

# Leveraging Landscape Change

## Instrument design for supporting the evolution of new natural resource industry niches

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### Abstract

This paper outlines how resource degradation in Australia could be reversed with innovative investment approaches that compensate for the main impediments to beneficial landscape change. We argue that the existing suite of policy responses is incomplete and there are benefits to be had by introducing some new approaches for encouraging innovative and creative, appropriate landscape change.

We discuss two examples that address the need for instruments that encourage the evolution of new natural resource industry niches:

1. the proposal advanced by the Allen Consulting Group in its recommendations to the Business Leaders Roundtable in 2001 on options for leveraging private investment entitled *Repairing the Country*
2. a pilot project that is being undertaken by Greening Australia and the CSIRO with funding provided under the Market Based Instruments Program of the National Action Plan on Salinity and Water Quality ..

The paper concludes with a comparison of existing instruments and their usefulness.

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# **Leveraging Landscape Change Instrument design for supporting the evolution of new natural resource industry niches**

## **Introduction**

Recent years have seen strong policy interest in 'market based' and 'market like' NRM policy tools, such as more efficient arrangements for funding public benefit activities. Most of this policy discussion and research inquiry has focused on static allocative efficiency issues treating resource degradation as essentially a static problem to be addressed within existing technologies and industry structures. However, resource degradation and of particular relevance, its reversal, is a dynamic efficiency issue. There are opportunities for innovations, which are essentially dynamic in nature, that are not directly addressed with current NRM policy tools. It is argued here that to some extent the NRM policy? problem has been framed incorrectly because beneficial landscape change requires innovations in the way landscapes are used and not simply adjustments in current usage.

The purpose of this paper is to outline how resource degradation can be reversed with innovative investment approaches that compensate for the main impediments to beneficial landscape change. We argue that the existing suite of policy responses is incomplete and there are benefits to be had by introducing some new approaches for encouraging innovative and creative, appropriate landscape change.

We discuss two examples that address the need for instruments that target support for evolution of new natural resource industry niches:

1. the proposal advanced by the Allen Consulting Group in its recommendations to the Business Leaders Roundtable in 2001 on options for leveraging private investment entitled *Repairing the Country*
2. a pilot project that is being undertaken by Greening Australia (GA) and the CSIRO with funding provided under the Market Based Instruments Program of the National Action Plan on Salinity and Water Quality .

The next section of this paper summarises the main natural resource management issues that define the Australian situation. This is followed by a discussion of Australian policy priorities and a summary of policy instruments. The question is then asked as to why non-degrading commercial practices have not evolved on Australian farms. The reasons are discussed in the context of dynamic efficiency.

The paper concludes with a comparison of existing instruments and their usefulness.

## **The Landscape**

Globally, Australia is in the unique situation of being one of the driest developed countries with a high degree of variability in its rainfall and climatic patterns. Regionally within the country, the dryness and variability are particularly marked and have contributed to a degradation of the landscape that is compromising production potentials and becoming increasingly socially unacceptable.

The source of the problem has been generally accepted to be the result of the imported agricultural methods and crops that are inappropriate for the climate and biophysical composition of the landscape. Walker et al (1999) has argued that this is a mismatch that has been perpetuated since development in Australia began because the geomorphology of Australia is different to that elsewhere.

There have been conservation efforts undertaken here that concentrate on purchase and reserve options, however, it is being recognised more often now that biodiversity conservation, for example, cannot be achieved adequately by setting up reserves alone. What is needed are incentives for encouraging biodiversity conservation on private lands.

A solution that has been advanced by many lies in promoting the commercialisation of native plants and accelerating the adaptation of our commercial resource use by using landscapes in a sustainable way (Stirziker et al 2000, Williams, 2001, and others). This is the recommendation that motivates our work on private sector incentives presented here.

