh air and water). Society has a stake in ensuring that the surface of the land is managed to permit society's survival. Also, every property affects land-use downstream, for example by pollutants such as sediment transferred in watercourses, by pests expanding outwards from an incursion and pre-eminently by shedding water in the form of 'feast-or-famine' flows rather than recharging aquifers and ground flows through healthy soil condition. By common law dating back centuries, no landholder is entitled to damage the property rights of neighbours – including landholders many kilometres downstream.

On leasehold land, the argument that the public has a stake is stronger, because Queensland society is the landlord, through its elected government.

Acceptance that the public has a stake is crucial to justifying payment by the government towards the periodic rejuvenation of the land asset.

3. **Commodity markets under free trade are disconnected from the cost of production.**

The primary source of income for the pastoral industry has of course been from the sale of marketable commodities such as food and fibre. Concentration of buying power by wholesalers and supermarkets, facilitated in part by technology and cheap transport, inherently enhances the market power of buyers. Cooperative marketing arrangements that in an earlier era shielded producers from undue market power exercised by traders have been dismantled in the post-1983 era of economic rationalist reforms. In short, farmers are price-takers.

Mainstream economics claims that 'perfectly competitive' markets are 'efficient' because high-cost producers are squeezed out by others who can undercut them on price. Microeconomic reform since the Hilmer *National Competition Policy* report of 1995 has aimed to comprehensively re-engineer the Australian economy to approach perfect competition. But despite this extensive restructuring, the preconditions for textbook-perfect competitive markets do not exist. Mainstream macro-economics is consumer-centred and is broadly

unconcerned about the fate of individual producers, let alone social or environmental effects. In textbook economics, the risk of failure in a competitive market is merely a discipline to incentivise producers to become efficient and minimise the prices they need to charge buyers.

Mainstream economics however had its origins in the craft economy of the 18th century England in which most enterprise was local (Nell 1988). Even before the advent of globalisation, pastoralists in Queensland could be undercut by competitors in distant Australian localities with different climatic conditions and cost structures. The notion that price cannot be competed down below cost of production, otherwise the local producers simply will not supply the goods, is invalid for farmers. Debt can accumulate or assets run down to make up the shortfall. The textbook assumption of market clearing – that buyers can be found for as much produce as can be supplied – is also invalid, by Engel's Law.

There are other invalidities in the market model of an economy. The phrase 'get big or get out' reflects the economic view that farms' profitability will increase more than proportionately as acreage increases. Yet input costs (especially for labour) increase stepwise rather than linearly, as additional labour is taken on. Given mainstream economics' faith that markets revert to equilibrium, it holds that commercial success or failure cannot reflect market failure but rather depends on the farmers' management skills. This is 'blame the victim'.

Much is made in commentary of the ruthless competition by the supermarket duopoly and their excessive market power. This has a sharper edge in relation to dairy and horticultural products than beef and wool from the pastoral zone, so won't be laboured here. Suffice to say that the dismantling of collective marketing cooperatives has allowed commercial entities to govern beyond their corporate boundaries (Richards et al 2012), usurping the role of governments to structure the economy in the public interest.

Under globalisation, producers operating under different economies of scale and different labour, environmental and other statutory regimes – in other words under an entirely different cost structure – can import and market products more cheaply. Also, the value of money varies across international borders and each competitor country has a unique currency exchange rate and capital market. Australia has unilaterally opened its borders to foreign products, including food, so domestic prices are capped by international prices. As almost every farmer will explain, this is manifestly unfair. The operating principle of globalised markets is not supply and demand, but wage and tax arbitrage and transfer pricing between corporations exercising oligopolistic market power. To take just one example, some 42% of red meat processing in Australia (2011 figures, ABARES 2011) is conducted by foreign-owned companies. One needs only to add the sale of our grain agencies to vertically integrated international firms to clinch the point. No matter how honourable they are, their commitment to furthering Australia's national interest cannot be undivided.

This is only part of the story, of course. The dominant two supermarkets also wedge Australian producers against each other by transporting food across large distances within the nation. Trucks carrying frozen chickens from Brisbane to Melbourne pass trucks carrying frozen chickens the other way, all in the name of brand competition careless of the investments of producers at either end and in disregard of the waste of finite petroleum fuels that after burning once will never be recovered. Likewise, open market competition has reduced the capacity for localised production of goods such as milk in Queensland when Victorian farmers can produce this at lower nominal cost. Economic efficiency, as narrowly defined by price in markets, is disconnected from resource efficiency.

To be profitable internationally or domestically, farmers must reduce costs – not because they are 'inefficient' but because Australia's currency has a higher value than Chilean pesos or Chinese

yuan. 'Reducing costs' implies squeezing labour costs and reducing investment in maintaining and regenerating the productive asset, the land resource.

On top of price pressures, local pastoralists are not like local manufacturers who can be competed out of production, close their factories and sell their land for apartment blocks. The land cannot be closed down and shipped overseas. The land remains regardless of the success of the enterprise conducted on it; and in most of the rangelands, the land has an opportunity cost of zero because there is no ready alternative use other than grazing. So governments are then obliged to pay for Landcare, drought aid, FarmBis, welfare and other schemes to ensure farmers' survival. Free-trade policies have led to a massively inequitable and economically clumsy method of remunerating the nation's food producers via the taxation and welfare systems. We can do better.

4. Market forces will not achieve sustainability or stewardship.

By definition, markets are exchanges between buyers and sellers through bartering or transfer of a medium of value, usually money. But individual purchases in markets are inadequate for supplying public goods – those goods and services from which the general public cannot or should not be excluded, for reasons of free riding, inequity, under-provision, lack of cashed-up buyers, environmental impact or other manifestations of what economists call 'market failure'. The definition is blind to the question of whether they are delivered by public agents or private agents reimbursed from a non-commercial source.

Most of the public goods that farmers produce – such as fresh water, clean air, carbon sequestration, wildlife – do not appear in any established marketplace, so do not appear on any mainstream economic metric such as GDP. These are 'common use resources' or 'community service obligations' and under the 'user pays' logic which has been an element of the national micro-economic reform crusade of the past 30 years, the consumer – the public at large – should pay for any shortfall. Applying economic language to farming, becoming 'more efficient' means stripping out the community service obligations from the operations. The problem is that there is no ongoing scheme for extracting fees from consumers then reimbursing farmers for producing the public goods. Welfare and drought aid lack dignity and have no logical nexus with land condition or NRM need.

The alternative economic funding principles outlined in textbooks aren't being applied either. 'Polluter pays' would justify extensive hypothecation of fuel taxes or carbon levies to the front line managers of rural lands trying to ameliorate the effects of climate change. 'Beneficiary pays' would see consumers pay farmers the full cost of producing food and fibre including externalities that the unaided market can't accommodate, but this can't happen while federal trade policy allows supermarkets to source food and fibre from overseas producers to whom they would not have to pay such an impost.

In short, the disconnects between commodity product markets, the cost base of domestic producers and the land asset markets will not-self rectify (McGovern in Katter 2016).

5. The economic payback for investing in environmental repair is very large.

Business, taxpayers and the public are paying dearly for poor land condition in the pastoral lands, but the benefits and costs are opaque because both are mostly experienced indirectly or are diffuse or are not reflected in GDP.

Costs of remedial action

It is difficult to improve on the words in Alluvium (2016) in examining the cost of meeting just two water quality targets for the catchments flowing to the Great Barrier Reef:

“The scale of investment required is commensurate with the scale of the challenge. The catchments flowing into the GBR lagoon are some of Australia’s largest, with the Burdekin catchment alone almost double the size of Tasmania. Across catchments like the Burdekin, the extent of ecological repair work required is extensive. And as with any asset management program, the costs of delivering successful asset management, asset repair, asset renewal and asset maintenance is both expensive and ongoing. Natural assets are no different...

“Land practice improvement was nearly always the most cost-effective solution and should be considered first in most cases.” (p.vf).

Governments have not invested the funds required partly because of the anti-environmental stance of the tabloid press, and partly because the benefits of remedial action are public goods: costs cannot be apportioned to identifiable businesses, and benefits are diffused. Public taxation is the primary and most efficient method of raising funds to supply public goods.

Benefit-cost ratios

There are many studies using orthodox economic analysis to quantify the economic payback for expenditure on nature conservation, erosion control and environmental repair generally. The calculations rely on assumptions and proxies, but they accepted by economists as tractable. Balmford et al (2002) estimated that the benefit-cost ratio of an effective global program for the conservation of wild nature is at least 100 to 1. Although this is a global average, and focused just on nature conservation, it is probably conservative for the Queensland rangelands given the potential for marketable commodities from repaired properties as well as intangibles.

An indicative sample of studies is presented in Fig. 9. For comparison the table also includes benefit-cost ratios of typical transport infrastructure projects. Note: these entries are not directly comparable with each other as they all use different methods and are of different vintages. The table simply indicates that governments have a very large discretion to fund land repair, for example by shifting priorities away from toll roads with very poor economic performance to green infrastructure.

Environmental repair			
Commissioned by	Subject	Benefit-cost ratio etc	Reference
Department of Sustainability and Environment, Victoria	Pest control	100 prevention 25 eradication 5-10 reduction 1-5 containment	Port Philip and Westernport Catchment Management Authority. June 2007. <i>What might a true steward of our land and biodiversity do right now?</i> Victoria.
Australian Wool Innovation	Collaborative control of wild dogs	8.6	BDA Group. Aug. 2012. <i>Benefit Cost Analysis of AWI's Wild Dog Investment</i> . Melbourne and Canberra.
Zhang, Chen & Sheng	Public investment in broadacre agricultural extension 1952-2007	Internal Rate of Return 47.5% p.a. , consistent with median rates in the international literature	Zhang, Dandan, Chunlai Chen and Yu Sheng. 2015. "Public investment in agricultural R&D and extension: An analysis of the effect on Australian broad acre farming productivity". <i>China Agricultural Economic Review</i> . 7(1): 86 -101.
Department of Natural Resources and Mines	Coordinated land mapping	45-140 , consistent with interstate and international comparisons	Sanders, Richard. 2 June 2005. "Benefit/Cost of Land Resource Assessment: The Leichhardt Downs (Burdekin) Study". <i>Resource Planning Guideline E51</i> .

