Connections

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About Connections

Welcome to the first issue of Connections*: Farm, Food and Resource Issues*. *Connections*: the name reflects its origins, its intentions and the medium. It is a **joint product** of the Australian Agricultural and Resource Economics Society (AARES) and the Australian Agribusiness Association (AAA). It is intended that Connections will publish **connecting material** in farm and agribusiness, in marketing and management, in environment and resources in rural and regional Australia. Finally, Connections is the first **electronic based, extension** publication for both AARES and AAA.

Connections is **innovative and experimental**. AARES and AAA are launching Connections on a pilot basis; its interest and appeal to you the reader and potential writer will be assessed by both groups after 12 months. Connections represents a commitment by both groups to the extension of information about economic and business issues affecting rural industries, resources and communities. There are no costs to readers to download issues or articles during the pilot period.

The editors of Connections are keen to receive feedback from you about published articles and issues. Your feedback may be published in the form of e-mail letters or comments in following issues. We plan to produce up to four issues of Connections per year, with about half a dozen articles per issue. Our ability to achieve this target will depend on *Connections* being appreciated by members of both AARES and AAA as an opportunity to extend research and thoughtful analysis about contemporary issues to a world wide audience. We extend an open invitation to any interested person to submit material. The Guidelines for Writers are located on the websites of both groups.

Compliments of the season.

Bill Malcolm

Co-editor and Associate Professor

Institute of Land and Food Resources

The University of Melbourne
Victoria, Australia

b.malcolm@landfood.unimelb.edu.au

Glenn Ronan

Co-editor and Principal Economics Consultant - Livestock Industries

Primary Industries and Resources
South Australia

ronan.glenn@saugov.sa.gov.au

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Contents

Harry Potter and the Pendulums of Perpetual Motion: Economic Policy Instruments for Environmental Management

- David Pannell[1]

Associate Professor in Agricultural and Resource Economics at the University of WA.

There was a time, not so long ago, when "economics" was something of a dirty word in environmental circles. In Australia during the 1990s, the "landcare" movement brought a new emphasis on sharing and caring rural communities making generous sacrifices for the good of each other and of the whole community. Perhaps this contributed to the negative attitude towards economics, tainted as it is with some unsavory human qualities -- greed, selfishness, narrowness and hard-heartedness!

Pendulums swing

These days, even in this, the year of the volunteer, economic aspects of landcare and environmental management seem more respectable. There is clearly a greater recognition of the relevance to the environment of at least some of the ideas of economists. More cynically, there also seems to be an expectation that dressing environmental concerns in economic robes will help to capture greater resources from the public purse (and possibly the private sector) for use in environmental programs.

Most strikingly, there is a boom of interest in "economic policy instruments" or "market-based mechanisms", such as tradable pollution permits, auction-based systems, and environmental credits. Reflecting this boom:

Most relevant government agencies and departments are at least sniffing around the issue of economic policy instruments, and trying to work out what they are all about. A small number of these agencies have tried, or are trying, to implement schemes based on particular instruments.

A number of prominent environmental policy plans (particularly salinity-related plans) include economic instruments as featured elements, (e.g. the National Action Plan for Salinity and Water Quality) or as something to be examined closely (several state salinity plans).

Australian resource economists have prepared a number of discussion papers, working papers and reviews (e.g. ABARE 2001)

Discussion of economic policy instruments figures prominently in meetings and workshops about the environment (e.g. the 4th Annual AARES Symposium on "Public Funding of Environmental Issues" in Melbourne in October 2001. See: http://come.to/aares).

It is a welcome sign that economic policy instruments are making the step from the environmental economics textbook to the real world. Much will be learnt from the current attempts to apply economic instruments to the environment. Some of what we learn will be helpful. Where they work well, economic instruments will increase the efficiency of use of the community's resources for managing the environmental. Perhaps this will allow more natural resource and environmental assets to be protected and better protection of the most important assets.

On the other hand, most booms precede a bust, and this one will not be an exception. Indeed, the cracks are already starting to show. An officer from a NSW farmer lobby group commented recently that a "cargo cult" has developed around market-based instruments. He feels that expectations of what they can deliver have become inflated.

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[1] David Pannell is Associate Professor in Agricultural and Resource Economics at the University of WA. His research includes farmer adoption of land conservation practices, and the economics of land conservation at farm, catchment, and community levels. He was a member of the WA Government's Salinity Taskforce in 2001. In 2000 he was President of the Australian Agricultural and Resource Economics Society. He is a Program Leader in the Cooperative Research Centre for Plant-Based Management of Dryland Salinity. For more on themes related to this paper, see http://welcome.to/seanews

A number of senior government agency managers at both national and state levels have become enthusiastic about market based instruments and appear to expect that they will play a very major role, particularly for salinity. These non-economist converts to the cause appear to believe that economic instruments are like a perpetual motion machine, where you get more out than you put in!

I don't think economists have intentionally misled them. Perhaps it is just the endless search for the Philosopher's Stone – a simple solution to an intractable problem. Previously it was social processes and peer group pressure which carried the weight of expectation; now it appears to be economic policy instruments. Harry Potter's exploits (Rowling, 1997) led to the destruction of the Philosopher's Stone. A similar fate awaits expectations of magical effects from economic instruments.

To protect the 'muggles' from themselves, the 'economic wizards' probably need to be more careful and more explicit about not only the strengths but also the limitations of economic instruments. Economists should be advising that the potential contribution of economic instruments is probably fairly limited, particularly in the case of salinity. It should also be pointed out that inappropriate application of economic instruments will actually reduce the efficiency of resource use. This is likely to be the case. For example, some current trials in NSW were justified at a recent meeting as attempts to "suck it and see".

To understand my heretical claims, we need to (a) go back to the basics of what economics says about market failure and government intervention, (b) factor in some of the recent technical findings about salinity and (c) consider some practical aspects of implementing economic policy instruments. First, though, some very brief background on the instruments themselves.

What are economic policy instruments?

The common feature shared by the various types of economic policy instruments is that they work by altering the financial incentives and/or risks faced by individuals whose behaviour is important (in this case, mainly farmers). The effectiveness of these instruments depends entirely on the strength of the incentive they provide relative to the strength of incentive that farmers would require in order to change their farming practices.

Possible economic policy instruments for environmental management include:

- Tradable permits/tradable rights/auctions of rights or permits
- Enhanced tax deductibility
- Tax rebates
- Subsidies on particular inputs/practices
- Rewards for outcomes
- Regulation/standards/duty of care backed by penalties or taxes
- Cross compliance
- Cost sharing

The options vary widely in terms of:

- who benefits (farmers, other identifiable individuals or groups, the broad community);
- who pays (farmers, taxpayers, consumers, beneficiaries);
- ease of targeting incentives to where they are required;
- administration costs and other transaction costs;
- the amount of information and judgement required centrally to make the instruments operational.

Some general observations about use of economic policy instruments in agriculture are pertinent:

Economic policy instruments cannot alter the overall desirability of a set of conservation practices (from a community-wide perspective), at least not directly. What they *can* do is help to increase the adoption of practices which are already socially desirable but are not being adopted for whatever reason. (A range of likely reasons for non-adoption of salinity management practices are given by Pannell 2001a).

The economic instruments increase adoption either by rewarding farmers who act “appropriately” or penalizing farmers who do not. In effect, they *redistribute* the benefits and costs of the treatments such that farmers are given greater incentive to act.

An absolute requirement for use of any economic policy instrument to be economically efficient is that the total benefits (private and public) of the farming practices being promoted must exceed the total costs of implementing them. Indeed, they must do so by enough to exceed the administrative and other transaction costs of implementing the policy program. It is quite possible (and likely in some situations) for the overall costs of some approaches to exceed the benefits, especially where the practices are highly unprofitable on-farm or the off-farm benefits of on-farm treatments are low

If financial incentives are paid to farmers, they must be less than the resulting non-agricultural benefits. For example, if changes in a catchment would result in non-agricultural benefits valued at $1,000,000 then any payments to farmers intended to secure those non-agricultural benefits must be less than $1,000,000. If the payments equal $1,000,000, it means that farmers are capturing all of the community’s benefits associated with the treatments. If the required payments exceed $1,000,000, it means that the changes are probably resulting in a net cost to the community, rather than a net benefit.

Market failure and government intervention

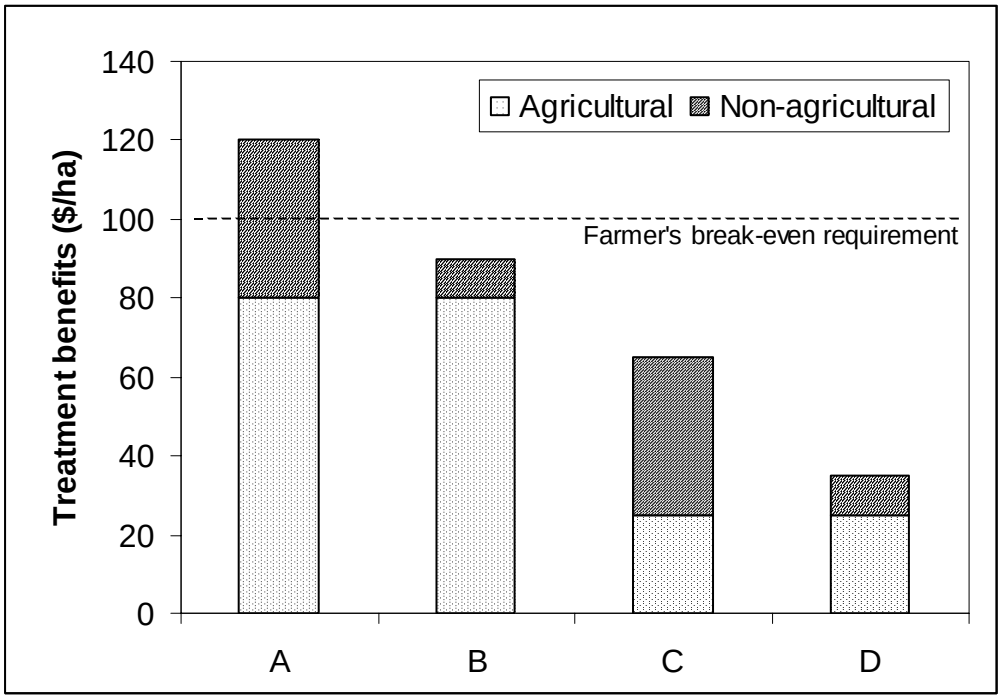
“Market failure” describes a situation where a change in the way resources are managed would increase efficiency. Government intervention *may* be warranted to achieve that change if it does not arise spontaneously in the market.