## **Policy Goals**

In 1992 the Australian government decided that all future development should be sustainable (*National Strategy for Ecologically Sustainable Development*). Since then there have been two main policies aimed at sustainability: The Natural Heritage Trust (NHT) and the National Action Plan on Salinity and Water Quality (NAP). The \$2.7 billion NHT was first set up by the Commonwealth in 1997 to help restore and conserve Australia's environment and natural resources. The goal is to deliver important resource outcomes including improved water quality, less erosion, improved estuarine health, improved vegetation management and improved soil condition. An associated benefit is identified as enhanced protection and restoration of biodiversity.

The NAP is a seven year program with \$1.4 billion in funding to apply regional solutions to salinity and water quality problems. A recent press release extends this mandate to one that encourages sustainable land uses in order to conserve biodiversity, reduce salinity and manage water allocation within environmental limits (Joint Media Release, April 16, 2003).

Both programs provide funding to support investments mainly through grant programs with some efforts in piloting cap and trade mechanisms. Underlying these two programs are socio economic goals such as viable rural communities and sustainable agriculture.

There is no one solution and there are no easy solutions. Policy makers are open to innovative strategies for attaining national, regional and local environmental goals. For example, creation of new institutions in this area was strongly endorsed by the House of Representatives Standing Committee on Environment and Heritage (HRSCEH), which noted 'the problems facing Australia's catchment systems will not be solved in a decade or even a quarter of a century. They will take generations to address. For this reason, stable, trusted institutions are required with access to stable sources of funding. For this reason, it is best to build upon, and extend, the stable institutional arrangements that we enjoy in Australia.' (HRSCEH, 2000, p. 84).

This paper describes two recent proposals that do not use a regulatory regime or a grant program as the primary mechanisms for generating landscape change in order to improve environmental outcomes. The two proposals are discussed in the context of how they address the impediments to landscape use change and how they encourage innovations in the way natural resources are used.

## **Instruments for Improving Environmental Outcomes**

The market and non market mechanisms for changing environmental outcomes are well studied and have been well communicated through a number of academic and government publications that have proliferated worldwide over the past decade. In Australia alone the CSIRO, the Murray Darling Basin Commission, the Productivity Commission, the Australian Department Environment and Heritage and the States have all contributed valuable advice during this time covering environmental issues on the ranging from the science of catchment regions, landscape mapping, the economics of market based instruments to regulatory options. While there is a smaller set of pilot projects or full-scale implementation, the theory is well documented.

While it is true that there are many instruments that affect incentives for natural resource use, all of these are not reviewed here. We concentrate on the three categories of instruments, or incentives, which are given in Table 1. This format is useful for highlighting where they are most appropriately used in the remainder of the paper. The incentives are

categorised according to whether they are intended for funding public good provision, for managing scarce resources or for generating innovations in the ways commercial ventures are undertaken.

**Table 1: Options for Altering Current Environmental Outcomes**

Option	Advantage	Examples
Flexible Tenders	Funds provision of public goods – single goods or multiple outputs as with ecosystem services	BushTender in Victoria US Conservation Reserve Program
Tax Leverage and Commercial Equity Investment Vehicles	Address industry development/evolution and innovation issues  Arm's Length from Government to encourage commercial engagement (In contrast to grants which are relatively more 'hands on')	Investment tax incentives <ul style="list-style-type: none"> <li>• Allen Consulting Group – <i>Repairing the Country</i> recommendations</li> </ul> Hybrid investment vehicles <ul style="list-style-type: none"> <li>• (Greening Australia's MBI Pilot under NAP)</li> </ul>
'Cap and Trade'	Tradable permits for managing scarce capacity	Limit bads rather than encourage goods Used for development plans, some emissions

Each mechanism has merit in specific circumstances. Tools such as the BushTender Trial in Victoria (Stoneham et al, 2003), the Canadian Permanent Cover Program and the Conservation Reserve Program in the US operate at the margin inducing change in management practice or withdrawal of land from use. Tax leverage programs have the potential to induce changes in the way that resources are used in production.

By far the major expenditure is on grant programs including the BushTender Trial in Victoria. It is estimated that less than one per cent is spent on the tax leverage vehicles, which includes Cap and Trade and the whole of the Market Based Instrument (MBI) trials of the NAP.