			Brisbane: Department of Natural Resources & Mines.
Kusler & Larson	Using wetlands on floodplains for flood mitigation compared to dams	10	Kusler, J. and L. Larson. 1993. "Beyond the Ark: A new approach to US floodplain management". <i>Environment</i> 35(5). Cited in: Regional Landscape Strategy Advisory Committee. April 2002. <i>Economic Benefits of Open Space in South East Queensland</i> .
SEQ Catchments	Constructing a wetland to treat factory waste compared to a sewerage plant	9, plus savings on recurrent costs	Warner, Simon. 24 June 2015. "Case Studies of Creating Value from Natural Assets". Community Infrastructure Forum. Royal Society of Queensland
National Reserve System	Terrestrial ecosystem services \$38-204 bn p.a. Marine ecosystem services \$197-441 bn p.a. Wild nature tourism spending \$23.6 bn p.a.	202-522 Investment by all governments \$1.28 bn p.a.	Volders, Adrian. 24 June 2015. "Valuing Green Infrastructure". Community Infrastructure Forum. Royal Society of Queensland
	Water storage, Brisbane River catchment	\$6500/km ² p.a. compared to \$1500-8000/km ² regional farm gate value of grazing products (O'Donohue 2004).	O'Donohue, M. 2004. "Natural asset value in South East Queensland's drinking water supply system". Brisbane: SEQWater
	Quality drinking water for New York City	4-6 US\$6 billion filtration plant or US\$1-1.5 billion investment in protecting the ecosystem services of the Catskill catchment	Chichilnisky G. and Heal G. 1998. "Economic returns from the biosphere". <i>Nature</i> 391:629-630.
	Protection of marine plants in estuaries	\$22,832 (1994 US\$) p. ha p.a.	Costanza, R. et al. 1997. "The value of the world's ecosystem services and natural capital". <i>Nature</i> 387.
	Grazing Best Management Practice extension project – adoption of BMP in Burdekin catchment	3.65 of private benefit per \$ spent, plus public env't'l benefit N = 272, 44% of catchment	Moravek, T. and B. Nelson, B. 2015. "Burdekin Grazing BMP and extension support project – a cost benefit analysis". <i>Proceedings of the Australian Rangeland Society Biennial Conference</i> .
	Value of forestry in Victoria's Central Highlands forests in 2013-14	Forestry \$29 p.ha p.a. Water supply \$2023 p.ha Tourism \$353 p.ha	Keith, Heather, Michael Vardon, John Stein, Janet Stein and David Lindenmayer. June 2016. <i>Experimental Ecosystem Accounts for the Central Highlands of Victoria</i> . Australian National University: Fenner School of Environment and Society.
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.	Worldwide, land restoration	At least 10	IPBES-6-L-9 2018
Transport construction projects			
State	Project	Benefit-cost ratio	Reference
NSW	Duplicate Pacific Highway – \$5.6 billion	1.2	Infrastructure Australia. 2013. <i>National Infrastructure Plan</i> . Canberra.
NSW	WestConnex – \$1.5	1.5	Ditto

	billion initial allocation		
NSW	NorthConnex –	0.75?	Newspapers
Victoria	East West Link –\$5 billion	0.45, later 1.4	Newspapers
Victoria	Melbourne Metro – \$9-11 billion	1.2	Infrastructure Australia. 2013. <i>National Infrastructure Plan</i> .
Queensland	Brisbane Cross-River Tunnel – \$4.4 billion (early estimate)	1.34	Infrastructure Australia. 2013. <i>National Infrastructure Plan</i> . Canberra.
Queensland	Ipswich Motorway - \$558 million	3.2	Infrastructure Australia. 2013. <i>National Infrastructure Plan</i> .
Queensland	Gateway Motorway North upgrade – \$1.3 billion	4.9	Infrastructure Australia. 2013. <i>National Infrastructure Plan</i> .

Fig. 9 Benefit-cost ratios of environmental repair and transport projects

Some items highlighted for emphasis.

The economic case for diverting budgetary provision away from toll roads and tunnels in South East Queensland towards repair of green infrastructure is overwhelming. Typically, grand transport projects can demonstrate benefit-cost ratios of only 1.5 or lower. Investment in the health of rural landscapes can demonstrate ratios of 50 or more under well-attested conventional economic calculations.

The March 2018 international report on land degradation has this to say:

“On average, the benefits of restoration are 10 times higher than the costs, estimated across nine different biomes. While challenging, the benefits of restoration include, but are not limited to, increased employment, increased business spending, improved gender equity, increased local investment in education and improved livelihoods.” (p.3).

To take a single example, Brisbane’s Cross River Tunnel has been recently estimated to cost \$5.2 billion with a benefit-cost ratio of 1.34. Assuming that these funds are allocated over a 5.2 year period (\$1 billion per year), delaying construction of the tunnel by *just three weeks* would yield the State \$60 million, more than enough to establish the architecture of a stewardship scheme and to commence a flow of payments. Land restoration can be shown to create ten times more economic value than these grand projects, and can readily be distributed around the regions.

This paper does not argue against the tunnel, as there are no doubt many powerful transport planning reasons for building it. This paper is simply making the point that land restoration can hold its own on orthodox economic terms with construction projects.

6. Constitutionally, the State is responsible.

Given that the rangelands cover parts of all mainland States it may be argued that their management ought to be a Commonwealth responsibility. However, under the Constitution, the administration of natural resources is unambiguously a matter for the States, except for some aspects of water management in the Murray Darling Basin, referred by the Basin States in 2008; and for activities that can indirectly be brought under its external affairs power to sign international treaties.

Nevertheless, the Commonwealth has legislated for “matters of national environmental significance” and has also used its taxation powers to influence natural resource management, such as through the former Natural Heritage Trust and the current National Landcare

Programme. These involvements are *additive to* and *do not replace* the corresponding State powers.

The current parlous state of official support and funding for regional natural resource management is a case lesson in the perils of administering a function through joint State-Commonwealth administrative arrangements. During the 1990s the Commonwealth embarked on the preparation of a National Rangelands Strategy. After an enormous investment of time and effort by stakeholders, the *National Principles and Guidelines for Rangeland Management* was released in 1999, with useful though generalised principles, and with no clear feasible path towards implementation, given that there was no commitment to apply State powers systematically and no significant new funding.

Even if the Queensland Government wished to cede a significant role to the Commonwealth, State-specific action like that described in this paper would still be necessary, for the Commonwealth's activities must be played out on a Queensland backdrop.

Short of constitutional change, the State is and will remain accountable for all aspects of tenure administration, ecosystem management and property development, with limited exceptions. The State also has the direct power to determine local government's role and the indirect power to limit the Commonwealth's role by exception. There is no aspect for which the State can avoid responsibility.

7. To achieve sustainability, the pre-conditions must be nourished.

The text in the next Part is structured around this fundamental insight. If Australians expect landholders to manage sustainably and not to cause common law nuisance or off-site effects, the statutory, policy and budgetary settings must be conducive to that outcome.

The most powerful precondition is *stability*. Stop-start budgetary provisions, stop-start organisational restructures, politicised appointments and pressure from the financial sector for short-term results are *poison* for an effective solution. Survey after survey within the regional NRM sector has concluded that the single most important criterion for success is security of funding arrangements which in turn is a precondition for security of staff tenure. This is the single ingredient which has repeatedly been denied to the sector.

If the model outlined in this report finds favour, no action should be taken to implement it until there is bipartisan support with contractual arrangements in place to guarantee its continuity for *a minimum of 20 years*.

There would be a significant payoff for government. Knee-jerk reactions like funding injections for the Great Barrier Reef, Green Army programs or grants to Greening Australia for planting trees, with all their overheads and transactional costs, would be unnecessary as progressive restoration would be happening anyway. The currently fashionable market-mimicking model of allocating funds through competitive tender to alternative service providers is built on mistrust and carries huge overhead costs. Our best scientists-managers spend their lives filling out application forms or rearranging staff to cover vacancies or contractual obligations. *The current system is built to fail.*

PART 6: FEASIBLE PATHS: MAKING STEWARDSHIP HAPPEN

In this Part, we will set out the primary elements of a model that will effectively deliver stewardship incentives and enable the responsible frontline agents – landholders – to manage their landscapes sustainably. The elements include a vision, a coherent theory (explanation of cause-and-effect) and a feasible path to connect practical results.

Vision

Numerous statutory and non-statutory plans, strategies and organisational manifestos contain vision statements applicable to the pastoral zone. Prominent amongst these are the regional NRM plans, which were conceived for the purpose of articulating strategies that all stakeholders could use in applying their own capacities. It is not lack of aspiration or vision that is the root cause of unsustainable management, so this paper will not labour over optional wordings for a vision, but will simply suggest the following:

An appropriate vision for the pastoral sector generally is that Pastoral enterprises on average will be sustainability profitable over the business cycle, while maintaining the natural biophysical assets and drawing down only the annual production from this ecological capital. In short, healthy landscapes, managed sustainably.

An appropriate vision for a financial incentive to contribute to sustainability could be: Pastoral enterprises will earn a 'stewardship incentive' to generate ecosystem services of a public good nature, beyond the legal duty of care reasonably expected of them as producers of commercial commodities.

The vision can be expressed in non-spatial terms (such as in statements of policy or incentive scheme guidelines); or spatially (such as in a land-use plan).

If public goods are to be purchased, then a public source of finance will be required. Only the State Government can legitimise such a scheme. However, a publicly coordinated, publicly funded scheme can operate in parallel with private services, just as the health system is delivered and funded by public and private sources.

Theory

Typically, practising farmers are hands-on people more comfortable with operations than with abstract theorising. However, unless the challenges facing them are conceptualised adequately, a durable feasible path to resolve them cannot be devised and any success will be ad hoc rather than systemic. Without an adequate theory, solutions may or may not work but those involved wouldn't know why and are vulnerable to preconceived ideological positions. Put in pithy terms: If the basic assumptions are incorrect, nothing else will fall into place.

A serviceable theory must draw upon a range of scholarly disciplines including pre-eminently ecological science, agricultural science, complexity and chaos theory, systems dynamics, sociology, public administration and various heterodox branches of economics including ecological economics and behavioural economics. Theories derive from observations (evidence), scholarly research and logical analysis. They are required for all aspects of a stewardship program, such as:

- a theory of landscape function – for example, of carbon stocks and flows;
- a theory of property rights and duty of care;
- a theory of local sustainability – including conservation;
- a theory of global sustainability – for example, ecological economics;

- a real-life theory of markets – including supply chain management, competition and trade;
- a theory of public and private interest;
- a theory of collective action;
- a theory of governance – including centralisation/decentralisation.

