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Environment protection: challenges for future farming

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Abstract. There has been increased public demand for environment protection, including in rural areas. Government programs and policies have responded to these demands in various ways, such as by attempting to increase farmer awareness of environmental issues, increasing budgets for rural environmental programs, increasing environmental regulation, purchasing water from irrigators for environmental purposes, and encouraging farmer adoption of new environmentally friendly practices. These changes create a number of challenges for farmers, including challenges related to maintaining farm productivity, meeting community expectations, living with less water and evaluating new opportunities. These challenges are described and discussed. While there certainly are challenges, it is concluded that they are not insurmountable.

Keywords: environment, community expectations, water policy, carbon farming.

Introduction

As living standards rise, communities tend to place greater emphasis on environmental concerns. This trend appears to be playing out in Australia, at least over the long term. For example, public expenditure on environmental programs in rural areas has increased substantially since the 1980s. Public policy regarding land clearing has changed from it being encouraged (or even a requirement in some cases) to it being tightly constrained through regulation. New policies on climate change potentially have major implications for farming. This paper discusses changes such as these, with a focus on the challenges they are likely to pose for farmers in future.

Changes in public attitudes

Since the 1970s, Australians have developed stronger concerns for the environment. Environmental issues such as the proposed damming of Franklin and Gordon Rivers in Tasmania, salinity and climate change have been prominent in public debates over the past few decades. Australian Governments now spend hundreds of millions of dollars each year on environmental programs to satisfy voter expectations.

As well as changes in environmental attitudes, there have also been changes in the way that farming is viewed by the urban community. It is not many decades since the view of agriculture was predominantly positive: a provider of wealth for the country, a noble and highly respected job, our (then) strongest export industry. Most people had some connection to agriculture through friends, relatives or personal experience. These days, relatively few urban dwellers have any real connection to or understanding of agriculture, and urban sympathies for agriculture have declined substantially. Indeed, for many, their main perspectives on

agriculture relate to its negative impacts on the environment or animal welfare. Farmers are less able to counter these views as agriculture becomes relatively less important socially and economically.

One reflection of these two sets of changing community attitudes is the increased demand for agricultural products with environmental credentials, such as organically produced food. Some people are now prepared to pay more for food that is produced in ways they approve. In most cases this is leading to new opportunities for farmers rather than new constraints, although there are exceptions. Notable amongst these exceptions have been the pressure on the sheep industry to find an alternative to mulesing, and the recent public and political responses to poor animal welfare practices in Indonesian abattoirs.

A consequence of the common lack of contact with agriculture is that many people have highly unrealistic expectations about what farmers can and should do to meet more stringent environmental standards. This lack of realism is not limited to public attitudes, but pervades national policy programs as well (Pannell et al. 2006), influencing the design of national programs such as the National Landcare Program, the Natural Heritage Trust, and the National Action Plan for Salinity and Water Quality (NAP). For example, over half of the project funds allocated under the NAP was spent on extension (Pannell and Roberts 2010), although, in most regions, the actions that were promoted were clearly not adoptable on the scale necessary to meet salinity targets (Pannell 2001).

To illustrate, Figure 1 shows the net economic benefits to farmers from increasing the area of lucerne (a key salinity mitigation option) in the Fitzgerald region of Western Australia. For a particular set of assumptions, it shows that lucerne can increase profit if

grown on up to 200 ha of this farm. However, containing salinity to reasonably low levels on the farm would require much larger areas of lucerne than this (e.g., Dawes et al. 2002). Figure 1 shows how lucerne becomes progressively more unprofitable as its area is increased above 200 ha. Indeed, at the time of this analysis, the potential to lose money through growing lucerne in this environment was much greater than the potential to make money. Notably, this is for a region where lucerne is considered to be relatively well suited and economically attractive. It is not surprising that program managers were disappointed with the extent of adoption achieved as a result of extension activities undertaken under the NAP (Pannell and Roberts 2010; Barr 2011).