The first observation above means that, although economic instruments may be useful tools to overcome market failure, in situations where resource degradation is not a sign of market failure (e.g. where it is actually more efficient to allow salinity to develop), economic instruments cannot alter the equation to make resource protection economically desirable.

There may be exceptions to this rule in the medium to long term if the presence of the economic instrument provides sufficient incentive for the farmers to innovate and develop less expensive ways to reduce degradation. However, my judgment is that, in the case of dryland salinity, it is much too much to expect farmers in most locations to be able to do this to a sufficient extent, without very substantial support, particularly in the forms of research and development and infrastructure.

Figure 1 illustrates potential consequences of combining observations 2 and 3. Scenarios A and B are where the recommended practices are somewhat profitable, although not sufficiently so to be more attractive to farmers than their existing farming systems. In scenarios C and D the practices are much less profitable than existing systems. The levels of non-agricultural benefits resulting from the treatments are relatively high in scenarios A and C and low for B and D.

Figure 1. Agricultural and non-agricultural net benefits from environmental treatments (e.g. planting perennials to prevent salinity) in four scenarios.



In scenario A, the combination of agricultural and non-agricultural benefits is such that it is possible for an economic instrument to change the way a farm is managed and to be beneficial overall (in terms of efficiency). The instrument could provide sufficient incentive to exceed the farmer's break-even requirement (mainly determined by the profitability of their existing land use) and prompt a change of management without violating one or more of the principles outlined above.

In the other three scenarios, either the treatment is not sufficiently profitable at the farm level, or the non-agricultural benefits are too small or both. This highlights a point which is often neglected: the private, farm-level economics of the proposed management change are critically important in determining whether a program of economic policy instruments intended to reduce external costs would be a good thing. They may even be more important than the size of the external costs. In the case of dryland salinity, this is likely to be the case more often than not.

Some characteristics of dryland salinity

Even though the off-farm costs of dryland salinity are obviously high, the off-farm benefits from on-farm treatments are often much smaller than the off- farm costs. Particularly in drier regions, the treatments are often only partly effective at preventing salinity off-site and the positive off-site effects tend to be very long delayed (Bell *et al.* 2000; George *et al.* 1999; Hatton and Nulsen 1999; Heaney *et al.* 2000; National Land and Water Resources Audit 2001; Stauffacher *et al.* 2000). Applying standard discounting methods to convert distant future benefits into present values for the purpose of decision making greatly reduces the magnitude of the benefits. The significance of this for economic instruments is as follows. The level of off-farm benefits from on-farm treatments sets an upper limit on what it could be worthwhile for the community to provide in financial support to farmers (using economic policy instruments) to encourage adoption of new practices. Small off-site benefits warrant only small financial support. For similar reasons, they warrant only small financial penalties for non-compliance, when a regulatory or tax-based approach is used.

For most of the agricultural land threatened with salinity, there is currently no perennial plant that can be produced profitably. When evaluated within an individual farm, the benefit:cost ratio for planting existing perennials varies widely, but in drier regions it is frequently well below one; often nearer to 0.5.

Thus, for the majority of non-irrigated agricultural land, off-site benefits from re-establishing perennial vegetation are low, or on site costs are high, or both. In these situations, use of market-based instruments are unlikely to be effective in altering farm management on the scale needed to prevent non-agricultural salinity impacts unless the incentives created are greater than the off-site benefits. The use of such large incentives would actually reduce economic efficiency, rather than increase it, because they would encourage adoption of perennials in situations where the total costs exceed the total benefits.

Some practical aspects of implementation

I have focused above on one of the practical aspects of implementation: the need, prior to introducing economic policy instruments, to identify situations where there is a clear community benefit from changes in land management which are not occurring spontaneously (in other words, the need to identify situations of prominent market failure). I am not saying that the instruments will not be "successful" in locations with no market failure, at least in the sense of promoting changes in farming practices. It is just that such "successes" may actually be better described as cases of "government failure", because they would be cases where government intervention reduced economic efficiency. The fact that interventions may display the superficial trappings of success will likely make it difficult to convince others that they are looking at government failure.

Even where market failure is identified, the potential for government failure remains. A perpetual motion machine must defy the reality of friction. For economic policy instruments, friction comes in the form of "transaction costs". These would include costs of administration, collecting scientific information, monitoring and enforcing agreements. For the schemes which are more attractive in theory, such as tradable permits, these transaction costs could be very high. The more it costs to enforce adherence to agreed outcomes, the lower are the net benefits to society from the policy. However, without enforcement, the policy is toothless and ineffective.

Efficiency is also threatened by long time lags and uncertainty. Ideally, we would like both sides of a market for "environmental services" to operate, with the efficient level of services being arrived at by the competitive interaction of buyers and sellers. In reality, the public benefits of environmental services from salinity prevention are a long way into the future. Indeed, they are so far into the future that the beneficiaries will not be around to participate in any scheme of "market-based mechanisms". Given this, it is probably necessary for government to operate as a monopoly purchaser of salinity prevention services. It is government then that must bear the risks and inefficiencies arising from the considerable uncertainties surrounding even the best projections by scientists about future salinity.

A fourth practical way in which the efficiency of economic instruments may be reduced is if there is no choice but to base them on indirect and inexact indicators of the desired outcomes, rather than on the outcomes themselves. For salinity, the desired off-site outcomes, such as protection of water quality in the Murray River, will occur many years after the action is taken; many years after the program of economic policy instruments is a matter of history. If such instruments are to be used, there is clearly no choice but to use indirect and inexact indicators of the desired outcomes, such as the area of trees planted, or the reduction in on-site groundwater recharge.

So, what action is needed?

Notwithstanding the critical tone above, I believe that further investigation is needed to design and evaluate economic policy instruments for environmental management. However, the instruments need to target situations where market failure is clear and costly. In the case of dryland salinity that will be in the minority of situations where:

a) on-site net costs of establishing perennial vegetation are small, *and*

b) groundwater flow systems are responsive to changes in recharge, *and*

c) the value of off-site assets at risk is high.

A very small proportion of the agricultural landscape of Australia satisfies these requirements. "Suck it and see" is clearly not the right strategy. What we do in the areas where economic policy instruments are not appropriate is the subject for another paper (e.g. Pannell 2001b). Perhaps that paper should be called "Harry Potter and the Burden of Unpalatable Truths".

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Environmental Policy Implementation Challenged by some Land Management Realities - John Cary[2]

Bureau of Rural Sciences, Australia

T.S. Eliot observed that humankind cannot bear too much reality. Ignorance of the realities that motivate changes in land management practices in Australia will endanger the development of appropriate policy approaches. A recent large-scale study of human and social aspects of capacity to change to sustainable management practices, undertaken for the National Land and Water Resources Audit (NLWRA), identified some important realities that confront aspirations for significant and speedy landscape change.

Let us consider some of these realities as well as the place of community consensus and participation within the wider instruments of policy for managing land degradation. Concern about land degradation problems amongst Australian landholders is now well established. While many landholders may not recognize subtle or insidious manifestations of land degradation, most landholders recognize significant degradation problems. In most areas of Australia some form of 'landcare' related work[3] is undertaken on more than a third of farms (Cary, Barr, Aslin, Webb and Kelson 2001).

The nature of management 'technologies'

Polices to improve the management of degrading land include land use change and the encouragement of change to more sustainable management practices within given land uses. Encouragement of landholders to adopt more sustainable management practices is easy where, financially, they believe they will be better off or no worse off by the change. If, however, landowners believe that they will be worse off financially there is a serious impediment to adoption.

Sustainable practices, which provide economic and other advantages, will generally be adopted more rapidly. In most cases, any economic advantage will be influenced by commodity prices, which are outside the control of farmers and can fluctuate significantly. Ideally, sustainable practices should provide observable and positive consequences for land managers over a short time frame rather than depending on pro-environmental values of land managers.

Landholders generally seek to reduce the risk of adopting a new practice. In a forthcoming publication Mara, Pannell and Abadi Ghadim (2002) review the influence of uncertainty and risk on adoption decisions. They emphasize the importance of personal experience, experimentation and learning in the adoption process, reflecting associated uncertainty and the adaptive nature of an adoption decision for the decision-maker. Sustainable practices which are observable, able to be experimented with and less complex will be more quickly adopted than practices which are complex or where the outcomes are not able to be observed or have long time lags before being observed.

Very often the economic advantage of a particular sustainable management practice varies with location. It is to be expected therefore that rate of adoption will vary between districts and regions. This common-sense observation was first demonstrated for the adoption of hybrid corn in regions of the United States by Zvi Griliches in the 'sixties'.

Cary, Webb and Barr (2001) confirmed this locality effect for nine resource management practices in Australia. It makes no sense to assume that a practice with advantages in one location will yield the same advantages elsewhere. Given Australia's diverse environment few sustainable practices have universal applicability. Sustainable practices with wider geographic applicability, such as deep-rooted perennials (which usually need to be accompanied by other complementary inputs), often provide only moderate advantage to the landholder. Increased effort needs to be applied to identify and develop locally applicable sustainable practices.

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[2] ADDRESS: Bureau of Rural Sciences, The University of Melbourne, Burnley College, Yarra Boulevard, Richmond Vic 3121 Australia. Email jcary@unimelb.edu.au

[3] Landcare related work includes control of animal pests and weeds, fencing for environmental protection, tree and shrub establishment, and setting aside conservation areas.