An appropriate combined theory is encapsulated in the sections Explanations of Key Concepts and Fundamental Principles above and won't be repeated here. Of course, the analysis builds upon a large body of scientific scholarship which is not articulated in this report.

Feasible paths

In this section we will outline the elements of a feasible path connecting the second limb of the vision above – a stewardship incentive – with its implementation. Statutory power is usually not lacking, for many Acts cover the territory. It is the lack of sustained application of existing powers which impedes progress. So many government reports such as the regional statutory plans published in the 2000s or the *Queensland Plan* of 2014 articulate nice ideals but with no practical pathway to give them effect.

Coordinating authority - Reputational authority and influence

The pre-eminent power required to implement any program of practical activity is 'somebody in charge'. This coordinator imparts legitimacy and accountability to the program, sets standards, assesses applications against criteria and makes choices between competing claims. An effective coordinating body will set out a vision and map feasible paths for achieving it.

The need for a coordinator arises because the institutional landscape is fragmented. A coordinator is required to align statutory responsibilities, harmonise disparate policy objectives, collate information from various sources, recruit personnel and muster funds. Without a coordinator, ambiguity as to role trickles down to front-line managers who cannot assemble the organisational or financial resources to tackle any issues that lie on the perimeters of their core business.

It is the absence of an adequately resourced coordinator that suffocates so many well-intentioned policies and programs.

Any stewardship scheme launched without investment in the following backroom functions, no matter with how much enthusiasm or fanfare, will not endure:

- corporate governance, general administration, contract administration
- strategy formulation, crystallising theory
- locality, catchment, regional and biodiversity planning
- workforce planning and recruitment
- engagement with the Indigenous and mainstream communities
- mapping and GIS
- data management, library, resource monitoring
- publicity, interpretation, media
- technical advice and outreach, two-way translation
- participation in and hosting of conferences and events
- input into others' planning exercises
- contribution to strategy and policy
- participation in the regional and national NRM sectors
- performance evaluation
- envisioning ideas for future projects and submission-writing.

All this is without planting a single tree or conducting a single inspection for the purpose of accreditation. It is common to describe these backroom costs as 'administrative overheads', diverting funds from those who can use them purposefully on the ground. The April 2016 federal parliamentary report (HRSCE 2016) targeting environmental organisations and demanding that they spent 25% of their tax-deductible funds on practical remediation committed precisely this fallacy. We deserve a better understanding of public administration by our parliamentarians.

Some of the above items are *indispensable* for any enduring, effective on-property program. Governments' efficiency dividends that quarantine 'front line services' from staff cuts but retrench the staff and middle managers responsible for these backroom functions are hacking at the foundations of economic viability, let alone environmental condition.

In assessing the credentials of the potential candidates for administrator of a stewardship scheme, we consider representation, scale, constitution and world view.

State government

Until about the mid-1990s, it was reasonable to look to the State of Queensland as coordinator of NRM. It was possible to be particularly optimistic in 1996, when the Land Use Branch of the Department of Primary Industries amalgamated with the Department of Lands when the Department of Natural Resources and Water was formed. However, confidence in the State as a benevolent landlord and sympathetic servant of the rural community deteriorated over the 1990s as the State closed railways and transferred district officers to regional centres, or nowhere. In the new century, rural people generally feel abandoned by urban-centric governments. Trust took a severe battering with clumsy handling of the vegetation management controversy in 1998-9, which again bubbled to the surface in the form of rural and tabloid pressure on the Coalition Government of 2012-15 to reverse the restrictions, then on antagonism towards the Labor government of 2015-2017 when it announced legislation to reverse the reversals (failed in Parliament in August 2016, passed in May 2018).

The involvement of the Commonwealth via the Natural Heritage Trust and the National Action Plan for Salinity in Water Quality from about 1997 – and via Landcare before that – has helped to undermine the capacity of Queensland's public service. As Toyne & Farley (2000) argued:

Landcare has also made it easier for State Governments to withdraw from regional Australia and from their traditional role of providing agricultural support. The States have used this opportunity to 'cost shift' and to substitute federal money and positions for State resources.

The loss of trust in government remains strong to this day and suggests that the necessary champion must lie outside the ministerial departments. However, in 2017, the Australian Labor Party took to the Queensland election a policy to establish a "Land Restoration Fund". There is a substantial degree of alignment between that announced policy and the stewardship incentives scheme described in this paper. This paper supplies a theoretical rationale as to why a Land Restoration Fund (LRF) of some format is necessary.

The ALP's LRF seems to be grounded in concern about carbon emissions – legitimate – and views the generation of carbon credits as a possible vehicle for funding – inadequate. The election policy envisages a State allocation of only \$30 million, with a capital fund of \$500 million to be raised by a green bond. It would be legitimate to raise funds from sympathetic investors only if there is a prospect of a return on investment comparable to the long-term Australian Treasury bond rate. This paper has not identified any such reliable source of income. The landscape improvements described here are likely to improve the profitability of participating farms, but attempts to capture a proportion of those returns via dividends, rents

or profit-sharing would doom the scheme to instant failure. In any case the Commonwealth will capture some of any increased profits through federal taxes.

The election policy promises that an incoming Labor Government would be “committed to working with stakeholders in the design, development and implementation of the Fund.” This is an eminently sensible invitation that should be accepted by the Society and NRM Regions.

Local government

Local governments have unrealised potential in NRM. However, their administrative boundaries are aligned mainly with centres of population and transport corridors rather than any natural boundaries. Their mandate derives from their municipality which is too small to spread accountability for landscape management; and their rating powers are too geographically limited. In any case, the local government mindset is not as conducive to regional NRM as that of the network set up specifically for that purpose.

The opportunity to devolve natural resource management to local governments was lost for a generation when local government was restructured by Treasurer Andrew Fraser in 2007-8. NRM was initially one criterion for selecting new boundaries, but was not followed through.

Regional natural resource management bodies

Regional NRM bodies are community-based non-government organisations accredited to deliver Queensland and Commonwealth Government NRM programs. None except the Torres Strait Regional Authority has statutory or rating powers, unlike catchment management authorities in other eastern states. There are 56 bodies Australia-wide and 14 in Queensland, with boundaries established mainly along watersheds. In addition to their mandate from the State they have a mandate to their communities in that applications for positions on their boards are open to all landholders, independent of ministerial powers. They are now the only entities through which national, state and local governments are able to partner with landholders and the community to improve the health of natural and productive lands.

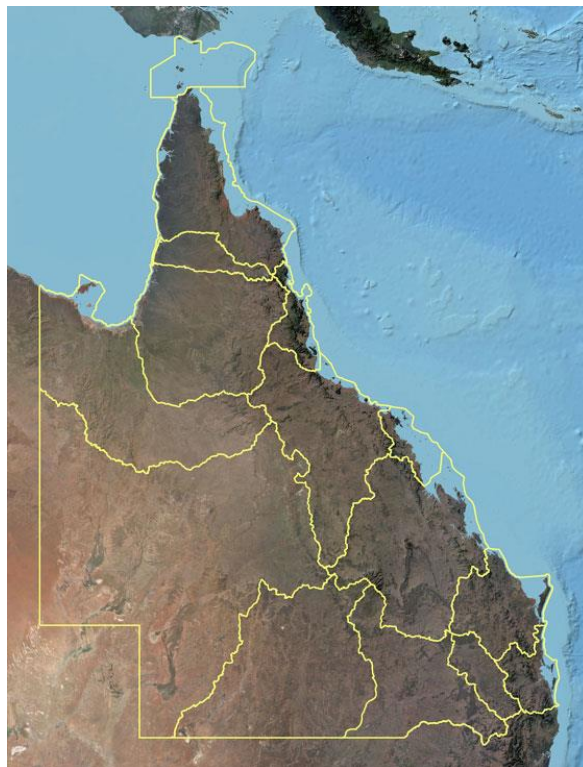


Fig.10 Queensland’s NRM regions – based on catchment boundaries.

Source: www.nrmrj.org.au .

The regional NRM bodies, by and large, have enjoyed harmonious relationships with rural bodies such as AgForce and Growcom. Recently Reef Trust funds have been allocated to a consortium consisting of five regional bodies and eight industry bodies through a single contract held by Queensland Farmers' Federation.

Statutory Trust for Nature

The statutory Trust for Nature in Queensland has the function of promoting conservation on private land and could not easily broaden to take on management of non-conservation land. In any case, no program with 'conservation' in its title is likely to gain ready acceptance with landholders.

Legal authority

To manage a rural property, that is to construct works and conduct maintenance, the pre-eminent legal power is that exercised by the landholder in occupation. Landholders enjoy sovereignty over their properties, leasehold or freehold. Several local, State and Commonwealth statutes will need to also be invoked to make the incentive scheme work. Every public authority who participates in a co-ordinated arrangement brings their own powers to the table: it is not necessary to give the coordinator coercive powers of its own.

The State needs no new statutory powers to administer an incentive scheme. Ministers already enjoy wide powers under the royal prerogative to write contracts, to establish corporate entities or to appoint advisory committees, apart from specific existing statutes.

Knowledge: data, information, translated information

Productive farming systems and the natural ecological systems on which they are superimposed are hugely complex. Even the most self-reliant landholders depend upon external advice. Information to support landholders is abundant, but is scattered and unsorted, and needs to be translated into a form that is meaningful for each property. A translator coordinates information from different sources, changes scale and interprets meaning. A translator converts the abstract concepts of stewardship and sustainability into practical terms relevant to particular properties. The process is well explained in a legacy guideline by the Department (NRM 2004).

The external sources of information are segmented within the sciences by discipline and within government by portfolios divided along functional or sometimes political lines. Specialisations in government and the sciences foster technical expertise but reinforce the 'silo effect'. Superimposed upon these splits is a policy-operations axis.

Yet inevitably the environment and natural resources are managed not as *subjects* but as *places*. The questions for governance then become: first, who should translate the knowledge of the external disciplinary, functional and policy specialists into a format that suits the place-based outdoor managers; second, who will translate the experience of pastoralists into a format that can be communicated back to the corridors of power and built into policy; and third, who should pay the cost of this work?