Since there is a continued degradation of the environment in Australia, this begs the question of where is the failure and where is the potential. What is true for all policy is true for NRM policy as well: successful policies match instruments to the needs of the situation and the best policies will follow when there is recognition of where the failure lies.

Since current tools do not address a number of significant issues, there is room in the policy mix for other incentive instruments. There is room for tax incentives that address the need for commercial engagement in large scale, on farm innovations. Hence there is scope for using a suite of instruments in pursuit of NRM goals. Tax leverage has the power to put the decisions concerning the best investments in the hands of those making the investments.

And what mix is best? The position of the ACG and the GA pilot rests on a common hypothesis. This is the expectation that the scale of long term change in land use may not follow from Cap and Trade Instruments and Grants alone because the degree of change needed requires extensive innovations in the way that resources are used and the crops that are grown. In addition, the level of grants required to induce the required amount of change is beyond the financing capability of the public purse alone. Private sector investment is required.

Large scale change requiring innovation requires innovative policy tools that will stimulate the degree and type of change that is required. Tax concessions that leverage significant private sector investment in development of new practices and resource niches are included in the options in Table 1 since our hypothesis is that what is needed is a funding structure that supports a major shift in investment at the firm and project level in environmentally sustainable land use ventures.

## **Innovations and Dynamic Efficiency**

Why hasn't there been wide scale landscape change? The key to generating sufficient landscape change lies in innovations in the way landscapes are used in production. What is required is innovation at the farm level. This represents what Porter (1980) first described as growth in industries that comes from innovations in the organisation of business. Porter (1980) led the work on the evolution of firms and the growth that is generated through clustering of like firms, for example, which generates agglomeration economies. In this sense, the processes that evolve are new and generate expansion of growth possibilities that expand output and reduce average costs. This microeconomic growth literature runs parallel to the literature on the 'New Economy' that is driven by information and technology change and the macroeconomic literature that describes economic growth generated through endogenous growth processes that are similarly based upon information change, learning and innovation. This process of growth is described as 'dynamic' in the sense that an evolution takes place in the way business is organised and this evolution leads to expanded output possibilities. (Florida, 2001)

This is not just about 'not enough dollars', it is also about what the dollars are spent on for the long-term wellbeing of the country's ecosystem. Given the scale of the current and projected resource degradation, systemic change in the way the whole landscape is managed is needed. The proposed ACG framework and the Green Bank pilot project, while not perfect, represent the kind of creative innovations in encouraging commercial engagement that is necessary. Engaging commercial interests in financing environmentally sustainable land use could lead to a change in the most productive path for producing the joint products of agricultural output and environmental outputs at the level of change that is necessary.

In order to provide a framework for comparing the policy tools, the next section outlines the four main reasons that there has been insufficient evolution of non-degrading commercial practices.

## **Impediments to Landscape Change**

Why haven't non-degrading commercial practices evolved on farms?

There are four main reasons that there has been insufficient evolution of non-degrading commercial practices. These are:

1. There is poor information on best practice commercial sustainable land use mainly because either information does not exist or it is not communicated well.
2. There are risks associated with moving to new (often untried) NRM practices including the *implementation risk* associated with new ventures, moving to untried processes introduces significant *innovation risks*.
3. There are significant landholder liquidity and capital constraints; and
4. There are low private returns on investments producing public NRM benefits.

### *Information*

Efficient outcomes require information exchange. Information flows are promoted by programs that encourage communication among stakeholders and that provide economic incentives to create and seek new information. This is an ongoing process that is being promoted by both policy (NHT and NAP) and the private goals of economic agents.

### *Risk*

The risk facing enterprises contemplating investments refers to the distribution of returns that is associated with the investments. Risk can be split into two types. The first is implementation risk, which is the kind of risk facing all business including agriculture. These risks include those imposed by weather variation. The second is innovation risk.

Innovation risk arises when there is development of new technologies or production methods for which there is uncertainty about the commercial viability of outcomes. Innovation risk is the kind of risk that is facing those who seek to develop new ways of doing things on the land in Australia.