Effort also needs to be made to resist the temptation to promote these practices beyond localities where their advantage has been established.

Resource and social capacity

Farmers vary in their *capacity* to change management practices. The linkages between socio-economic characteristics of land managers and the use of sustainable practices were explored by Cary *et. al.* (2001). This analysis was based, in part, on data collected in the Australian Bureau of Agricultural and Resource Economics (ABARE) annual resource management survey undertaken in conjunction with the Australian Agricultural and Grazing Industries Survey and the Australian Dairy Industry Survey. This research showed that it is difficult to predict which landholders are more likely or less likely to change land management practices.

The NLWRA study found the following factors were useful as indicators of landowner capacity to change to sustainable management practices:

- participation in occupation-related training
- level of farm income
- optimism about future farm income
- having a documented farm plan
- membership of Landcare
- age.

In fact, most of these variables are not particularly strong or reliable predictors (Table 1). For example membership of community landcare was one of the 16 independent variables that were explored. For 15 practices investigated, membership of community landcare was found to be significantly associated with the adoption of only three management practices.[4]

Age is an important social characteristic because it is an indicator of the structure of the agricultural workforce that is changing in Australia, and changing differentially in different localities. Farmer age seemed to have little influence on individual adoption of management practices in the models tested (Table 1). It is unlikely that any age relationship with adoption is linear. In other studies the influence of age is often contradictory. However those who retire from farming are usually older farmers and those approaching retirement age are less likely to be making large environmental investments, particularly if they have also been receiving lower incomes.

[4] In a similar analysis in an earlier study Mues et al (1998) found membership of community landcare was significantly associated with the adoption of two of five practices reported.

Table 1 Characteristics significantly associated with practice adoption

Characteristic	Frequency of significant associations	
	Predicted direction	Non predicted direction
State of residence	9	
Positive financial expectations	7	1
Has a farm plan	6	0
Recently participated in training	6	0
Farm planning incorporates concern about land degradation	6	0
Land use intensity	4	2
Concerned about inadequate technical resources to overcome land degradation	4	1
Closing equity ratio	1	3
Landcare membership (1998-99)	3	0
Length of landcare membership	1	1
Concern about inadequate financial resources to overcome land degradation	1	1
Property management planning participation in last 3 years	2	0
Age	2	0
Farm cash income	1	0
Farm size	0	1
Profit at full equity	1	0

Table 1 summarises the frequency with which the characteristic variables demonstrated statistically significant associations with practice adoption in 15 logit regression models for the use of 15 sustainable practices recorded in the ABARE resource management survey.

Landholders' expectations of their future financial situation was one of the better predictors of the adoption of sustainable management practices. In fact, financial outlook was more often associated with practice adoption than were objectively measured indicators of financial position. Similar associations between financial perceptions and business behaviour can be observed in the wider economy. This highlights the importance of perception in adoption behaviour. Farmers who feel secure in their financial future are more likely to invest resources in adopting new resource management practices. Feeling financially secure is an outcome not just of current financial circumstances, but of future expectations and psychological disposition.

These findings suggest strong limitations in the utility of community landcare alone to drive the adoption of sustainable land management practices. Generally, financial incentive and financial capacity, skill capacity and appropriate useful technology are necessary concomitants for changes in resource management behaviour. Stewardship values and care about environmental ideals, on their own, are unlikely to bring about effective change in resource management behaviour.

The influence of changing environmental values

Pro-environmental values have been important in fostering awareness of land degradation, but they have a relatively minor influence on the adoption of sustainable practices.

For the most part, stewardship and landcare values have more significant indirect than direct effects on resource management behaviour.

They provide a consensus for community action (and for the imposition of informal or formal social constraints) but they have a much weaker direct influence on individual action.

The effect of positive environment values is constrained by the influence of prevailing incentives or disincentives to adopt a sustainable practice. Positive environment values interact with external incentives or disincentives (such as costs, benefits, convenience, or uncertainty of outcome of a given practice) to determine adoption behaviour regarding sustainable practices.

The effect of strongly positive environmental attitudes on sustainable practice adoption tends to be influential when there are no strong external incentives or disincentives for undertaking the practice. (An urban example is kerbside recycling of domestic waste.) Positive environmental attitudes have much less effect on behaviour when external incentives or external disincentives are strong (for example forgoing the convenience of the private automobile in favour of public transport). In the latter case it is the external factors which usually compel or prohibit the behaviour in question.

The strength of the external conditions determines the bounds of influence of positive environmental attitudes and values (Cary, Webb and Barr, 2001). In situations where the private benefits are negative, or in open access common property situations, the expectation that farmers will make significant investments in public good activity for little or negative financial return is usually doubtful. To paraphrase latter day philanthropist George Soros, where there is a conflict between the common good and self-interest, self-interest is likely to prevail. Policies to change motivation via changing the stewardship ethic in the absence of other enabling conditions are likely to achieve relatively little.

The economic rationale for cooperative action

In confronting the realities facing policies that rely on increasing environmental awareness to counter land degradation, the implication is that there are strong limitations to what Landcare and community action can achieve. However, inadequate information on which to base localized action and high transaction costs for action suggest there is frequent failure of markets. This works against individuals acting independently and encourages some form of cooperative action to ameliorate land degradation problems.

Local information and knowledge needed for tackling land and water degradation is often deficient. It is often abstract and catchment-based rather than based on concrete local empirical information at the farm level. End of catchment discharge indicators of soil and river salinisation may be known, but local impacts within catchment recharge and discharge areas are generally inadequately identified. In situations where externalities exist and individuals are unlikely to capture sufficient benefits to act optimally, the externalities are likely to be complex with the knowledge of external benefits and private costs rudimentary.

Even for the apparently straightforward task of evaluating the use of perennial plants to control groundwater levels in regions at risk of dryland salinisation Pannell (2001) identified a wide range of ‘information’ difficulties facing landholders. He identified that observability of treatment impacts on groundwater levels is low and observations are costly; there are long time lags between treatment and effect; and, in a common property groundwater problem, the effectiveness of a local trial by an individual farmer may be compromised by non-trialing neighbors.

While economists commonly favour the use of market-based instruments to coordinate individual behaviour, in resource management situations many transactions involve more complex relationships, reflecting the inadequacy of information and the risks associated with the transaction. Typically, these consequences give rise to transaction costs and unequal distribution of knowledge between agents.

Transaction costs include the costs of search and information, of safeguarding an agreement; of monitoring and enforcement, and of adaptation for particular circumstances. When transaction costs are high, businesses seek to internalize and reduce them, such as, by use of formal contracts or business integration. Sometimes when transaction costs are high economic transactions are facilitated by less formal, or other socially institutionalized, arrangements.

Land degradation problems are frequently characterised by low ‘agreed knowledge’. For example, ground water that is transmissive between properties or the degradation of a stream flowing through several properties. The required inputs and likely consequent outputs (the transformation process) may not be known or be understood by all parties. The process is not often repeated and thus requires intense discussions, negotiations and personal trust (Mahoney 1992).

In transactions of this type there is typically an inability to determine the rewards amongst participants because the efforts of one party cannot be separated from those of another and, because outcomes occur over a long period, output is difficult to monitor. Mahoney calls this 'low separability'. Even if the transformation process is understood, because of common property characteristics, the knowledge that an outcome will be achieved is not assured.

Because reward cannot be based on output, behavior or effort must be monitored. Resource management arrangements with these transaction characteristics are commonly best undertaken by cooperative arrangements or relational contracts where obligations of parties are specified and self enforced (Cary 2001). Thus, there seems to be a place for manageably scaled community or clan action that has yet to be fully developed.

There is a need to recognize the potential contribution of community action for tackling land degradation problems. However, it needs to be appreciated that community action is not a panacea without other conditions necessary to bring about effective management action. As appropriate cooperative arrangements and relational contracts evolve, or are developed by groups of individuals, these need to be documented and disseminated to reduce the transaction costs for others.

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New Knowledge Means New Approaches to Solving Dryland Salinity - Mike Read

Resource Economist, formerly managing director of Read Sturgess and Associates, and recently retired for health reasons

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This paper summarises a recent study of dryland salinity, undertaken for the National Land and Water Resources Audit (Read *et. al.* 2001). The findings are important because they overturn some long held fallacies that have shaped governments' policy responses to dryland salinity in Australia. This mainly reflects a new understanding of the biophysical processes involved with dryland salinity (see Coram *et. al.* 2000 and Pannell 1999).

The study for the National Land and Water Resource Audit by Read *et. al*. (2000) involved a substantial amount of fieldwork, along with economic modelling, and was concentrated on four particular catchments as case studies:

- **Wanilla** catchment, a small basin of about 17,000 hectares, situated about 40 km to the north west of Port Lincoln on the lower Eyre Peninsular, South Australia.
- **Lake Warden** catchment, situated near the coastal town of Esperance on the southeast coast of Western Australia.
- **Kamarooka** catchment, located in north central Victoria on the northern slopes of the Great Divide.
- **Upper Billabong Creek** catchment, located NW of Holbrook (NSW) in the Murray Darling basin.

This work was commissioned in conjunction with scientific studies, for which Commonwealth Scientific and Industrial Research Organisation (CSIRO) specified catchment water balance models for the same four catchments and formed projections about future extents of salinity, for scenarios with and without salinity control in each catchment (Baker *et. al.* 2001, Hekmeijer *et. al. 2001*, Short *et. al.* 2001 and Stauffacher *et. al. 2001*).

The work by Read *et. al.* (2000) benefited greatly from other major economic research projects that were undertaken concurrently, particularly those undertaken in Western Australia by Dr David Pannell, and those undertaken by the Australian Bureau of Agricultural and Resource Economics (ABARE) in the Murray Darling Basin. In each of those research projects, the economic benefits and costs of various salinity management options have been compared for particular catchments. In aggregate, those catchments represent a significant and representative sample of areas affected by dryland salinity across Australia, and all the studies have arrived at very similar conclusions.