Landholders have traditionally had the skill of gathering disparate sources of information and interpreting its significance for their property. Nowadays, the repositories of information are too numerous, too specialised and too disorganised for this to be a fair expectation upon the average landholder. A good deal of agricultural extension, to the extent that it is still conducted, is anchored in reductionist silos with too few well-informed agents working across disciplines. Conclusion: there ought to be some geographically anchored facilitator or *translator* to funnel and translate knowledge between landholders, specialist experts and the policy community.

Landholders need tools to differentiate climate and cyclical signals with long-term planning implications, from signals relevant to short-term management. Remote sensing capability as a management tool is rapidly maturing and has been rolled out by technology-wise intermediaries in the form of the NRM Spatial Hub, but its funding is insecure.

Since their inception, the regional NRM bodies have had the role of engaging and building the capacity of regional communities to deliver desired NRM outcomes for their regions. The average overhead cost of delivery for regional bodies in Queensland has been around 12%, about half of the overheads incurred by local government (Drysdale 2015).

The Department of Environment and Resource Management produced comprehensive guidelines to support implementation of the Delbessie Agreement: *Guidelines for Determining Lease Land Condition* (DERM 2011a), *Managing Grazing Lands in Queensland* (DERM 2011b) and the *Land Condition Assessment and Monitoring Kit – Rural Leasehold Land*. These guidelines are sufficiently authoritative to serve as a generic basis for accreditation under this scheme.

Incidentally, it cannot be assumed that scientific knowledge is adequate. A vigorous research program crossing boundaries between disciplines and crossing gaps between grazing trials and the experience of generations of graziers requires ongoing public investment.

Knowledge: skilled personnel

Prior to the economic rationalist reforms of the 1990s and later, pastoralists were served by an extensive network of district offices under the Queensland Departments of Primary Industries (DPI), Lands and Environment. DPI staff in particular acted as brokers to assemble and translate information from a wide range of sources such as their own researchers and CSIRO and brought it to landholders through extension officers. The corps of Land Officers in the Department of Lands, which saw itself as a benevolent landlord, was constituted with former cadets who gained extensive experience of land assessment through various postings around the State during years of on-the-job training.

During the 1990s and 2000s, under severe pressure from Treasury to downsize, the departments re-conceptualised pastoral properties as private businesses. The network of district offices crumbled and landholders were more or less left to seek whatever advice they needed from commercial consultants, Landcare and the regional NRM bodies.

Unevenly, and hobbled by stop-start funding and stop-start enthusiasms for various forms of regional plan, the primary locus for on-property technical advice now lies with the regional NRM bodies who each have or can have a cadre of staff skilled at rural outreach, Indigenous engagement, media, operational management, science, land use planning and economic development, among other disciplines. The network lacks sufficient guaranteed funding to establish an NRM career service which would give portability, transferability and permanence to regional employees, would streamline recruitment and would guarantee that every region is served with capable and work-ready operatives.

It is difficult to envisage that the State agencies can reconstitute their former networks of knowledgeable and helpful district guides and translators within a timeframe desirable for restoring vigour to our inland pastoral industry. The damage done through cost cutting, restructuring and other new managerialist doctrines has been too great and too prolonged. Even if Treasury agreed to fund these networks immediately, some of the core skills and corporate memory have been lost forever.

Funding options

A stewardship incentives program is proposed as a long-term remedy, not achievable within a three-year let alone an annual budget cycle. Capacity must be built up within the

administering bodies, possibly for two years or more before the first payment is issued. However, given that the scheme is to be property-specific, it can be commenced on a small scale, with small-scale funding, in a pilot catchment. More important than *quantum* is *security* of funding: a feature that has been consistently denied the NRM and Landcare sectors since their modern birth. Political changes and stop-start funding are corrosive of the trust and investment planning required for landholders to commit to the scheme.

Sums required

For these reasons, it is difficult to include a budget in this paper. A back-of-an-envelope calculation is all that is possible. First, funding must be granted to the regional NRM bodies to restore them to health, to maintain the human capital (institutional infrastructure) that enables them to perform a range of relevant functions. A basic \$2 million per annum is required to cover the non-project running costs of each regional body: \$28 million for Queensland plus \$2 million to establish a career service including a pool of candidates and training.

Second, the regional bodies will require additional funds to pay for administering the incentive scheme and to skill the property accreditors in advance, say \$5 m p.a. for all Queensland: (\$2 m in the first year).

Third, money will be required to pay the incentives. Say:

- 3500 leasehold properties (assessed first)
- Assume 50% take-up after five years = 1750 properties
- Assume \$25,000 per property per annum
- Total \$45 million per annum.

Total \$50 million per annum including administration, less while being phased up. More would be required in the subsequent years as freehold properties come into the scheme and CPI pushes figures upwards. During the second year, a better informed budget estimate can be put to the guardians of the purse strings.

For those requiring more detailed assessment of the scale of the challenge, Alluvium (2016) contains relevant costings. Further, a landmark report by the National Farmers' Federation and Australian Conservation Foundation (Virtual 2000) included estimates of the cost of land repair Australia wide, a far more ambitious program than the modest scheme proposed here. They estimated a capital investment of \$60 billion over a 10 year period with ongoing maintenance of \$0.5 billion, or \$6.5 billion per year. Government would be required to contribute \$3.7 billion per year. The annual cost of degradation was estimated as at least \$2 billion annually. The benefit-cost ratio at 5% discount rate was estimated at 1.3, which is surely too conservative but in any case is competitive with the large transport infrastructure projects in the capital cities. Unlike major toll roads which are a form of terminal consumption (Edwards 2016), repair of land degradation would yield an accelerating stream of employment and economic benefits across regional Queensland.

There are several credible sources for the funds some of which are mentioned briefly here. Once government chooses one (or more), it should be subject to bipartisan negotiations then legislated so that it is immune to politicisation.

Tariffs

One logical method of funding a stewardship payment would be a tariff imposed upon imports of food and fibre that Australia is well capable of growing itself. Tariffs have been the traditional method of equalising unfair cost advantages. An appropriately calculated tariff would prevent the supermarkets from leveraging down returns to Australian producers by threatening to replace their produce with imports, but would be most relevant to fruit and vegetables which are not the subject of this paper. Tariffs cannot be levied upon trade in commodities such as lamb chops between the States. In any case, tariffs would contravene

Australia's commitments to the World Trade Organisation and would no doubt be a step too far for Australia's trade negotiators.

Consolidated Revenue – Commonwealth

The simplest method of funding is for the Commonwealth to increase the top marginal rate of income tax by 1 or 2%, in the form of a Landcare Levy as recommended in the Virtual (2000) report, and to remit the extra revenue to the States. The administrative costs would be vanishingly small. It is highly likely that the electorate would support this move. Given that the top marginal rate would then still be 10% less than its figure prior to the Hawke/Keating administration, this can hardly be a burden on the economy, although the financial press would no doubt make that claim, loudly and emphatically.

Consolidated Revenue – Queensland

Queensland's Consolidated Revenue is the next obvious choice as a fund for purchasing public goods and is the preferred one. Derived from general taxation and dedicated for public interest purposes, it ought to be possible to claim a secure and substantial line of funding for the repair of the green assets and their recurrent maintenance. There is no logical reason why NRM could not be funded just as police and schools are funded by a regular appropriation. This source is entirely under the control of the Queensland Government.

The primary impediment is been the siphoning of budget capacity away from nation-building services such as green infrastructure towards dead-end hard infrastructure in the city such as tunnels and freeways. A symposium co-hosted by The Royal Society and Engineers Australia Queensland in June 2015 followed up by a research paper published by the TJ Ryan Foundation (Edwards 2016) explores this diversion in more detail. Allocation of 5% of the State's freeway budget towards stewardship incentives would transform rural Queensland.

The relative absence of scientists and farmers within the ranks of the central agencies is also an impediment to giving the maintenance of natural capital repair the attention it deserves. The economic mindset that prevails amongst central agencies seems to view environmental protection and NRM as burdens upon the State budget rather than the reason for having a State budget. Treasury does not seem to factor in (or is not permitted to factor in) the cost to the State budget of allowing Queensland's natural capital to run down. Treasury does not maintain regional offices and rarely attends farming field days. This impediment can be overcome if political support for a stewardship scheme can gather momentum and the scientific literacy of the central agencies is augmented.

Employment and economic activity generated by these payments would spread throughout Queensland, and would make a contribution to reducing the need for urban infrastructure in the south-eastern corner. That contribution alone would no doubt far outweigh its fiscal cost.

Pressures on the Consolidated Revenue will increase as royalties from coal mining decline over the next few years, with thermal coal mines already on the point of closure. Governments have largely dissipated the coalmining windfall (and the proceeds of previous asset sales) on current capital expenditure including transport infrastructure, when they could have been investing the royalties in transitioning to an emissions-constrained future.

Hypothecating land rents

The State receives rent for land and royalties for water, minerals, timber and gravel. The level of rent can be set to achieve policy objectives. For example, in Queensland's pastoral districts it has been historically low to encourage settlement and compensate for disadvantage. If rents were raised towards a more commercial level, and the surcharge diverted to a stewardship fund rather than the Consolidated Revenue as at present, beneficiaries of the scheme described here could be subsidised by non-participants. This solution would have rationalist logic but is not

favoured as it contradicts the central assertion that graziers on average are already operating below the sustainable cost of production and do not need to suffer increases in their cost base.

Hypothecating rents into stewardship payments would also have the undesirable result that Treasury would seek to cap outgoings to the stewardship scheme at the quantum of rental revenue (<\$50m p.a., see DNRM Annual Report), which would impose an artificial ceiling. In any case, hypothecation as a general principle is not favoured by Treasury, for sound reasons of fiscal policy. (It complicates the budget with commitments that may drift apart from need).

Levy upon food or fibre consumption

Under the disciplines of the World Trade Organisation to which Australia has signed up, subsidies cannot be granted for producing agricultural commodities. No such subsidies are contemplated in this paper, if for no other reason than that graziers with the heaviest output would perversely receive the largest subsidies. By contrast, grants for environmental repair unrelated to quantum of production are not prohibited (WTO 1994), even if they happen to result in substantially improved production. If the theory of carbon stocks and flows is adopted widely, production per hectare from better managed pastures may increase, but that would be an incidental benefit that would not enter into the formula for payment.

A more serious impediment is the ruling of the High Court against State sales taxes. Wikipedia explains the situation:

The definition of "customs and excise" has been considered by the High Court of Australia on a number of occasions. Generally, a customs duty is a tax imposed on goods entering a jurisdiction. An excise is a type of sales tax on goods, and the High Court has interpreted what constitutes an excise broadly. The High Court has found that any tax that imposes a tax up to and including the point of sale is an "excise", thereby striking out State sales taxes.