Existing grants, that are static in nature, do not explicitly compensate for risk or respond to risk and as a result, do not necessarily encourage innovation. Even in the case where a grant system might be structured to identify and assess innovative changes, there is no guarantee that the public service officers who allocate grant funds would be able to encourage the most commercially viable projects. It is the contention here, that as in many other circumstances, the commercial sector is in the best position to choose the best investments.

#### *Landholder Equity and Capital Constraints*

The farming sector is heavily dependent on loan finance, which discourages more risky investments. Innovations that raise the degree of risk for farm enterprises, because they are untried and often generate returns over a relatively long time horizon, are effectively precluded when loan finance is the main form of financing ventures. This is because loan finance causes a given debt load to be borne regardless of the expected earnings. In other words, the interest paid on the loan does not necessarily bear a relationship to the riskiness of the venture.

New instruments that provide access for farm enterprises to innovation 'venture' funds for equity participation by investors have the capacity to expand farm financing opportunities, especially for the riskier ventures. Equity participation allows participation of investors who are willing to take on greater risk of all sorts in pursuit of earnings. However, in the case of loss, the investors bear the risk unlike the case of loan finance wherein the same loan must be repaid regardless of the losses incurred.

#### *Low Private Returns on NRM Investments*

In general, agricultural investments are not high return investments. Investment funds made available by commercial investors are inversely related to the riskiness of an investment and therefore, improving the expected return facing commercial investors is the key to encouraging investment.

### **Effectively Leveraging Landscape Change**

The ACG report lists and describes a wide range of activities that can be invested in to address environmental problems and make natural resource use more sustainable. The examples lie within three categories: management change, such as conservation tillage; landuse change, such as plantations and wattle seed production; and, new supporting infrastructure, such as local processing plants. The changes that are required are not well documented because, being new and novel, they are, to a large extent, untried. Stirzaker et al describe what is needed in the following quotation.

We need to develop and deploy a suite of novel landuses that are matched to [Australia's] diverse climate, soils and hydrological conditions...These landuses, in combination, need to deliver leakage rates past the root zone that approach those of natural vegetation. This will require radical change to landuse, incorporating the development of commercially driven tree production systems; new farming systems made up of novel mixes of all the best current annual and perennial plants, the best agronomy, companion plantings, rotations and combinations; (and) new forms of cereals, pulses, oilseeds and forages selected for characteristics that substantially reduce deep drainage and nitrogen leakage. (Stirzaker et. al. 2000 p. 2)

What is described here are market based mechanisms that are intended to stimulate the commercial adoption of these new and novel landuses. The ACG proposal is essentially a

tax based instrument and the Green Bank provides an investment vehicle for leveraging commercial investments.

#### *ACG Framework*

In the report prepared for the Business Leaders Roundtable entitled Repairing the Country, the Allen Consulting Group proposed a new institutional structure that is intended to leverage private sector investments in the sort of innovative landscape change discussed above. The proposal includes a recommended new structure that addresses each of the following; Management Change, Land Use Change and New Supporting Infrastructure.

At the core of the overall proposal is a tax preferred investment vehicle that improves the after tax return to investors in regionally accredited sustainable land uses. The framework envisioned by ACG is extensive providing a whole new structure to support environmentally sustainable investments that effectively lowers the cost of capital to land managers.

The tax measure would generate four crucial innovations in support of landscape change, namely:

- Creation of demand for and supply of information through intermediaries.
- Harnessing of existing tax advice base.
- Expansion of brokerage services that bring together the various stakeholders.
- Development of an institutional framework for accrediting potential land use proposals to meet tax guidelines.

An integral part of the ACG proposal is a Commonwealth Land Repair Fund, which would be the vehicle through which the Commonwealth government could fund high priority environmental outcomes associated with selected private sector investments. The main aim would be to purchase environmental outcomes in partnership with commercial land and natural resource users. In addition, proposals for investments would need to be accredited under a system of sustainable land use plans.