Important biophysical characteristics of dryland salinity

A common misconception of dryland salinity in Australia has been that it is typified by actions of particular farmers affecting mainly other parts of the catchment where salinity emerges, often long distances from the particular landholder (see for example, ABARE 1992). Such external effects represent 'economic externalities' and could justify government funding. The analyses that concluded that external effects were paramount were based on the view that there was a high degree of hydrological transmissivity such that changes in recharge at one location would benefit areas way beyond the area treated.

To the contrary, recent research has shown that the adoption of practices to reduce recharge mainly leads to benefits only for that land on which the treatment is implemented. For example, evidence of the limited area of benefits beyond the site of implementing works to reduce recharge comes from observations of extensive tree planting in Western Australia. George *et. al.* (1999) surveyed the effectiveness of tree planting as a salinity management measure at 80 sites in Western Australia and concluded that trees had little effect on the watertables beyond 10 to 30 metres from the planted area.

Important research by Coram (2000) undertaken as part of the National Land and Water Resource Audit's Dryland Salinity theme, has emphasised that such observations are not limited to Western Australia, and that the type of groundwater flow system for each sub-catchment influences greatly the scope of externalities and the effectiveness of particular options for managing and controlling dryland salinity. The extent of the flow system, or the distance between groundwater recharge and groundwater discharge, provides an indication of how quickly salinisation is likely to manifest at the ground surface in each groundwater flow system, and how long management strategies are likely to take to achieve results.

Coram (2000) considered three main types of groundwater flow systems; local, intermediate and regional:

- Local groundwater flow systems are fully contained within small catchments, and off-site impacts would rarely extend beyond a distance of 10 to 50 metres.
- Intermediate and regional groundwater flow systems operate within much larger catchments than local systems. While off-site impacts could extend over large areas, the slow rate of movement ('hydrological transmissivity') makes them largely inconsequential. For example, extensive movements of groundwater in these groundwater flow systems would involve delays typically of 50 to 200 years.

Because of the high incidence of local groundwater flow systems, and the low transmissivity of intermediate and regional groundwater flow systems, it is not common that actions to control salinity by one landholder in one region can have a substantial impact on neighbouring and downstream regions, with respect to land salinisation. It should be noted that this is very different to the hydro-geological processes associated with salinisation due to irrigation, for which externalities are much more relevant.

Case study results

Results from the case studies are summarised in Tables 1 and 2. Four is only a small number of case studies from which to seek generalisations, but even so the case studies have produced some very interesting results:

- Kamarooka represents a catchment that has had a dryland salinity problem for a long time, but a catchment which has had an extremely intensive extension and research input as well as grants for landholders, with the result that landholders have implemented a fairly substantial amount of salinity control. The extent of salinity has now stabilised.
- Lake Warden represents a catchment with dryland salinity problems that have appeared only recently, but landholders are already responding and implementing a fairly substantial amount of salinity control. Landholders are motivated by the need to halt the rapid expansion of salinity. From the viewpoint of capacity to change, these results from Lake Warden and Kamarooka are highly encouraging.
- On the other hand, there is Wanilla for which no viable technical options are available to achieve any substantial salinity control. Unfortunately it appears that Wanilla will be more typical of many other catchments than would Lake Warden or Kamarooka.
- In Upper Billabong Creek the impacts are nowhere near substantial enough to warrant the implementation of any salinity control. This also will be the outcome for many catchments, particularly in the Murray Darling basin.

Only Lake Warden involves substantial environmental benefits and that case study has emphasised that a major disadvantage for farm-scale treatment is that it is unlikely to lead to substantial improvements for downstream water quality in streams. Only catchment-scale treatment of salinity, or appropriate engineering approaches, can avoid water quality impacts since the hydrologic balance throughout an entire catchment contributes to water quality at the bottom end of the catchment. Local scale treatments can rarely have a substantial impact on water quality as salt continues to be mobilised from the untreated areas of the catchment.

Table 1: Summary of Results from Case Studies – Quantitative

	Wanilla	Lake Warden	Kamarooka	Upper Billabong Creek
Catchment area (hectares)	17,000	171,000	10,000	300,000
Mean farm size (hectares)	700	1,300	800	850
Present extent of severely salinised catchment	8 per cent	8 per cent	7 per cent	0.1 per cent
Projected extent of severely salinilised catchment by 2050 without control	16 per cent	more than 45 per cent	7 per cent	1.1 per cent
Present impact of salinity ($ p.a)	$300,000	$1,400,000	$50,000	$40,000
Projected impacts from salinity over next 50 years without control ($ NPV)	$8,500,000	probably greater than $200,000,000	$100,000	$3,700,000
Agricultural share of impacts	95 per cent	42 per cent	85 per cent	80 per cent
Environmental share of impacts	not significant	42 per cent	not significant	not significant
Roads, rural, urban share of impacts	5 per cent	15 per cent	2 per cent	6 per cent
Water users share of impacts	nil	nil	10 per cent	14 per cent
Net economic benefit over next 50 years from implementing 50 per cent reduction in recharge (NPV $ million)	n.a.	44	0.6	n.a.
Net economic benefit over next 50 years from implementing 75 per cent reduction in recharge (NPV $ million)	n.a.	-67	n.a.	n.a.
Net economic benefit over next 50 years from implementing 90 per cent reduction in recharge (NPV $ million)	-27	-251	-0.4	n.a.

Table 2 : Summary of Results from Case Studies – Qualitative

	Wanilla	Lake Warden	Kamarooka	Upper Billabong Creek
Substantial environmental benefits achievable by controlling dryland salinity	No	Yes	No	No
Substantial impacts for agriculture and rural infrastructure due to dryland salinity	Yes	Yes	Yes	Yes
Substantial impacts for urban infrastructure due to dryland salinity	No	No	No	No

	Wanilla	Lake Warden	Kamarooka	Upper Billabong Creek
Substantial impacts for water users due to dryland salinity	No	No	Yes	Yes
Availability of effective option(s) for salinity control	No	Yes	Yes	Yes
Implementation of substantial salinity control is occurring	No	Yes	Yes	No

The results for all catchments show conclusively that large-scale recharge control based on tree planting would represent a very poor investment in most catchments. Balancing that disappointing result, the good news is that a shift towards greater use of perennial pastures in crop rotations has been shown to be profitable in some cases.

Trees simply are not well suited to most salinised areas in Australia. The Bureau Of Rural Sciences (BRS) has estimated that the area of cleared agricultural land potentially suitable for commercial timber plantations and subject to salinity risk is only about 6 per cent of the total area subject to salinity risk (Tickle *et. al.* 2000). Re-vegetation for commercial timber production, under currently accepted parameters, is therefore likely to have only a small role in the overall control of dryland salinity.

Another reason mitigating against the attractiveness of catchment-wide tree planting is that typically only a relatively small area of any one catchment is salinised. For example, in the Wanilla catchment, (unprofitable) re-vegetation for about 70 percent of the catchment would be required in order to protect the 8 per cent of the catchment which is at risk. Furthermore planting of trees also has the effect of reducing surface runoff, with implications for river flows. The effect of tree planting on runoff is relatively immediate and can be potentially large.

Factors favouring re-vegetation with trees

There will be situations where catchment-scale tree planting is attractive, but those situations will be the exception rather than the rule. Large-scale re-vegetation will be more likely to occur where:

- only a small proportion of the catchment requires re-vegetation; and/or where
- substantial off-site benefits would be achieved.

A classic example of an attractive opportunity for catchment-scale re-vegetation lies in the Collie catchment of Western Australia. Wellington Dam was constructed in the catchment in 1960 with the main purposes of supplying the water supply needs of Perth and Bunbury. The salinity levels of the streamflows have subsequently become highly salinised such that water from the Wellington Dam cannot be used for urban supplies. The Water and Rivers Commission of Western Australia believes that most of that additional salt load has been contributed by two small sub-catchments which are managed primarily for grazing. The cleared area across those two sub-catchments covers only about 16,000 hectares and catchment water balance modelling by the Water and Rivers Commission indicates that tree planting across that 16,000 hectares would lead to a greater reduction in salinity levels than those required to meet their water quality targets for urban supplies from the Wellington Dam.

For supplies equivalent to the safe minimum yield of the Wellington Dam, it would be necessary to spend $1,070 million for the lowest costing alternative water supply. When it is considered that those potable supplies could be achieved by planting trees across only 16,000 hectares, the mean level of benefit for each hectare of trees planted would be about $67,000. That is, on average the recharge reduction from each hectare planted to trees would lead to the avoidance of future capital expenditure for water supply headworks of about $67,000. The reasons for the seemingly nonsensical, continuation of agriculture in the problem sub-catchments of the Collie lie squarely at the political end of the spectrum.

The Collie catchment is an exception. Most salinised catchments across Australia are not well suited to trees, with low rainfall generally being the constraint. The Collie has good tree growing conditions plus a major external benefit. It is not very common to have either of those and the Collie has both.

The Wanilla catchment represents the opposite extreme. The Wanilla catchment will not grow trees (nor lucerne and other perennial pastures species) with commercially acceptable yields and there are no substantial external benefits.

Scope for change

There are good technical options for some catchments and these are being implemented in a profitable manner. It is now generally accepted that there is a need to incorporate a significant coverage of perennial vegetation if we are to reduce significantly the level of leakage across the landscape. Trees are generally not going to be viable for large scale salinity treatment, and changing farming systems to substitute perennial pastures for annual pastures is the other way of reducing leakage. In addition, the two main engineering approaches to dryland salinity that have been used in Australia are surface drains and pumps.

An important observation by Read (2000) is that impacts for human consumers of salinised water may not be as high as previously thought since it may be much cheaper to treat the salinised water supplies rather than to control all of the dryland salinity in a catchment. Similarly, many environmental impacts may be treated more cheaply with engineering approaches rather than attempting to control all of the dryland salinity in a catchment (see for example, Lake Warden wetlands).