Relying upon the Commonwealth to introduce a sustainability excise to fund a stewardship incentive scheme would require patience.

Having said that, a *sustainability levy* applied at the wholesale level (for simplicity) would need to be only a tiny proportion of the total retail price to make a significant difference to graziers' income and their capacity to regenerate their land assets. Evidence that retail price is malleable is that consumers not long ago were prepared to pay \$1 per litre more for fresh milk than is currently possible. Reinstatement of a \$1 per litre charge (with 50c returned to dairy farmers, 50c to a stewardship pool) is unlikely to attract public hostility and would publicly acknowledge the distortion that powerful commercial participants wreak upon markets.

However, this source is not favoured as it would increase the cost of fresh food, even if only nominally. Government should do everything in its power to make consumption of fresh food easier. It would be better to add a levy to plastic packaging or to the registration of factories that turn fresh food into processed food-like chemicals.

Policy support is building for a levy upon sugary drinks or sugar in food generally. However, any revenue gained from such a source should be re-invested in preventative health.

Replacing drought subsidies and Centrelink payments

It may be feasible for the Australian Government to shift its support of the rural industry from welfare payments to land management stipends, changing policy from a reactive to a proactive stance, which would give landholders more dignity and would allow them to spell some of their acreage. Reliance upon welfare destroys proud landholders' dignity. Statistics are not available from Centrelink at this time to assess the practicability of this source, but it should be pursued. It is more likely to be feasible after a year's experience of a pilot project generates data.

Household levy

A 'stewardship levy' explained in advance and collected via local government rates notices could gain popular acceptance. The additional cost of collection would be almost zero. It would be a form of land tax which has strong orthodox economic as well as progressive credentials and cannot be escaped. A levy of \$50 per household per annum would raise \$80 million per annum (QGSO 2015). A sliding scale could be introduced to exempt low-value properties, say to the extent of \$20 million per annum.

Application of the model

Strategic regional planning

It cannot be assumed that the area currently managed for pastoral production is inherently suited for that land-use. As the climate changes, as land degradation intensifies in some places and as markets evolve, a number of areas that are now marginal for grazing will become manifestly uneconomic or be shown to have a higher-valued form of land-use.

To differentiate those properties that have a good prospect of sustainable production from those that don't, the sector could rely on market forces, as at present – the laissez-faire approach. Under current market settings, this is cruel and economically wasteful for those properties with inherently low productivity. Landholders naturally will cling to their properties, especially family holdings, as long as possible in the hope that good seasons or favourable prices will return. Once the load of debt or despair becomes too great and financiers take control, the pastoralists can be left destitute, the bank out of pocket and an incoming owner condemned to repeat the struggle.

An alternative is strategic land use planning at the district or regional scale. Land-use planning can identify the most appropriate use of each part of the study area, drawing upon scientific knowledge of condition and trend, policies such as for infrastructure or national park expansion, market forecasts and a wide range of other considerations.

A specialised form of this procedure (regional ecosystem planning) was applied in the 1990s to identify areas of high conservation value suited for addition to the protected area estate. The negotiations were not transparent to non-parties (for valid reasons of probity) and the selection criteria arcane in the eyes of the pastoral sector. A modern land use planning evaluation could be a very different procedure. It could be collaborative, multi-sectoral and multi-disciplinary; it could publish drafts for critical input before finalisation and could be backed up by a body (the Department of Natural Resources and Mines or a new statutory planning agency) funded to implement its findings, whether by purchase, re-subdivision, regeneration or transition to nomadic grazing.

The revival of a strategic land use planning capacity within the Queensland Government is a large topic that is not further discussed in this paper but deserves focused consideration.

Regional planning for property management

All regional NRM bodies have some form of regional NRM plan in force, in draft form or in residual form from various previous planning exercises – mostly inadequately implemented through lack of funds. As explained in the section immediately above, some regional NRM plans (of whatever title or pedigree) took a strategic view of land use, mapping such features as regional biodiversity ecosystems and endeavouring to serve as a guide for strategic decisions by landholders and the authorities. Others were more focused on property management and simply intended to guide the regional bodies in prioritising grants for works.

Regional NRM plans can specify targets in such fields as salinity, biodiversity, river and wetland health, water quality, flood plain management, revegetation, soil and nutrient loss,

property amalgamation and weed control that are capable of being applied at the neighbourhood and the property level. Targets provide a systematic basis (not necessarily quantitative and sometimes aspirational) for environmental improvement and the measurement and evaluation of change. The plans can also present action lists for stakeholders.

No new round of planning activity is necessary to prepare for a stewardship scheme, but all regional bodies would be expected to dust off current plans and ensure that a useful plan is available for every catchment/locality in which candidate properties are situated.

Property management planning

Over the past twenty years, landholders have been encouraged to prepare voluntary *property management plans* (by various titles) which are a personal document including NRM information as well as the non-NRM layers of production (stock/crop), estate planning and financial information. The latter two chapters in particular will usually remain confidential to the family. Some industry-endorsed best management practice guidelines to aid landholders are in operation, the Cotton Best Management Practice manual being the earliest modern guide of this kind. There is a Grazing Best Management Practice kit, but the current edition lacks a unifying theory of landscape health.

Governments have introduced statutory requirements to produce plans by various titles to justify issue of improved tenure or other statutory approvals. Examples are 'land and water management plans', accompanying 'new' water entitlements in certain circumstances; and 'vegetation management plans' to support applications to clear vegetation. Unfortunately, these various plans have been dis-coordinated and an attempt through the OnePlan project to specify a single format that would satisfy all departments has not yet produced a template.

A distinction has (appropriately) been drawn between plans required to secure a statutory approval and plans for the landholder's private benefit. The landholder's plan is best regarded as a comprehensive source document from which more specific plans are extracted. Landholders who already have a property management plan will be best placed to take advantage of a stewardship scheme, although this need not be made mandatory.

Accreditation of properties

Quality control systems aimed at certifying product standards are coming into vogue as purchasers seek labelling to attest to product quality or sustainability. Voluntary environmental management systems and quality control systems are available to provide independent verification of performance. One of the best known is the Australian Land Management Group's Certified Land Management (CLM) system. "Experienced trainers guide land managers to develop and implement their plan for improving environmental and animal welfare management... Accredited auditors review implementation of the management plans, ensuring the integrity of the certification."¹⁰

The originators of ALMG have advised the lead author of this report that the system is internally coherent and ready to disseminate. It lacks only *recognition* and *reward*. Both of these features will be satisfied by the proposed scheme.

The relative merits of ALMG and alternative systems need further exploration. Governments convinced of the universality of competition between providers as the best way of delivering services may seek to open the accreditation process to open public tender. Nothing could be better calculated to destroy the initiative from its commencement. We can write the script for this process: bids come from opportunists and international services firms with no lasting roots in rural Queensland but with superficially attractive pricing. Having said that, it may be possible to accredit two or three providers (no more) with experience in rural Queensland to

operate in different regions of the State or to give landholders a choice in case personalities intervene.

In 2008, the Wentworth Group of Concerned Scientists with other experts developed a model *Accounting for Nature* that placed scientific information about environmental condition into an accounting framework. The purpose was to allow “the community and our policy makers to better understand complex scientific information, evaluate and set measurable policy targets, estimate the cost of meeting those targets, identify the most cost-effective investment decisions, and then monitor the success of these investments over time”¹¹. The method erected a common unit of measure, the “Econd”, to quantify the condition of environmental assets. The model was trialled over five years and is now available as a framework for standard-setting at the property scale.

Disbursement of payments

There are many optional ways in which stewardship payments might be calculated. Criteria include probity, reproducibility, equity across district and property boundaries. Payments could be made:

- for specific works, in advance or in arrears (high transaction costs, potentially grants highest payments to worst properties);
- directly to a flying squad of tradesmen (undermines prospect of local employment, undermines farmers’ own capacities);
- by tender (pits landholders against each other, some works difficult to cost in advance);
- for on-ground results achieved (in a variable and changing climate, difficult to attribute to actions by landholder).

A criticism raised during compilation of this paper runs to the effect that:

“You propose that the mechanism is justified because income is insufficient. The corollary would be that payments are not warranted when and for whom income is sufficient, however that might be defined. This has never been done effectively.”

The response is that the mechanism is justified because income *on average across the industry* is insufficient. Payments however would not be means tested, as they would be reimbursement for production regardless of other sources of income.

A pilot program, explained in Appendix 3, was conducted by South West NRM Ltd in 2008 in the mulga lands. Recipient properties were selected after widely advertised open tender. The tender method was effective for a scheme based on a single attribute (surrender of the right to graze stock on the subject area).

Property improvements could be categorised into specific actions (such as a kilometre of fencing) which could be purchased according to a schedule. A procedure based upon auctions or tenders or payment to contractors carries greater overheads than a procedure that requires only an annual check-up.

The preferred method is to make an annual payment based upon an annual inspection of property condition and face-to-face dialogue. The dialogue by itself would be a progressive step as it could tap the landholder into the latest scientific and policy knowledge, reduce the feeling of isolation, feed intelligence back from graziers to the centre and allow the inspecting team to build knowledge of the land systems of the district.

Allowance would be made each year for unseasonal events. Properties in good condition and well managed would attract the highest payment, because they would be rewarded for producing environmental goods. An inherent weakness of this formula is that the worst

properties, that need the most remediation, would initially receive the lowest payments. However, contracted cash flow from the incentive might allow a prospective purchaser to take over and improve the standard of management.

Landholders could be encouraged to anchor a bank loan against the contractual commitment as a private arrangement. Perhaps a progress payment to cover fixed costs could be paid early. As most of the works that will be approved (such as fencing watercourses) are tried and true, the cost of works could be estimated according to a scale fee.

Although the payment would be validated annually and could be increased or lowered, it would be set out in a contract with a 10 year life. *Given a 10 year horizon, every landholder, every local community and every Landcare group in consultation with the regional NRM body could devise a workable method of delivering ecosystem services in return for payment.*

Landholders would be given a certificate for a quality standard achieved and signed by both the assessors and the regional NRM body. This could be used as a marketing instrument – ‘green badging’.