The ACG report estimates that the leverage ratio for private to public investment of 1.0:3.5. The estimate is based on an industry survey, and a model that addresses key commercial risk and return issues directly through tax preferred investment vehicles and extended funding arrangements. With investment vehicles that reduce risk, private sector investment is encouraged beyond current levels and environmental goals are more likely to be met because the new institutional arrangements ensure that investment actually addresses independently verified plans formed within an integrated catchment management framework and national priorities.

It is envisioned that by engaging commercial interests through the tax system, there will be minimal inter-jurisdictional friction. While as a general rule, the Commonwealth does not have Constitutional power in the area of land management, the proposed arrangements allow the Commonwealth to establish a framework with relatively streamlined links between financiers and investors through to accreditation agencies and land users.

#### *Green Bank Framework – ‘Farming Finance’ NRM Leverage Fund*

The Green Bank Framework is a Market Based Instruments pilot project proposed by Greening Australia and the CSIRO and to be funded by the Market Based Instruments Program of the National Action Plan on Salinity and Water Quality. The purpose of the pilot is to assess whether a leveraging approach can deliver public good outcomes beyond those generated in response to the existing grants-based ‘purchaser-provider’ model’. The goal is to explore whether or not there are benefits associated with a leverage model that are different, more cost effective or simply would not be available through traditional grants approaches. As discussed above, this is an example of a project that provides an incentive for generating innovations in landscape change and

provides both private returns and public benefits rather than requiring ongoing public funding to achieve desired environmental outcomes.

The pilot will establish a 'social enterprise' directed by an Investment Advisory Council comprising the best available financial, NRM and public policy skills, with at least \$2.5 million in private and public capital. The public portion of this is \$1 million. Investments through the Green Fund will be in rural projects or enterprises that provide an 'environmental dividend' to public and philanthropic investors, and financial returns to private investors.

Unlike the ACG recommendations for tax preferred investments, the Green Bank is not an entitlement approach but it is an instrument that enables piloting of the leverage possibilities suggested in the ACG report. In particular, the business strategy of the Bank deliberately matches the services provided to the market failures discussed above.

The Green Bank Proposal outlines five key strategies for addressing different types of market failure. These are:

- Equity investments where the Green Fund provides venture capital for promising and innovative projects;
- Risk sharing where the Green Fund shares both upside and downside risk for projects that do not need direct financial support;
- Underwriting commercial finance where there is a strong business case and underwriting can reduce net financing costs, improving private and public returns;
- Integrated NRM business advice to enhance the business case for investment and the public benefits achieved; and,
- Brokering partners to improve the viability and performance of valuable new initiatives.

The Investment Advisory Council will provide information, broker partnerships, evaluate expected NRM benefits and decide upon the best Green Bank involvement – equity participation, risk sharing or loan underwriting. Hence the Green Bank effectively pilots elements of the ACG proposal without requiring tax changes. For example, the public fund portion of the Green Bank parallels the ACG's proposal for the Land Repair Fund. However, it is not expected that one Green Bank would be able to stimulate the scale of innovation required in Australia even at full scale but a number of Green Banks may be effective at the enterprise level.

### **Incentive Mechanisms – the Scope for Landscape Change**

The question motivating this paper was expressed earlier as 'Why have non-degrading commercial practices not evolved on farms?' The impediments to landscape change have been discussed earlier. In this section, the categories of instruments are summarised according to which each of these impediments is addressed when they are used. The analysis is summarised in Table 2 below.

The tax leverage approach, as well as the Green Bank, addresses all four of the identified impediments. Clearly, there is room in the policy mix for this type of mechanism due to its clear focus on dealing with innovation risk and therefore has the potential to encourage the evolution of new natural resource industry niches. Whether or not the investments take place will depend on the degree to which information flows are improved and more importantly, the degree to which private returns are competitive given the tax advantage.