In terms of economic value, the two important types of externalities from dryland salinity across Australia would be:

- use of water in Perth and Adelaide; and
- environmental values in salinised streams and wetlands.

The scale of the latter remains largely unknown, but judgements can be made about the former.

The Water Authority of W.A. estimated that reverse osmosis water treatment technology could be used at a cost equivalent to $1,300 per megalitre. At that cost, the entire water supplies of both Adelaide and Perth could be treated to excellent standards for a cost of the order of $340 million per year. This would be equivalent to increasing total water charges for water use in those cities by a factor of about 2 to 3. Reverse osmosis water treatment can produce drinking water attributes similar to those of a pristine mountain stream, even for appallingly degraded water resources such as those supplied presently to Adelaide. The reverse osmosis treatment process can remove taste problems associated not only with salinity, but also with other characteristics such as turbidity (which, interestingly, contributes more to poor taste than does salinity in the case of Adelaide). It seems that such an engineering approach would be much more cost effective, possibly even by orders of magnitude, than attempts at catchment-scale recharge control.

Constraints on capacity to change

In terms of achieving an economically optimal mix of salinity control measures, it is concluded that:

- The availability of suitable technical options is clearly the greatest constraint to our capacity to change at present.
- The other two constraints of particular importance are the availability of benefits and elements of risk such as unexpected commodity price shocks (for example, the crash in wool prices has been a major impediment to an increased adoption of perennial pastures species).
- Other important but lesser constraints would be lack of information and political constraints.

Read (2000) has emphasised that most recharge control requires landholders to switch from annual crops or pastures to perennial plants, which generally involve more intensive farming systems. Most dryland salinity in Australia occurs on mixed wheat-sheep farms and the traditional farming systems have been based on a low level of inputs.

Such low input farming has allowed reduced risks, particularly by providing greater flexibility for landholders to switch between cropping and grazing in response to changes in relative commodity prices. Adoption of perennial pastures greatly increases the level of farming inputs required, and this is a barrier to adoption since landholders do not wish to reduce their flexibility to switch from year to year between cropping and grazing enterprises.

The present state of knowledge suggests the following three groups with respect to likelihood of adoption:

Those who have no option but to live with the salt

As in Wanilla, at present there are no viable options to control salinity in any substantial way for much, possibly even the majority, of areas affected by dryland salinity in Australia. For that large area of Australia, the emphasis must remain on 'living with the salt'. The hopes for these areas is either that new and better suited control measures are identified, or that exogenous shocks, such as substantial changes in a commodity price(s), lead to the present options becoming viable. This group is likely to be the largest, possibly comprising as much as 30 to 60 per cent of Australia's dryland salinity.

Those who adopt substantial salinity control

As in the Kamarooka and Lake Warden catchments, landholders do adopt appropriate salinity control measures if they are profitable in their region and/or if the expected level of salinisation in the future is substantial. From the case studies, this group appears likely to be the larger of the remainder of landholders, concentrated particularly in Western Australia, where there is generally a greater justification for implementation of salinity control measures since the impacts are generally higher.

Those who could, but choose not to, adopt substantial salinity control

For example, landholders in the Upper Billabong Creek catchment. For some landholders the expected level of salinisation would not lead them to adopt salinity control options even though some of the presently available options would be marginally viable. They would prefer to retain their present farming systems and 'live with' the salt.

Conclusions

It is most promising to see the progress in the Kamarooka and Lake Warden catchments. This has emphasised that very severe salinity, such as is progressing in the Lake Warden catchment and elsewhere in Western Australia, is the like of a massive commodity price shock that is sufficient to achieve substantial adoption of salinity control by encouraging landholders to change farming systems. Many landholders have changed to farming systems that represent only a marginal improvement in profitability and which incur major difficulties for landholders. The change and willingness to accept those difficulties has been motivated by the need to protect against the future expansion of salinity on their properties.

The following important conclusions have been drawn:

- Most of the control of dryland salinity aimed at protecting agricultural values should focus on changes to farming systems at a farm scale.
- The role for catchment-scale tree planting is extremely limited.
- It will not be economically sensible to control most dryland salinity and hence the community will have to 'live with' much of the existing (and looming) dryland salinity across Australia. This is because, for many catchments, the scope is presently limited by a lack of technically and/or financially acceptable alternatives and each catchment needs to be considered on its own merits.
- Externalities for downstream water quality may not be as great as previously thought; notably, impacts for human consumers of salinised water (eg. Adelaide and Perth) may not be as high since it may be much cheaper to treat the salinised water supplies rather than control all of the dryland salinity in a catchment. Similarly, many environmental impacts may be treated more cheaply with engineering approaches rather than control all of the dryland salinity in a catchment (eg. diverting saline flows away from Lake Warden wetlands). The community's valuation of external benefits from the viewpoint of unpriced environmental values remains unknown. Those environmental values could provide some substantial justification for government intervention.

- The availability of technical options is the greatest constraint to our capacity to change for dryland salinity at present. The other two constraints of particular importance are the limited availability of benefits and elements of risk, such as the effects of unexpected commodity price shocks. Other important but lesser constraints would be lack of information and political constraints.
- Most decisions about where to implement salinity control will be made by private landholders as Government has a relatively small role to play in the provision of private benefits to individual landholders.

The fallacy that widespread re-vegetation with tree plantations was technically and economically feasible led to a fairly uniform policy response over the past twenty years which emphasised trees for most areas affected by dryland salinity. It is now clear that this has been inappropriate. The major emphasis should be placed on targeting only those instances where other control measures are technically and economically attractive. Those other control measures are likely to comprise mainly farm-scale changes to farming systems as well as engineering approaches.

The other fallacy, that economic externalities were thought to be very substantial, led to conclusions that there should be a substantial amount of Government assistance for landholders who implement salinity control measures. Externalities are limited mainly to (unpriced) environmental impacts on surface waters at the downstream end of catchments. To the extent that those do justify substantial Government funding, then it is important to evaluate carefully whether it is less costly to use engineering solutions to protect the environmental assets at the downstream sites, rather than to change farming systems over enormous areas in the upper catchment.

There are relatively few off-site impacts for downstream farmers, nor for regional and urban buildings and infrastructure. The high incidence of local groundwater flow systems, and low transmissivity for other groundwater flow systems, means that such impacts would be affected mainly only by management of adjacent land, not by land management further afield in the upper catchment, as thought previously.

The finding that there is no viable and substantial salinity control presently suited to most of the area affected by dryland salinity means that Government funding must be directed at R&D aimed at providing a greater range of technical options. Options should be sought for immediate implementation, but others might be identified which could become viable at a later date due to exogenous changes. The more technology is on the shelf, the more chance it can be adopted if circumstances change.

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Farmer Land Stewardship : A Pillar to Reinforce Natural Resource Management? - Jim Croswaithe

Department of Natural Resources and Environment, Victoria.

jim.crosthwaite@nre.vic.gov.au

In the 1940s, Samuel Wadham, Professor of Agriculture at the University of Melbourne, toyed with the idea of giving farmer committees the power to remove farmers from their land for poor stewardship of the land (Humphreys 2001).

Recently a rural newspaper ran a 'war on weeds' campaign in which frustrated landholders were invited to write in about the weed problem on neighbouring properties. Aside from attacking irresponsible neighbours, contributors generally directed criticism at poor enforcement of regulations by government. Meanwhile, calls are being made for a major public investment in environmental management on private land of up to $6.5 billion annually for 10 years. How different might these debates have been if farmer groups had received a mandate to enforce stewardship in the 1950s?

Recent proposals for a duty of care (Industry Commission 1998, Australia 2001) have placed the question of regulating farming activities according to the concept of stewardship back on the public agenda. The duty of care and other policy initiatives are under consideration because key indicators of the state of land management and biological diversity are worsening (State of the Environment Advisory Council 1996, Walker *et. al.* 1999, Williams 1999). While environmental considerations are leading many farmers to make some management changes, they are not generally the 'deep' changes now seen as necessary (AFFA 1999) and are generally at the periphery of the existing production system (Beilin 2000).

The duty of care would impose obligations on all those who are connected directly or indirectly with land management. The duty is based on what is 'reasonable and practical' given community expectations, and on what is 'foreseeable'. The regulators are not to approve standards as the aim is to shift responsibility to the duty holders. Duty holders comply by adopting voluntary standards such as codes of practice or a recognised environmental management system.

As the duty of care changes in line with community expectations, it creates a dynamic incentive to change. The Productivity Commission (formerly the Industry Commission) regards the duty of care as one of three pillars of a desirable government approach to sustainable land management; the other pillars are market-based measures and voluntary measures (particularly management agreements). Mandatory standards may be required if the consequences of land use are uncertain, or if there is a high risk of irreversible damage to significant environmental values.

The duty of care marks the point below which landholders have to meet land management obligations and above which they begin to provide public services. Binning and Young (1997) explore the use of management agreements with farmers to obtain conservation services over and above the duty of care. Auctions have been proposed as a way to overcome the information asymmetry problems when reaching agreements with farmers (Stoneham *et. al.* 2000), and are currently being trialed in Victoria and New South Wales. A potential problem is what economists call moral hazard - payment to farmers for environmental outcomes that they may have provided without contractual agreement (Colman 1994). Any scheme should be designed to minimise such payments and to avoid building expectations that further payments are required to maintain the status quo.

How could a duty of care be enforced and updated? The Productivity Commission (1998) proposes a package of measures, with the regulator having a role in ensuring that the duty of care is updated as circumstances change. However, governments have consistently shown a lack of will to enforce laws governing natural resource management by farmers (Bradsen 1988). Regulation can take many forms, including self-regulation and moral suasion. While Landcare groups may exert some influence, they do not have formal powers to compel action by individual landholders.

Many commentators have recognised the potential contribution to the public interest of a consistent and expanded right to standing before the courts, both in Australia (Gunningham and Grabosky 1998) and in other countries (Naysnerski and Tietenberg 1992, Australian Law Reform Commission 1985, 1996).