Properties owned by overseas investors would not be eligible for payment, at least in the first tranche of the program. Queensland has no obligation to improve financial returns to foreign landowners. A negotiated rate may be payable to large Australian corporations capable of applying remediation on a large scale.

Feedback added in proof

John Brisbin, Chair, Northern Gulf NRM, has written:

“Now apply the stewardship program...turn the taps on and start paying producers for their production of public goods. Watch the question of what is a ‘private cost of doing business’ and what is a ‘discretionary cost of producing a public good’ suddenly take on very sharp definitions! In no time at all we will have land managers making the earnest case that a majority of their operational costs are actually the cost of producing public goods. And since grazing is by definition a complexly enmeshed system, there is no possibility of disentangling each aspect of production activity into neat piles of causal threads: private here and public there.

“What is the mechanism envisaged for keeping this line clean and free of dispute?”

No person can disentangle the public from the private threads in property management, even if that were theoretically possible. Payments would need to be made only on the basis of works performed or results achieved – regardless of the landholder’s personal circumstances.

Summary

The elements of the model are:

- Oversight by an appropriate department
- Regional NRM body as regional coordinator
- Assessment team – independent contractor, long-term contract to the regional NRM body
- Best Practice Manual based on carbon grazing model of landscape management
- Payment criteria including scales for the cost of works, for assessing condition, for coping with natural disasters, pests and kangaroos
- Central pool of funds
- Probity – audit checks.

PART 6: CONCLUSIONS

The scientific evidence is conclusive and has been for more than three decades: Australia's rangelands warrant remedial action to avoid degradation of the land, intolerable offsite effects (such as to the Great Barrier Reef) and immiseration of the pastoralists. The primary cause of the absence of effective stewardship programs in the inland is the adherence to a false conception of rural landholders as self-sufficient producers who must sink or swim in a competitive market. The parsimony of governments in making funds available for NRM programs is a consequence and in turn frustrates the best attempts of landholders and their advisors to establish a more sustainable model. Fragmented accountability and fragmented knowledge reinforce each other to cocoon those who determine the State's budgetary priorities from personal awareness of the problems.

People living in rural and regional Australia look to their elected governments to exercise responsibility for ensuring a coherent social and economic system (Hogan and Young 2013), but this will not be achieved by reliance on market theory.

If a stewardship scheme of the kind proposed in this report were to be established, then the subject landholders would have a reliable source of income that did not depend upon grazing stock. They could then choose to destock or reduce the stocking rate, according to the resultant of costs and benefits to the family. This would be an appropriate application of market forces, leaving the choice to the individual.

A reliable cash flow dedicated to land restoration would offer opportunities to underutilised youth labour in the form of an environmental workforce that has standing and dignity.

Implementation of the scheme requires more than just in-principle support from one department or Minister. A Premier's directive identifying one Minister and departmental head as champions with an instruction to all departments to collaborate is required.

Recommendations

The lead author recommends:

1. That a submission be made to the Queensland Government and the Opposition to secure agreement to support a stewardship incentive scheme for a minimum of 20 years. The submission is to recommend that the Premier issue a directive nominating a portfolio champion and instructing all departments to collaborate.
2. That the Royal Society of Queensland accept the Queensland Government's invitation to discuss the design, development and implementation of the proposed Land Restoration Fund.
3. That a new Land Restoration/stewardship incentives program be directed in the first instance towards State leasehold properties.
4. That Treasury be urged to run a comprehensive study of the economic and employment benefits of investing in land restoration contrasted with high-profile construction projects.
5. That a submission be made to the Commonwealth to introduce a Landcare Levy surcharge on income tax.
6. That the Delbessie Agreement be revived as a parallel program offering the prospect of improved security of tenure in return for improved land management, and preceded by strategic regional land use planning.
7. That a pilot project be launched in one of the catchments of the Great Barrier Reef (because of the current federal commitment and because of the well-established

connection between the condition of pastoral lands and pollutants running into the Reef lagoon).

8. That a submission be made to the Commonwealth to reverse its unfathomable decisions to de-fund Land and Water Australia, National Land and Water Resources Audit and the Australian Collaborative Rangelands Information System; and to starve the NRM Spatial Hub. In the absence of a sympathetic response, that the Queensland Government reinstate Queensland equivalents within the Department of Natural Resources and Mines.
9. That the Department of Natural Resources and Mines convene a dialogue of scientists, agriculturalists and graziers including the NRM Regions, AgForce, The Royal Society of Queensland and independent experts to review all available best-management-practice materials for graziers with a view to developing a sophisticated set of guidance materials embodying the best modern understanding of landscape function. This would serve as a framework for more localised guidelines.
10. That the Queensland Government make a public commitment to keep the stock routes open to allow pastoralists flexibility in responding to weather and climate; including stock routes now largely unused; and amend statutes to allow local governments to retain 100% of travelling stock fees and 0% of static grazing fees until these are phased out.



APPENDICES

1. Summary of State of Environment Reports – 1990-2011.
2. A Pilot Stewardship Scheme in the Pastoral Mulga Lands.
3. Landholders' Perceptions.
4. The Delbessie Agreement– A Framework for Sustainable Land Management.
5. Extracts from Relevant Authoritative Reports.
6. Land Restoration Fund – ALP Policy.
7. References and Endnotes.

SUMMARY OF STATE OF ENVIRONMENT REPORTS – 1990-2011

Compiled by Chris Kahler. Spreadsheet to be inserted.

A PILOT STEWARDSHIP SCHEME IN THE PASTORAL MULGA LANDS

This Appendix describes an attempt by South West NRM Ltd, a community-based organisation based at Charleville, to offer financial incentives to improve the condition of a pilot selection of properties in the mulga lands of south-western Queensland, in 2007-08. It is an edited version of an opinion piece that appeared in the *Proceedings of the Royal Society of Queensland*, volume 119, December 2014.

CONTEXT

Economic and biophysical context

The *mulga lands* is a shorthand term for the region, where the predominant woody species is grey-foliaged mulga (*Acacia aneura*), although there are many other vegetation types, notably along the three major rivers the Bulloo, the Paroo and the Warrego. Mulga tends to dominate where biomass of grass, through grazing by domestic stock and kangaroos, is too sparse to support periodic fires. Unlike most of the sclerophyllous trees and shrubs in the Queensland rangelands, mulga is palatable. This is a lifesaver for graziers caught in a short drought, as the leaves can serve as survival rations for the breeding herd. However, in an extended drought that persists long after the grass foliage has gone, the pastoralist is trapped into relying on the mulga, well after the animals should have been dispatched.

Concern about pasture condition in the region is not new. In 1901 a Royal Commission investigated reports of degradation in the comparable Mulga Lands of western New South Wales. The enquiry heard evidence of drought, overgrazing, pastoralists' distress and economic unviability: a litany of ills that could apply today, even more so, with only the dates changed.

There has been extensive research over decades by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and scientists employed by the State department of agriculture at the Charleville Pastoral Laboratory. The science and practice of land management in the region was comprehensively summarised and covered in the 1984 symposium hosted by the Society (Sattler 1986).

One hundred and fifty years of European-style grazing have underpinned the development of the region, contributing to the State's prosperity. Primary industry, particularly pastoralism, remains the major driver of economic activity, but the farming practices have adversely affected the natural resources that underpin the agricultural base. Systemic change is required to break the gradual cycle of resource decline and degradation. The severity of the long drought in the early 2000s brought this dilemma into focus.

During the 2000s, the concept of 'market-based instruments' as a method of achieving environmental or natural resource management (NRM) objectives became fashionable in economic and policy circles. The seminal initiative in this field was the BushTender project run by the Department of Primary Industries, Victoria (Stoneham et al 2003).

Institutional context

South West NRM Ltd is a company limited by guarantee with a board elected by the local community, with headquarters in Charleville. It covers approximately 11% of the State's surface.

The charter of South West NRM requires it to consider innovative ways to foster sustainable land management in the region. In preparing for a new regional plan to prioritise Australian and State Government investment during the period from July 2008 to June 2013, the company devoted considerable thought to crafting strategies to transition the management of the mulga lands to sustainability, beyond its traditional grant programs to graziers such as for weed control and remediation of erosion.

A particular concern was to ensure that any grant programs did not fall foul of either the public interest obstacle to arrogating taxpayers' funds to subsidise private commercial businesses; or to the nation's obligations under the protocols of the World Trade Organisation not to pay production subsidies.

Another concern was the prospect of being able to demonstrate measurable improvement in the condition of the land in order to satisfy contemporary expectations of program evaluation. This concern was brought into sharp relief by the release in February 2008 of a report by the Australian National Audit Office (ANAO 2008) critical of the inability of recipients of funds for natural resource management programs such as Landcare to demonstrate lasting improvement to the condition of lands subject of government investment.

MATERIALS AND METHODS

South West NRM Ltd decided in late 2007 to introduce a "Pasture Recovery" scheme on a pilot basis. The company invited landholders to bid competitively for the provision of ecological services, which would include carbon storage, clean water, wildlife habitat, erosion control, pest animal control and weed control. Such a scheme was thought to be a valid use of public funds given the public goods that would be produced. The scheme was structured to pay a sample of pastoralists a steady income to produce fresh air and water as an alternative to growing sheep and cattle.

South West NRM Ltd elected to employ this method as it was administratively simple, did not require landholders to reveal their personal financial information, and was thought to represent good value for public money. As far as the company was aware, this was the first use in Queensland of a market-based initiative that aimed to improve landscape health by paying landholders to spell their pastures and control pest animals.

The company reserved \$250,000 of discretionary funds to launch the scheme on a pilot basis. The number of properties which could be offered relief with this amount of money of course could only be modest compared with the 187,000 km² within the region, but the contribution it could make to regeneration and seeding of grasses, if the sites were selected strategically, need not be negligible.

Expressed in other words, the scheme was intended to allow a sample of graziers to become producers of ecosystem services rather than just farmers of domestic stock.

RESULTS

The purpose of the pilot was to test a tender-based process for evaluating the suitability of properties for stewardship-type payments. No illusions were held that the scheme would result in permanent improvements to the condition of the country. There are too many variables, notably climate, weather, the natural cycles of growth of the signature species (some of which have periods of decades) and the numbers of kangaroos which migrate long distances following rain, to mention only a few. Entirely worthwhile rehabilitation can be swamped by factors outside the control of the company or the landholder.

Some 123 expressions of interest were received, and from all quarters of the region. Some 600 addresses are recorded in Australia Post's rural mailing list for the region.