**Table 2: Comparison of Incentive Approaches – How are impediments to landscape change reduced?**

	<b>Discretionary Approaches</b> (eg flexible tenders)	<b>Entitlement Approaches</b> (eg tax leverage)	<b>Market Creation Approaches</b> (eg cap and trade)
Information Flows	Asymmetric Information reduced	Options clarified Creates demand for info	Creates demand for info
Risk of Investment Implementation Risk	Risk borne by landowner	Shared by investor Reduced if insurance underwritten	May be shared between supplier and purchaser of traded service (or borne by the landowner)
Innovation Risk	Risk borne by landowner	Shared by investor and public sector	Usually borne by landowner
Capital Constraints	Not addressed	Significantly Changed	May be addressed through brokerage arrangements
Low Private Returns	Improved Offset by public support	Expected return Improved	Returns from new markets

Table 3 compares the three policy instruments from the public sector perspective. Entitlement approaches have the clear disadvantage of providing no built in budget limits, however, this drawback needs to be weighed against the potential for innovative landscape change.

**Table 3: Comparison of Options for Altering Current Environmental Outcomes**

	<b>Discretionary Approaches</b> (eg flexible tenders)	<b>Entitlement Approaches</b> (eg tax leverage)	<b>Market Creation Approaches</b> (eg cap and trade)
Discretion	Yes	No	No
Budget Outlays or Tax Expenditures	Yes Known Outlays	Yes Revenues/Costs not usually capped	No
Administration Cost	Relatively High	Relatively Low	Borne by private actors
Focus	Public Benefit Mixed Benefit	Mixed Public and Private Benefit	Converts public benefit to a private benefit

## Conclusion

This paper argues that existing tools do not address all the impediments to improved environmental flows in Australia. Achieving Australia's NRM policy goals will require significant changes in commercial agricultural practice and natural resource management. Treating this desired transition as a dynamic efficiency issue suggests that desired changes are blocked by a range of impediments, including market failures related to innovation and risk, and by more general issues of enterprise culture and government administration.

Tax leverage and investment fund options are discussed as tools for addressing innovation risk and low private returns to investments.

- The ACG proposal is a tax preferred investment vehicle that improves the after tax return to investors in profitable regionally accredited sustainable land uses.
- The Green Bank option advanced by Greening Australia and the CSIRO achieves similar policy objectives through investments in rural projects or enterprises that provide an 'environmental dividend' to public and philanthropic investors, and financial return to private investors.

Investment leverage approaches have an important role to play in achieving Australian NRM policy objectives. The extent to which investment leverage provides a practical policy option for addressing ongoing landscape degradation is a judgement that requires testing in the marketplace. Over the next two years, the Green Bank Pilot Project should make a valuable contribution to our understanding in this area.

## References

- Allen Consulting Group (2001) *Repairing the Nation Report to the Business Leaders Roundtable*. Sydney.
- Australian National Audit Office (2001) 'Performance Information Commonwealth Financial Assistance under the Natural Heritage Trust', *Audit Report No.43*.
- Bardsley, Peter, Vivek Chaudhri, Gary Stoneham and Loris Strappazon (2002) New Directions in Environmental Policy, *Agenda* Vol 9 no 3 pp 211-221
- Florida, Richard (2001) Competing in the Age of Talent: Environment, Amenities and the New Economy, Report prepared for the R. K. Mellon Foundation, Heinz Endowments and Sustainable Pittsburg, January 2001.
- Greening Australia (2002) *Farming Finance: NAP MBI Pilot Proposal*, Canberra.
- Porter, Michael E. (1980) *Competitive Strategy: Techniques for analysing industries and competitors*, NY: Free Press.
- Stoneham, Gary, Vivek Chaudhri Arthur Ha and Loris Strappazon (2003) 'Auctions for conservation contracts: an empirical examination of Victoria's BushTender Trial', *The Australian Journal of Agricultural and Resource Economics*, 47:4, pp 477-500
- Stirziker, R., T. Lefroy, B. Keating and J. Willims, (2000) *A Revolution in Landuse: Emerging Landuse Systems for Managing Dryland Salinity*, Report, CSIRO Land and Water.
- Walker, G.R., M. Gilfedder and J. Williams (1999) *Effectiveness of Current Farming Systems in the Control of Dryland Salinity*, Report, CSIRO Land and Water.
- Williams, J., (2001) Farming Without Harming – Can we do it? CSIRO Land and Water, *Agricultural Science*, Vol. 14 no. 2.