For more than twenty years environmental legislation in New South Wales has expressly provided rights of standing to any citizen or group without requiring a demonstration of interest (Cripps 1992, Farrier *et. al.* 1999). The relatively few third party appeals in New South Wales have generally not been frivolous (Gunningham and Grabosky 1998, fn 35 p.105, Farrier *et. al.* 1999), and overseas experience is similar (Australia. Law Reform Commission 1985, 1996).

What if Landcare groups had legal standing to bring an action against individual landholders before the courts? After due process, actions could be initiated against landholders not following the duty of care that has been defined locally as 'reasonable and fair'. Such an action, or even just the threat of it, could have a powerful demonstrative effect. Frequent resort to such action is unlikely, given the nature of the social bonds linking landholders in small communities. Support by government is likely to increase the willingness of Landcare groups to act. Resourcing of such actions by government is likely to be required, as is the case with the Clean Water Act in the United States, which makes provision for recovery of legal costs (Gunningham, Phillipson and Grabosky 1999). Giving third party rights to environmental groups is a complementary means of ensuring that the regulator takes enforcement action and exerts pressure on those defining the duty of care to keep it up-to-date with changes in farm management practices.

Third party rights could be abused by a Landcare group. The risks are illustrated by a recent incident, conveyed to me by a colleague, in which a Landcare group signed a contract with a State Government for a grant to rip rabbit warrens on stony rises. One farmer refused to act because to do so would destroy vegetation recognised as having conservation significance. Legal action was threatened. In the end, the rabbits were controlled using hand measures! A system of checks and balances, as proposed by the Productivity Commission (Industry Commission 1998), is clearly needed to ensure that any duty of care covers all relevant environmental issues, and not just those regarded as important by local farmers.

By introducing new obligations, the duty of care changes the property rights of landholders. If the duty of care is expected to disadvantage many land managers, resistance is likely with farmers both ignoring the duty of care, and mobilising politically to ensure that it is watered down. Regulation without majority support is difficult (Gunningham and Grabosky 1998). The need for financial support to help shift farmers to a new duty of care has been previously recognised. Binning and Young (1997) argue for one-off payments which 'secure permanent changes in property rights (p.20)'.

One approach to financial support may be to fund a re-organisation of the farming system that will enable the farm to comply with the duty of care while remaining capable of meeting farmer objectives into the future. Financial payments could be in the form of adjustment assistance based on an analysis of whole farm options and future prospects, rather than as compensation. From this perspective, financial assistance to meet the duty of care may only be required in some cases. In others, strategic business advice to farms that pinpoint solutions at the level of the farm business may be enough. Emphasising farm re-organisation is consistent with the dynamic nature of the duty of care in that it will evolve over time, following changes in farming practices and community expectations.

If payments to shift to a duty of care were standardised across a given class of farmers, payments must equal the marginal costs for the farm that is least willing (on financial grounds) to comply. Standard payment schemes have been previously criticised for incurring 'the moral hazard of paying farmers for things they need no payment to perform' (Colman 1994 p.310) and for being inefficient (Weaver 1998). A competitive auction system could be used to lower costs by revealing landholder's willingness to accept (Latacz-Lohmann 1998, Stoneham *et. al.* 2000). However, competition cannot be introduced if every farm is required to comply. Direct costs may be lowered by individually negotiating agreements with landholders. The disadvantage is the high transaction costs.

One problem with standard payments, individually negotiated agreements and auction systems is that they do not necessarily act as an incentive for a shift in strategic behaviour whereby farm business and land management goals might both be more easily met. Investigations into modifying such payment vehicles in this direction may be fruitful.

Our understanding of opportunity costs and farmer motivation are important to the question of assistance to comply with a duty of care. Concern is not with the alternative uses to which a *particular* parcel of land might be put, and the net income that might be foregone. The critical consideration is opportunity to invest across the farm, and alternative futures that might be available for the farm business.

Beyond the question of opportunity cost, objectives of satisfying rather than profit maximisation motivate farm family behaviour, as they motivate many firms (Leibenstein 1979). Once farmers can expect satisfactory income levels, investment to comply with standards of land management is likely to be forthcoming. Surveys show that stewardship is an important goal of farmers (Curtis 1997), and environmental attitudes are positive to the extent that this is consistent with good farming practice and business survival (Cary and Wilkinson 1997).

New farm business opportunities depend in part on the capacity of farm businesses to adjust. Recent research shows that there is considerable scope to increase intensification of pasture production on land with high capability. This gives scope to manage other areas of the farm more benignly (Crosthwaite and Malcolm 2000) Opportunities will also arise as markets change. There is a growing emphasis on 'clean and green' production in 'boutique' markets, more so than in bulk commodity, markets. The industry research and development corporations, and corporations such as Unilever, are trialing environmental management systems to position industries so that farmers can take advantage of market premiums should they arise.

Taking the dynamics of farm businesses and changing opportunities into account, the sum required to 'repair the land' in Australia needs to be recalculated. There are fundamental weaknesses in the method by which the proposed $6.5 billion per year has been calculated, estimating the area affected by each form of land degradation and multiplying it by the estimated cost of repair per hectare. The sum should be based on more careful specification of the problem (Pannell 2001) and then on determining the sum required by farmers to do the work - in the context of future farm business opportunities.

In conclusion, farm businesses are dynamic entities. A set of mechanisms, rather than one alone, will be required to achieve policy goals. The duty of care can be one of the pillars, but needs to be supported by adjustment assistance, management agreements and third party rights, as well as demand-led measures and mandatory standards in some cases. However, these mechanisms cannot work in isolation from institutional changes. As concerns about the sustainability of Australian agriculture have emerged over the last two decades, conflicts in goals, policy and administration have been evident. The reasons are not simple, and a concerted program is needed (Dovers 1999).

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Dear Taxpayer, Send Money
- Alistair Watson

Freelance Economist

When the 'salinity tree' is given a shake, many proposals to tackle problems of dryland salinity fall out, ranging from recommendations based on well-researched scientific and economic analyses to the more common, apparently simple solution from salinity fixers that could be summarised as: 'Dear Taxpayer, Send Money'.

Unfortunately, the recommendation to spend more and more public money on dryland salinity programs is often unencumbered by much consideration of the human, technical, economic and institutional aspects of Australian agriculture that are critical to solving environmental problems. Even more unfortunately, the Australian Conservation Foundation (ACF) and the National Farmers Federation (NFF) have also been attracted by the spend first and think later approach. A defining event was the joint ACF/NFF proposal to spend $65million over 10 years on mitigation of dryland salinity and other land management issues (Virtual Consulting Group and Griffin nrm 2000). Pannell (2001, p.46) has suggested that if this proposal had been accepted the result would have been "one of the most poorly conceived, unproductive and wasteful programs of public expenditure in Australia's history."

The main conceptual and empirical issues surrounding dryland salinity are to do with issues like:

- How many farmers are capable of generating sufficient revenue to invest in environmental remediation that would yield on-farm benefits?
- How should programs be designed to account for the variability of commodity prices, farm income and investment and the time path for control and amelioration of dryland salinity?
- How does the endemic small farm problem in Australian agriculture affect farmer behaviour in relation to dryland salinity?
- Will the market for agricultural land eventually sort the problem out?
- What are the implications for government policy?

In this article, information about the magnitude of the dryland salinity problem is introduced as a starting point. Some observations are then made about on-farm and institutional aspects of dryland salinity.

Size of the problem

Estimates of the potential losses from dryland salinity for the major groundwater systems across Australia are detailed in Australian Dryland Salinity Assessment 2000, a recent report of the National Land and Water Resources Audit.

In summary:

- Australia has close to 25 million hectares of local groundwater systems. Approximately 3 per cent (0.75 m ha) of the area is considered to be at risk of developing some dryland salinity.
- Australia has around 40 million hectares of intermediate groundwater flow systems. Approximately 5 per cent (2 m ha) of these systems are considered to have a high risk of developing dryland salinity.
- Australia has around 45 million hectares of regional groundwater flow systems. Approximately 6 per cent (2.70 m ha) of this land is considered to be at high risk of salinity in the next 100 years.

The 'costs' of dryland salinity are difficult to estimate. Because of the difficulties involved Bathgate and Pannell (2000, p.2) suggested that there is 'almost no practical value' in estimating the cost of salinity. This has not stopped some rash estimates being made. Nor has it stopped policies based on these estimates.

A recent paper by Commonwealth Scientific and Industrial Research Organisation (CSIRO) scientists Walker, Gilfedder and Williams (undated) refers to a 1998 estimate by the Prime Minister's Science, Engineering and Innovation Council that dryland salinity costs $700 million in 'lost agricultural land' and $130 million annually in 'lost production'.

The use of estimates of the lost value of agricultural land and loss of annual earnings is double counting. Losses from salinity can be measured either as losses in the value of agricultural land, as indicated by the capitalied value of the losses in net annual returns to that land, or as the annual losses of net annual returns themselves. Furthermore, the CSIRO estimate does not distinguish between revenue and cost – losses of gross returns are advanced as if they were the same as losses of returns.

Losses from salinity should also be put in the wider context of Australian agricultural development. Knopke, O'Donnell and Shepherd (2000) estimated productivity growth on broadacre farms in Australia at 2.6 per cent per annum from 1977-78 to 1998-99. This is significantly greater than estimated annual losses from dryland salinity. In an aggregate sense, offsetting the losses occurring from dryland salinity by management improvements and technical innovation on non-affected areas is well within the bounds of previous productivity improvement in Australian agriculture.

Thus, on the basis of the estimates reported by the Prime Minister's Science, Engineering and Innovation Council, the estimated current losses of $130 million per year from dryland salinity do not loom large as an economic problem. Note that the annual gross value of Australian farm production is around $30 billion.

On the farm

Farmers do not deliberately damage the land they farm. Investment to change farming systems to reduce dryland salinity has implications for farm profitability and risk in both short and long terms, just as farm profitability and risk have implications for the capacity to invest on farms. In this regard, size does matter in farming.