After the initial reviews had taken place and ineligible applicants removed, 89 sets of tender documents were posted.

At the close of tenders on the 14th December, 34 submissions had been received covering 330,826 ha or about two percent of the region. The tenders fell loosely into two groups, those with a low price per hectare (average about \$4) and those with a substantially higher price (average \$13.50 per hectare – more than three times as much). The most likely explanation for this surprising differential is that some graziers bid just enough to cover their net outgoings, while others calculated on the basis of commercial rates for agistment. This result tends to confirm the merit of a tender-based scheme in terms of public financing, as it takes advantage of the leanness of many grazing enterprises. It also hints that some of the stations are operated on a maintenance only basis.

The periods of leases sought were from one year to five years. That some graziers sought long periods signposts their low expectations of a likely imminent return to commercial profitability.

Given that there had been little preparatory personal forewarning of graziers about the scheme, the level of interest expressed was considered high. Also, the fact that tenderers were comfortable with allowing officers of the company to enter their stations to record pasture and soil conditions was gratifying. Landholders are traditionally averse to interference with their prerogatives of management and their sovereignty over their properties. The lack of concern with this condition could indicate a significant level of trust in the company, aided by the absence of any regulatory powers.

There was no systematic survey of landholders who requested tender documents but who decided not to submit a bid. This would have been useful.

The Monitoring Officer of South West NRM established monitoring sites at all properties after contracts were signed. She has advised by way of summary (Nicholls 2014) that "basically it was only one lot of data!" After monitoring commenced, "it rained and the whole region had the best pasture ever." One paddock was burnt out which compromised the time series observations. She reported that graziers were pleased with the scheme because they gained an income from land that in many cases constituted back paddocks that were not grazed much anyway.

This intelligence does not invalidate the mechanism. It highlights the difficulty in securing reliable improvement in land condition within a landscape subject to irremediable climatic variability. It is arguable that only if the scheme were to be applied over perhaps decades would its merits become transparent.

DISCUSSION

Contracts for achieving conservation objectives have been described as a method of creating markets for public goods, but on close examination they seem to be simply a competitive method of distributing a subsidy. Given that public goods by definition are not adequately reimbursed in commercial markets, there must always be a source of non-profit money funds and so they must by definition fall outside the scope of conventional markets. Also, to be effective, conservation contracts require careful planning such as clear definition of purpose and meticulous attention to design; these features alone distinguish them from what

economists describe as self-governing markets. South West NRM could not have run its tender without a source of pool of funds external to the production systems being influenced.

As Stoneham et al observed, a benefit of the auction-based approach (or tender) is that “it enables an agency to take advantage of heterogeneity in landholders’ opportunity costs.” A risk of this approach where the landholder is required to perform conservation works is that it is merely a method of undercutting commercial contractors. The South West NRM pasture recovery scheme did not require the land holder to construct any works (except maintain boundary fencing) so avoided that regressive aspect.

The tender method had a number of benefits for the agency. It allowed a value for money criterion to be inserted into a palette of other criteria based upon land condition, biodiversity value and potential for catchment improvement. It allowed the agency to gain an understanding of the scale of funding required should a larger more comprehensive scheme be enacted subsequently.

Given the objective of reducing grazing pressure on these semi-arid landscapes, an incentive scheme like the one described here offers the prospect of destocking while allowing experienced landholders to remain in occupation and, at least in principle, to manage populations of feral goats and pigs. The alternative of bringing properties back into public ownership has the disadvantage of requiring the State to fund the capital cost of purchasing properties and the running costs of replacing independent proprietors with rangers.

The benefits of the scheme for a given property might well be long-lasting, if the incentive payments act as a circuit-breaker to allow pastures to be spelled after rain and biomass to build up so that the grazier can in due course reintroduce sufficient animals to make a living without harvesting more than the surplus plant production. Realistically, however, climate change, weather, market conditions and personal idiosyncrasies can all conspire to make this difficult. A scheme would probably be successful in reducing degradation only if it were ongoing and structured to result in a permanent lowering of grazing pressure. This would require an ongoing external source of funding.

CONCLUSIONS

The pilot scheme demonstrated the practicability of a tender-based method of choosing recipients of stewardship-type payments. The level of interest expressed in the scheme was high and negotiations that led to the eventual issue of subleases were non-problematic. The face-to face dialogue and inspections held with the short list of candidate landholders were valuable. The level of engagement with landholders was aided by the non-government status of the company.

The administrative costs to the catchment body were within the scope of routine business of the company. The time and travel involved in regular condition assessments were considerable, but again were built into the budget for the scheme and were well within the skill capacity of the staff.

The scheme highlighted the value of the regional NRM bodies in operating a program of this kind. South West NRM is ongoing organisation based in the regional centre, with a staff having long-term familiarity with and resident within the region. Its track record of running field days, environmental condition assessments and water quality monitoring positioned it well for the program. Given its status outside the public service, it can be more commercially nimble.

However, the program could not have been envisaged without the availability of a pool of discretionary funds. It also depended upon the existence of a trusted regional community-based organisation as coordinator.

ACKNOWLEDGEMENTS

The Board of South West NRM should be commended for taking the courageous step of approving a programme with no known precedent in eastern Australia.

The staff of the company worked effectively as a team to deliver the program. Nigel Kimball, Principal of Yarramine Environmental Consultants, inspected and evaluated properties on the shortlist of candidates and prepared comprehensive submissions.

Disclaimer: The author was Chief Executive Officer of South West NRM from 1 January 2007 to 30 June 2008.

LANDHOLDERS' PERCEPTIONS

This Appendix summarises the doctoral dissertation of Dr Robert Finlay (Finlay 2014). The words are extracted from Finlay and Crockett (2014).

“As a means of understanding land managers’ knowledge of, and attitudes toward, land management policy in relation to land management, 327 land managers from Central and Western New South Wales responded to a survey which contained questions regarding external and environmental influences on production, the personality dispositions of producers and challenges facing successful land management.

“This paper focuses on the policy implications of the findings, which show primary producers have a strong commitment to sustainable management and acknowledge a duty of care and responsibility towards the land, while displaying a dislike at the ‘outside intervention’ of others, including policy makers, into their farm management decisions and practices. Respondents strongly support restoration of degraded landscapes, but there is an equally strong belief that they should not be solely responsible for funding what is essentially a public benefit, particularly where the overall cost is beyond their capacity to pay. This reflects a level of resentment over the ‘blame’ they feel they are being made to carry for perceived environmental mismanagement. From their perspective, it would be more productive to attribute value to the land management practices of farmers and graziers, rather than focusing on their shortcomings.

“It is recommended that through understanding land managers’ attitudes and perceptions, more equitable and less confrontational policies can be developed to harness their core values of stewardship and duty of care and empower them to adopt even more responsible land management practices in the future.”

THE DELBESSIE AGREEMENT – A FRAMEWORK FOR SUSTAINABLE LAND MANAGEMENT

The Delbessie Agreement (or State Rural Leasehold Land Strategy) is a framework for the sustainable management of state rural leasehold land. Developed and implemented by Queensland's Department of Environment and Resource Management (DERM), the Agreement represents a groundbreaking partnership between the Queensland Government, AgForce, and the Australian Rainforest Conservation Society.

It is a contemporary plan for sustainable use, protection and rehabilitation of rural leasehold land that takes aspirations of leaseholders, conservation and Indigenous groups, government agencies and rural industry into account. The Agreement uses a mix of incentives and regulatory approaches to support profitable and productive primary industry, while meeting natural resource management challenges. It applies to approximately 1800 rural leasehold land leases issued for grazing and agricultural purposes covering about 86.6M ha (or about 50% of Queensland's land area). The Agreement links the maintenance of land condition; the protection of conservation values (such as through the establishment of nature refuges) and Indigenous access; to extended lease terms.

A suite of practical measures and guidelines have been developed to support the implementation of the Delbessie Agreement. These include the Guidelines for determining lease land condition – designed around the eight elements of the Land Act 1994 'duty of care' and defined elements of land degradation; and a Land Management Agreement – negotiated between the leaseholder and DERM that clearly outlines leaseholders' natural resource management obligations for the ongoing sustainable management of lease land. The framework is further supported by practical policies, leading remote sensing and modelling tools, and purpose-built IT applications. Developing partnerships, capacity building and enhancing the knowledge of the stewards of rural leasehold land condition is critical to meeting the Agreements' social, environmental and economic objectives – improving the profitability, productivity and sustainability of rural leasehold land to assure the ongoing economic viability of rural communities.

Robert Hassett, Prue Peart, Greg Coonan

Department of Environment and Resource Management

Published on 13 May 2011 as a blog on the Liveable Cities' website:

<http://liveablecities.org.au/the-delbessie-agreement-a-framework-for-sustainable-land-management/> .

EXTRACTS FROM RELEVANT AUTHORITATIVE REPORTS

Blueprint for a Living Continent

Wentworth Group of Concerned Scientists, November 2002

In November 2002, after the first meeting of the Wentworth Group, the *Blueprint for a Living Continent* was published. It was founded on five key changes that needed to be made immediately to deliver a sustainable future for our continent and its people. They were:

1. Clarify water property rights and the obligations associated with those rights to give farmers some certainty and to enable water to be recovered for the environment.
2. Restore environmental flows to stressed rivers, such as the River Murray and its tributaries.
3. Immediately end broadscale land clearing of remnant native vegetation and assist rural communities with adjustment. This provides fundamental benefits to water quality, prevention of salinity, prevention of soil loss and conservation of biodiversity.
4. Pay farmers for environmental services (clean water, fresh air, healthy soils). Where we expect farmers to maintain land in a certain way that is above their duty of care, we should pay them to provide those services on behalf of the rest of Australia. (Emphasis added).
5. Incorporate into the cost of food, fibre and water the hidden subsidies currently borne by the environment, to assist farmers to farm sustainably and profitably in this country.

The Blueprint proved that we have sufficient knowledge now to set a new direction in the way we manage our land, towards practices that are in harmony with the highly variable climate that is intrinsic to Australia. It concluded that, if we get it right, Australia will continue to produce food and fibre for us and for the rest of the world. If we fail to act, history will judge us harshly.

Principles for Sustainable Resource Management in the Rangelands

NRMMC, 2010

1. Ecologically sustainable development (ESD) of natural resources should be the underlying principle for sustainable resource management (SRM) in the rangelands.
2. Building resilience in rangeland ecosystems is critical to managing uncertainty in the landscape.
3. The precautionary principle should be adopted so that decisions do not result in irreversible loss of opportunity.
4. Prevention of resource degradation is more effective than rehabilitation. While legislative responsibility for ensuring ecologically sustainable development resides with government at all levels, primary responsibility for sustainable resource

management rests with landowners and users, in accordance with relevant planning processes and relevant legislation.

6. Rangeland landowners, managers, users, Indigenous peoples, special interest groups, communities and administrators should be consulted in the development of relevant national strategies, where appropriate.
7. The varying tenure arrangements across the rangelands and the impacts on the ability, rights and responsibilities of landholders to access and manage natural resources need to be taken into account.
8. The aspirations and inherent rights of Indigenous peoples and traditional owners, their relationship with the rangelands, and the need for culturally appropriate engagement and consultation processes must be taken into account.
11. Coordination, collection and synthesis of rangeland specific data and the provision of information to national data sets should be actively encouraged.
12. Decisions impacting on the rangelands need to take account of interdependencies and inter-relationships between components of the ecosystems within and between regions, and between the rangelands and the rest of Australia.
13. Rangeland landscapes are not all the same and will respond differently to changes in the environment, and management regimes may need to be adapted for local or regional conditions.

The Decade of Landcare: Looking Backward – Looking Forward

10 Point Plan

Toyne and Farley, 2000

Building on this principle we propose a ten-point plan to tackle Australia's land-use crisis. Such a plan must go beyond the comfort zone of the current debate, for progress is being prevented by platitudes. The points of our plan are as follows.

1. There is a need to apply the concept of a 'Social Contract' between the community and land users as recipients of the vast amounts of public funding.
2. Landcare activities should be based on Regional Plans that would be given effect by legislation.
3. Commonwealth funding should be allocated on the basis of regional plans to encourage a whole-of-region approach. Project funding would be a regional responsibility with grants in accordance with the regional plan.

4. A process like the Resource Assessment Commission should be restored to provide Cabinet with a solid and independent base of fact upon which to make major resource decisions.
5. There should be a steady proportional increase in research funding in each Commonwealth and State budget.
6. A 1% National Landcare Tax should be imposed for the next ten years to raise funds in the order of \$30 billion.
7. Partnerships with business should be initiated to assist in the repair of Australia's lands and rivers, using mechanisms such as greenhouse emissions trading to drive commercial vegetation plantings, and water markets to bring full commercial value to water use.
8. This national initiative should commence with a meeting of stakeholders from across Australia to lay down the broad policy direction for its implementation.
9. There must be a 'tollgate' mechanism attached to policy development, integrated under the national natural resources management umbrella to ensure that policy objectives are achieved.
10. Indigenous people, issues and lands must be a core element of national and regional strategies.

Extracts from Clean Water for a Healthy Reef
Great Barrier Reef Water Science Taskforce, May 2016

Taskforce Conclusion 3

Agricultural extension, particularly when aligned with other mechanisms such as incentives, is fundamental for improved long-term land management.

Task Force Conclusion 4

In order to make the significant changes needed to improve Reef health outcomes, incentives (for example grants) and market approaches (for example tenders) should be considered to complement and integrate with regulation, extension and education.

Task Force recommendations

4. Establish greater use of incentives and market approaches to support water quality improvements.
 - 4.1. Targeted use of market approaches such as tenders/reverse auctions (for example for purchasing nitrogen reduction) should be used where practical.
 - 4.2. Develop new incentives to accelerate adoption of improved management practices and/or support land use change (for example incentives for practice change, acquiring areas, and stewardship payments for restoration).
 - 4.3. Explore innovative approaches to support existing tools and manage risk (for example yield insurance, concessional farming loans).

- 4.4. Water quality trading approaches may be viable in some settings in the future but will require a staged pathway of regulation and detailed farm level information to support implementation.

Recommendation 4 – Incentives

- Incentives are policies or initiatives used to affect change in actions or decisions. They are considered key tools in gaining greater adoption of sustainable land management to achieve the water quality targets.
- Market-based approaches include grants, subsidies and tenders...as well as stewardship payments, stamp duty relaxation and insurance schemes. Examples include:
 - stewardship payments to provide financial support for landholders to improve land condition (for example through payments to temporarily destock grazing land to reduce gully erosion) or to voluntarily convert unproductive land to a more sustainable land use (including by restoring wetland or natural ecosystem functions where this will be beneficial)

Using market approaches to achieve ecosystem repair

- The degradation or loss of riparian areas, wetlands and other natural ecosystems can be symptomatic of 'market failure'. The services that these areas provide (for example as fish nurseries or ameliorating poor water quality) are not fully recognised by the 'market' and as they are essentially a 'public good', no one is held responsible for the true cost of their loss. This means that reversing the degradation is unlikely unless there is targeted intervention or incentives.
- Providing targeted incentives for achieving ecosystem restoration and repair is considered particularly important recognising that best management practice alone will not meet the water quality targets. The restoration and rehabilitation of riparian areas, wetlands and flood plain ecosystems in strategic locations is expected to contribute to better outcomes for water quality and overall Reef health.

Stewardship payments (payments for ecosystem services)

- Stewardship payments are payments made to a landholder for carrying out 'stewardship services' on their land to maintain or improve natural resource values and outcomes (for example for fencing off areas or restoring areas of land).
- These payments are based on the concept of the landholder providing a public service with the fee paid reflecting this. Their main benefit is that they can address more than one problem at a time (for example biodiversity and water quality outcomes) as well as maintaining existing environmental values (for example retention of native vegetation).
- The type and extent of stewardship payments is usually governed by a voluntary management agreement. Payments are generally ongoing (for example on an annual basis) and are offered for services above the expected minimum standard and are tailored to the situation.

ends

LAND RESTORATION FUND - ALP POLICY

“SAVING HABITAT, PROTECTING WILDLIFE AND RESTORING LAND: ENDING BROADSCALE TREE CLEARING IN QUEENSLAND (AGAIN)”

The Australian Labor Party took to the 2017 election a policy to establish a Land Restoration Fund, with the following provisions.

‘The Land Restoration Fund will support projects such as:

- Revegetating state-owned land to create new koala habitat
- Protecting native forests on land earmarked for clearing
- Restoring and revegetating degraded grazing land to provide income diversification for farmer and other landholders by creating carbon credits, while reducing sediment pollution and improving water quality in the Great Barrier Reef
- Rehabilitating and revegetating private land by removing pest and weed species and replacing them with native trees
- Improving the condition of wetlands in Great Barrier Reef catchments, helping reduce nitrogen pollution.

The Land Restoration Fund will be established through an initial \$30 million contribution from government, with capital of \$500 million to be raised through the issuance of a State Government Green Bond. The capital raised will offset debt and interest impacts on the State Budget. The government will investigate options for the fund to operate independently to deliver returns as the world moves towards the Paris Agreement target. To ensure the environmental benefits of projects are fully-realised, projects involving longer-term commitments by landholders will be highly valued under the fund, as will projects that protect unregulated vegetation. We are committed to working with stakeholders in the design, development and implementation of the Fund. We will also be working with interested parties in setting the co-benefit priorities for the Fund. Queensland’s land mass and natural assets make our state a potential leader in the domestic and international carbon markets. We want Queenslanders to reap the benefits of this growing industry.’

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ENDNOTES

¹ Australian Institute of Health and Welfare. <http://www.aihw.gov.au/rural-health/>

² Queensland Government Statistician's Office, pers. comm. 13 March 2018:
“...some regions with a small sample size will still exhibit large volatility from month-to-month. This is the case for Queensland - Outback SA4. ...To give you an indication of volatility in this region, the unsmoothed (original) youth unemployment rate for Queensland - Outback SA4 went from 67.9% in Jul-17 down to 0.0% in Aug-17 and then back up to 51.8% in Sep-17.
“Using the ABS published standard errors, the smoothed youth unemployment rate for Jan-18 for Queensland - Outback SA4 was 62.0% with a confidence interval of 44.0% to 80.0%. Similarly for Jan-17, the smoothed youth unemployment rate was 36.6% with a confidence interval of 18.6% to 54.6%. Given these two confidence intervals overlap for Jan-17 and Jan-18, it could be stated that there has been no statistically significant change in the youth unemployment rate in Queensland - Outback in the past year.”

This explanation is statistically correct. However, it is at least as likely that the trend is genuine. The figure in May 2015 was 11.9%. Since then the deterioration has been steady. If the correct figure is *only half* of the 44% lower confidence bound, it would still be alarming.

³ Land tenure statistical information: Queensland Government. <https://data.qld.gov.au/dataset/land-tenure-statistical-information/resource/eb4ea8ab-1d4d-4f1d-9c69-72987d8ead3f> Downloaded 6 June 2016.

⁴ Material on duty of care and the definition of property rights is extracted from Edwards (2003).

⁵ This reflects philosopher Jeremy Bentham in the early 19th century against the arguments of philosopher John Locke. The Founding Fathers of the USA debated whether to follow Locke in nominating ‘property’ as a fundamental human right, but rejected this, confining the list to “life, liberty and the pursuit of happiness”.

⁶ Eves & Blake. 2013. “In many instances the cost of purchasing perpetual leasehold property is similar to the equivalent freehold property despite the fact that an additional rental charge is applied to this form of ownership.” Anecdotally, the same comment applies to the large stations under term lease.

⁷ The *Residential Tenancies and Rooming Accommodation Act 2008* spells this out in s.185: “While the tenancy continues, the lessor... must maintain the premises and inclusions in good repair...”; and s.188: “(3) The tenant must not maliciously damage, or allow someone else to maliciously damage, the premises or inclusions. (4) At the end of the tenancy, the tenant must leave the premises and inclusions, as far as possible, in the same condition they were in at the start of the tenancy, fair wear and tear excepted.”

⁸ This is almost true by definition. Authority can be found in numerous work such as Couto, Richard A. (Ed). 2010. *Political and civic leadership: A reference handbook*. Sage or Dalton, R. J. and H.D. Klingemann. 2007. *Oxford Handbook of Political Behavior*. Oxford, UK: Oxford University Press.

⁹ See his columns on the *Soils for Life* website, reproduced on the website of The Royal Society of Queensland.

¹⁰ <http://www.almg.org.au/>. Downloaded March 2018.

¹¹ <https://wentworthgroup.org/programs/environmental-accounts/> Downloaded 13 March 2018.