It is a commonplace of Australian agriculture that the distribution of farm size is uneven. This is usually expressed imprecisely as an '80/20 rule' – 20 per cent of farmers produce 80 per cent of the output and vice versa. Official data from the Australian Bureau of Statistics and the Australian Bureau of Agricultural and Resource Economics (ABARE) allow more accurate representation of the situation. For example, the McLachlan Taskforce on the wool industry reported in 1999 that only 2000 woolgrowers (four per cent of an Australian total of 46,000) produced 25 per cent of national output, with the largest ten per cent producing 40 per cent (McLachlan, 1999).

There is no simple way of interpreting data on the distribution of farm size and income. The data are confounded with social and economic variables associated with:

- Full-time versus part-time farming.
- Age and education of farmers.
- Succession and transfer of ownership of family farms.
- Location.
- History of land settlement.

The most important reason for concentrations of small farms with limited investment capacity in some areas of Australia is the history of settlement. A most dubious concept – the 'home maintenance area' – was the guiding principle of government settlement programs. The idea that farms should provide for the needs of an average family condemned many farm families to penury from the start. The development of Australian agriculture includes numerous government settlement schemes that had unintentional but serious environmental outcomes. Examples include dust storms in the Victorian Mallee in the 1930s, irrigation salinity and loss of high-quality timber and amenity with clearing of forests for dairying in Gippsland and on the North Coast of New South Wales. With such a poor track record, why should anyone be confident that government plans for the repair of previous environmental damage will be successful?

Australian farm businesses are small businesses distinguished from other small businesses by higher equity ratios, necessitated by the high variability of their income. Insolvency is a constant prospect in most parts of the grain-livestock areas of Australia. Occasionally, farmers have little

choice and adopt short-term strategies when confronted with low incomes brought about by low commodity prices and/or drought. Large numbers of farms in Australia perform indifferently for much of the time. These farms have little or no capacity to invest in dryland salinity control.

In the short-run, the opportunity for farmers to change enterprises quickly is constrained by their past investment in capital equipment and fixed improvements on farms; that is, sunk costs. Neglecting the significance of sunk costs overstates prospects for new investment.

Unfortunately, proposals for salinity mitigation usually imply a regular pattern of expenditure. Attempts to encourage a regular pattern of investment will fall on deaf ears if farmers do not have the financial capacity to respond. Yet forums assessing policies to combat dryland salinity frequently proceed as if the profit and risk dimensions of farming are unimportant, or even non-existent.

Succession issues are also important to this question, especially on small farms. Older farmers who do not anticipate passing on their farms to family members have different attitudes to the future than other farmers. The cash surplus from farming operations does not have to be spread as thinly. Given the episodic nature of peaks in farm income and land values, the timing of exit from farming is an important objective for farmers. How life cycle affects investment behaviour – and environmental investment in particular – is far from clear?

Small full-time farms do not have the capacity to generate sufficient revenue to operate commercially, let alone generate the funds necessary for remediation of environmental damage. For part-time farms, the story is mixed. In the ranks of small part-time farms are represented some of the richest and poorest people in Australia. Rich part-time farmers are concentrated in desirable locations close to capital cities and in aesthetically pleasing countryside. As a general rule, these individuals are conservation-minded and have the resources to act accordingly. Various indicators of environmental concern, including participation in Landcare programs and related activities, suggest a 'Hume Highway effect'. Environmental enthusiasm (and government grants) is concentrated in the neighbourhood of the road from Sydney to Melbourne (and in similar favoured areas). If so, this is hardly the basis of a long-term program of dryland salinity control in the places most affected by dryland salinity that are concentrated in the truly commercial farming areas of Australia away from capital cities.

It is not sufficient for a proposal to be technically feasible or even profitable 'on average'. Salinity mitigation has to fit in with management of the farm business. An important determinant of the attitudes and behaviour of individual farmers will be survival of the farm business in an uncertain production and marketing environment. What appears to be sensible to an outsider may be unacceptable and inappropriate for the farmer. National salinity mitigation strategies will be most effective if they recognise and fit with the many goals of farmers, of which profitability and business survival is pre-eminent. Without profits, survival, resource improvement and other goals cannot be achieved.

Institutional arrangements

The principal technical solution to the on-farm problems associated with dryland salinity is to lower water tables by increasing transpiration by plants. This requires modification of farming systems in salinity-prone areas. Where problems are localised, the financial resources necessary to mitigate dryland salinity have to be generated from the receipts of farming operations on the farms directly affected. There is no case for government assistance when dryland salinity is a problem contained within the boundary of a farm.

When dryland salinity is a problem with public ramifications, selecting the best institutional arrangements is critical to success of policies to ameliorate the problem.

Catchment management has been popular in recent times, even though not many agricultural problems are suited to management on a catchment basis. Australia is a relatively flat country. Traditionally, climate, history of settlement and soil type have been regarded as being more important than topography in determining the pattern of agricultural production and requirements for services by farmers.

Catchment management has advantages and disadvantages. There are certain classes of engineering problems that need to be managed on a catchment basis – flood mitigation, for example. While catchment authorities have been established widely, they do not have an independent funding base. They are funded by and responsible to state governments. In some cases, there will be external effects of dryland salinity on other landholders. Previously, the

significance of external effects was overstated. External effects were incorrectly regarded as the norm rather than the exception until the last few years. However, where there are external effects on water quality in streams in a definable drainage area, catchment levies are appropriate. Still, attempts to establish catchment levies in Victoria to fund a range of environmental programs were singularly unsuccessful (Watson 2001).

Engineering solutions are applicable to many problems caused by dryland salinity in country towns. While not all damage is worth repairing, local government rates are an ideal funding instrument to finance these engineering works. There will be cases where the local funding base is inadequate and state or Commonwealth support is justified for valuable assets. Much the same goes for roads, railways and other infrastructure affected by dryland salinity. Provided the necessary repairs can pass a cost-benefit test, the best strategy will be recoupment of costs by user charges.

In theory, there are legal remedies when the actions of one individual have adverse effects on others. This is not a practical solution in this instance. For one thing, long lags in the effects of land clearing on agricultural productivity mean that changes of ownership make it impossible to sheet home the source of damage. Some enterprising lawyers have claimed that there is an argument in law for farmers and others affected by dryland salinity to seek compensation from governments. This is because of past government policies that encouraged excessive land clearing. Investment allowances, accelerated depreciation, concessional credit and other previous inducements operating through the taxation and financial system spring to mind. Official settlement policies also wreaked economic, social and environmental havoc on the Australian countryside. The essential difficulty is that all these policies were widely supported at the time by all governments and the community. In any case, their ill-effects (and, of course, benefits) are not confined to dryland salinity.

It would be a grim outlook – except for the legal profession – if every past mistake of government brought about by ignorance, opportunism and/or misplaced enthusiasm could be settled in the courts.

Conclusion

Political imperatives and pork-barrelling predilections frequently conspire to confound sound policy. With this possibility in mind it is important that the science and economics of farm salinity measures are not only sound, but also widely known. Good science and good economics pursued with vigour in public debates may help slow the adoption, if not the promulgation, of less sensible policy measures. In so doing, they may contribute to the public policy objective of spending money well – or, at least, striving for the situation once described by an observant ex-agricultural bureaucrat, Chas Savage, as ‘wasting money wisely’.

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Land Management and Asset Security
- Ian Donges

National Farmers' Federation President

Farmers make the day-to-day management decisions for more than 70 per cent of Australia's land mass and 70 per cent of the water diverted from our rivers and streams. They are the most important stakeholders in good environmental management. Generally they are passionate about protecting their natural resource base in a bid to ensure sustainable agricultural industries for their children and their children's children.

Environmental protection and biodiversity conservation is the shared responsibility of all Australians. However, Commonwealth and state legislation generally imposes much of the cost of pubic good conservation directly on farmers.

Farmers' property rights are often reduced or removed to achieve a community benefit, at no cost to the wider community. Farmers ought not to be expected to foot the bill for public good outcomes that benefit the broader community. Such policies result in poor outcomes for the environment, for the economy and for farming communities.

Just as city businesses are compensated if the government needs to resume land to put a freeway through their property, farmers should be compensated if their ability to farm their land is compromised by legislation in the public interest.

Farmers are constantly interacting with the natural environment. By contrast, most Australians live in urban environments. And while they may have a strong interest in environmental issues, they do not experience the immediate consequences of variable climate, pests, feral animals, weeds, disease and environmental degradation to the same extent.

Threatened species are rarely located in urban environments. They are generally found outside of metropolitan areas, often on farming land. The aim of the new Environment Protection and Biodiversity Conservation (EPBC) Act, is to preserve threatened species for the benefit of the entire community. However, it does so by imposing onerous regulations and costs on farmers by reducing landholders' ability to manage their farm without compensation. This policy approach results in poor outcomes for the environment, for the economy and for farming communities.

A better approach would be to fairly share the costs of conservation and environmental outcomes between landholders and the general public. Incentives could be given to farmers with significant environmental features on their land to manage them for the benefit of the community, so that the community contributes to the costs imposed on farmers of so doing.

If regulations that reduce or remove farmers' ability to manage their land autonomously are imposed on farmers by the general community to achieve environmental objectives, then the general community should be willing to compensate farmers for any erosion in their ability to generate income from their land.

Developing and introducing new methods of managing land to preserve biodiversity can be costly, and the Commonwealth Government's commitment to research and development, plus compensation for adjustment costs, has a valuable role to play.

Farmers are also suffering because the EPBC Act is not consistent with state land management and conservation regimes. The on-the-ground impact of the Commonwealth legislation, on top of state interventions, has not been thought through thoroughly and is causing farm management problems.

The EPBC Act has a number of major deficiencies. A landowner can be managing the land fully in accordance with state legislation but be in breach of the Commonwealth Act. The onus is on the landowner to be aware of the implications of the EPBC Act. Neither local nor state government authorities have any obligation to advise landowners of the implications of the EPBC Act and Commonwealth bureaucrats do not have an understanding of local issues to give appropriate advice.

There is no provision for effective consultation with landowners. The implication is that the Commonwealth has a complete understanding of the preferred approach to land and water management to achieve environmental and social objectives in every part of the country, whereas in reality this knowledge is more likely to reside within the local community.

Suspension of further listings of threatened species under the Act until clear consultation and administration arrangements are in place would be a positive step.

The National Farmers' Federation (NFF) is seeking support from the major political parties in a number of areas. The first area is an explicit undertaking that adequate compensation will be paid if landholders' ability to farm their land is removed or reduced by Commonwealth legislation such as the EPBC Act.

The second area is significant strengthening of Council of Australian Governments (COAG) processes in regard to environmental management - to ensure better coordination of State/Commonwealth land management and environment protection legislation, improve consultation processes and address the issue of compensation.

The third area is an agreement by all governments to institute an incentive-driven, not legislation driven, approach to environmental management.

The fourth area is an explicit acknowledgment of the economic and social implications that can result from listings under the EPBC Act and improved community consultation processes. In particular, the NFF requires a specific implementation plan from the Commonwealth Government that explains how they will act once species or areas are listed as threatened.

A fifth requirement is research and development support and a commitment to meet the adjustment costs of introducing new and more sustainable farm management practices.

And finally, the NFF is arguing for no further listings until consistent State and Commonwealth administrative arrangements are in place.

Australia also needs to review water reform under the COAG agreements. Only secure water property rights, which are tradeable, will ensure that water resources are used sustainably, for the benefit of all Australians, in the long term. Inefficient and inappropriate land and water use has created problems of national significance such as rising salinity and falling water quality.

In recognition of the seriousness of this issue, the National Farmers' Federation established a special Water Taskforce in May this year. That taskforce has just finalised its report, which says: "It is the National Farmers' Federation's view that the Council of Australian Governments' water reform agreements have not been implemented to deliver on promised water property rights.

It also found that there are six fundamental characteristics of a water property right:

- DURATION – a continuous period measured in years that the property right is held;
- FLEXIBILITY – modification or alteration to account for recognised constraints on the availability of water resources;
- EXCLUSIVITY – an entity holds the water property right exclusively so that it can be traded in a market place;
- QUALITY OF TITLE – secured to the extent that removal or impairment is compensated and the rights are adequately registered to facilitate financing and transfer;
- TRANSFERABILITY – easy transfer of water property rights on a permanent or temporary basis; and
- DIVISIBILITY – capable of being shared or subdivided.

Importantly, these characteristics are not mutually exclusive. They must all be present for a true property right to be acknowledged and no alteration to one characteristic ought to be able to erode any of the other five.

It is now becoming obvious that one of the key steps in the COAG Agreement was the establishment of property rights, with respect to water, once water was separated from land title. This has not been carried out in all states, with the resulting situation that in financial negotiations, the level of security previously enjoyed has been seriously eroded.

All Australian governments have recognised the need for water reform and the Council of Australian Governments' has committed to:

- Changing the way water charges are set and the level of costs recovered;
- Refining existing allocation and water management systems; and
- Introducing trading in water rights so that those that can use the water most productively can get access to the resource.

Well-defined long-term water property rights – involving clear specification of entitlements in terms of ownership, volume, reliability, transferability, and if appropriate, quality – are a prerequisite for all of these initiatives.

The current practice of state governments clawing back over-allocated water licences, with no financial compensation, is at odds with regional communities' need for certainty in their infrastructure investments. Clawback without compensation actually threatens environmental outcomes due to the contention over equity, grid locking decision-making processes.

In Australia, state and territory Governments historically owned the rights to all ground and surface water. Governments then used licenses, permits and agreements to share the resource between water users. However, these entitlements have often not been issued as part of a comprehensive resource management system.

Until recently, water entitlements were tied to a particular piece of land, water storage or irrigation scheme, limiting their ability to be traded and giving them no legal status independent of the land or infrastructure to which they were tied. All states and territories now have legislative frameworks in place that separates "water property rights" from land and title.

However the frameworks are not consistent and often do not allow farmers and their financiers to form a reasonable expectation about the tenure and the security that the entitlement will deliver over time. This has seen a significant reduction in asset security, and needs to be addressed as the water reform is finalised.

The National Farmers' Federation is seeking Australia-wide recognition of and respect for secure water property rights. In establishing these rights, water users must get the maximum degree of security about the nature of the property right so that they are able to form a reasonable expectation of the benefits provided by the right. And compensation must be paid where the value or security of water rights is eroded by government actions in order to attain 'public good' outcomes.

NFF is pleased that all major political parties have committed to the definition of property rights and Australian farmers look forward to working closely with the government of the day to ensure that all farmers are compensated if their right to farm is eroded or removed.

Expensive Lessons for Government and Rural Industry from the Wool Stockpile - Bob Richardson[5]

Dean, Institute of Land and Food Resources, University of Melbourne

The wool stockpile, accumulated due to the collapse of the Reserve Price Scheme at the start of the 1990's was finally sold in 2001. This closes a significant chapter in the long history of woolgrowing in Australia, one which began with the introduction of the Scheme in the early 1970's. While the Scheme appeared to stabilise prices in the 1974-87 period, eventually over-confidence set in, the reserve level was raised too much and this sowed the seeds of destruction. It also reinforced a sense of inevitability that such schemes are doomed from the outset.

In the 1960's and 70's, the wool industry flirted with ideas of compulsory acquisition and, when the risks of that were seen to be too great, with loose concepts of integrated marketing. This involved price stabilisation, global promotion based on the Woolmark symbol, and research and development. Each of the marketing strategies, on its own, appeared to be successful for a time; Woolmark promotion was widely judged to be a good investment up to the 1980's and a continued case for wool research and development can be made. Even the price support scheme was concluded to have stabilised prices up to the mid-1980's. The presumed synergy of the strategies, a much more doubtful proposition, was part of the political rhetoric of the times and of the undoing of integrated marketing.

The most obvious lesson from this experience is the fundamental weakness of price stabilisation schemes. Sooner or later over-confidence sets in and policy setting falls into the hands of producers and/or politicians who set the minimum price too high. So it was with wool; what started out as a conservative floor price scheme subtly changed to an aggressive market-related reserve price scheme with all the attendant risks. The wool scheme was bound to fail once the floor price was raised by about 70 per cent over two years, to well above long-term trends. Politically this seemed the only way the Australian Wool Corporation (AWC) and the Wool Council of Australia could maintain the funding base of a compulsory wool tax. Government acquiesced in this in 1987, by removing the relevant Minister from the reserve price setting process, unless the parties disagreed. A strong political imperative to agree was thus created.

It is altogether too simplistic to blame greedy woolgrowers for this disaster. Their money was at risk and a good many grower leaders particularly from the Western Australian Pastoralists and Graziers Association and some Queenslanders, argued the case against the extent of the increase; such leaders received precious little support at the time from commercial and government participants in the decision-making process, or from rural industry leaders at the time, who subsequently claim to have seen the light.

The collapse of the scheme has been at the forefront of policy efforts to reduce the role of single commodity statutory authorities, or at least to make their marketing roles more contestable. The Wheat Board now listed on the Australian share market in its private enterprise disguise, while retaining legislated monopoly control of export marketing of wheat, has so far bucked this trend. In the wool industry, the McLachlan Report of 1999 performed the valuable but difficult roles of lowering expectations of woolgrowers about collective and integrated marketing and of promoting wider acceptance that private competitive market forces offer the best way forward in marketing, risk management and quality assurance.

[5] Bob Richardson, now Dean of the Institute of Land and Food Resources at the University of Melbourne is the author of a recent paper in the AJARE, reviewing 50 years of politics and economies in the wool industry. The present paper is a Revised Version of a feature published in the Australian Financial Review, July 2000.

Perhaps another lesson is that we must be careful not to over-react to the failings of government policy in the wool industry. The remnant organisation from the old AWC, the supposedly more commercial Australian Wool Innovation Ltd. (AWI) is now seeking to commercialise research and development based on continued compulsory levies.

This seems to deny the underlying reality that a good deal of valuable long-term industry research and development has most of the characteristics of a public good. The refusal of AWI Ltd to part-fund the proposed sheep and wool Cooperative Research Centre (CRC) is a manifestation of this over-reaction and sends a signal to many scientists in rural research to direct their energies to other industries.

Whether final sale of the stockpile heralds a new era of higher wool prices and profitability is doubtful. The sale of the stockpile from 1991 to 2001 was seriously mismanaged by governments and was blamed for persistent low prices; this masked the reality of fundamental changes in demand for wool. Over the eleven years, sale of the 4.75 million bale stockpile was probably 5-10 per cent of global producer sales, so its effect on prices was modest.

On the demand side, competitive fibres (cotton and synthetics) expanded their value and share of wool end use markets; this occurred at falling real prices and yet, because of productivity improvements, these competitors remain strong. More casual dressing in developed countries and increased use of wool in blends in developing countries will continue this trend.

There are some serious and lasting consequences from the collapse. A major opportunity cost of the scheme was its disruption to the development of innovative marketing systems. It undermined the development of private risk markets; the once thriving wool futures market actually disappeared and is only now making a gradual comeback as an instrument for efficient forward pricing of wool. And it seriously distorted price signals that usually guide efficient resource allocation in production and marketing, for example, seasonality of prices, a meaningful signal to producers about time of shearing and to buyers about seasonal quality attributes to offerings, was altered; the AWC operated a constant floor at the micron and type level within each season and tended to be a net buyer in the first half and a net seller in the second half of each season

The lessons from past mistakes are often difficult for rural industry leaders to accept. Despite the protracted Uruguay Round of World Trade negotiations, they see huge assistance packages to their competitors in Europe and the USA. We cannot hope to match the folly of such policies by ever repeating the disastrous experience of the wool industry with government backed intervention schemes. A legacy from this experience, if we needed one, is a classic textbook case of why buffer stock schemes do not work.

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