Below, I will discuss several types of challenges for agriculture related to government environmental programs: the challenges of maintaining farm productivity, meeting community expectations, operating with less water, and assessing new opportunities.

Maintaining farm productivity

The first set of challenges relates to issues of land conservation that directly affect farm productivity. These include:

- Dryland salinity (National Land and Water Resources Audit 2001).
- Loss of soil structure (Howell 1987).
- Soil acidity (Dolling and Porter 1994).
- Water-repellency of some soils (Blackwell 1993).
- Waterlogging (Bligh et al. 1983).
- Wind erosion (Marsh and Carter 1983) and traffic hard-pans (Bowden and Jarvis 1985).

With these issues, a challenge for farmers is to find cost-effective management responses. As illustrated in Figure 1, and recognised more broadly (Pannell et al. 2006), some of the widely promoted management responses for these issues are too costly to farmers to be justified from a financial perspective, even over a long timeframe. The challenge is heightened because, when issues such as these primarily affect farm productivity, there is little justification for public funds to be used to offset their costs (Pannell 2008). The benefits of taking action are private, so the costs of taking action should be too. Some past environmental programs have not made this distinction clearly, and have provided financial support to farmers to undertake actions that mainly generate private benefits with few public benefits. It is hard to predict what may happen in future programs, but in the light of the trends in community attitudes

outlined earlier, it seems possible that this may happen less frequently in future.

Meeting community expectations

Farmers have faced increasing expectations that they will manage their businesses in a way that does not cause degradation of environmental assets that are highly valued by the broader community. Issues in this category include:

- Salinity affecting non-agricultural assets (National Land and Water Resources Audit 2001).
- Degradation of remnant native vegetation (Hussey and Wallace 1993).
- Nutrient run-off or leaching causing downstream pollution problems (Waterhouse et al. 2010; Department of Natural Resources and Environment 2002).
- Greenhouse gases emissions, due primarily to livestock and burning of savanna and temperate grassland (FAO 2001).
- Loss of biodiversity. Among OECD countries, Australia has a relatively high percentage of threatened mammals and a high number of extinct or threatened plants. Land-use change for agriculture has caused nearly 90% of temperate woodlands and mallee to be cleared (Industry Commission 1998; Productivity Commission 2001).

In most cases, meeting community expectations for these issues results in a net financial cost to farmers. Indeed, in cases such as salinity, the costs to farmers of preventing all non-agricultural impacts would be so high (e.g., Dawes et al. 2002) as to render many farms non-viable. This is not to say that those farms should be sent out of business. One must consider whether the environmental benefits would be sufficient to justify the sacrifice of farm incomes and the social costs to farm families. For highly intractable problems like salinity, the answer to that question is often 'no', with off-site benefits from on-farm actions being very modest in many cases (Bathgate and Pannell 2001; Graham et al. 2010).

In past and current environmental programs, farmers have generally been asked to address these issues voluntarily, or with, at most, small temporary financial support. Notwithstanding that many farmers have made strong efforts to do the right thing, issues like salinity, nutrient pollution and loss of biodiversity remain serious concerns. It is not realistic to expect that farmers will voluntarily make the major financial sacrifices necessary to fully mitigate these threats.

The challenges of a purely voluntary approach have increased in some areas, where there has been an ongoing decline in the number of farmers and family members living in the landscape. For example, in the Western Australian wheatbelt, farms have continued to grow in size and shrink in numbers, such that there are fewer people available to undertake environmental projects, and those fewer people have greater demands on them, as they are responsible for larger areas of agricultural land than ever before.

Dealing with future policies

Looking ahead, several choices can be discerned for environmental policy makers: (a) continue with 'business as usual' and accept ongoing environmental degradation, (b) introduce regulation to require farmers to take environmental actions without compensation, (c) dramatically increase payments to farmers to compensate them for their costs in protecting the environment and thus to buy their cooperation, or (d) prioritise existing program funds more strategically so that a selected subset of environmental assets can be well protected.

While probably being unsatisfactory for all, 'business as usual' may turn out to be the most politically feasible option. A potential risk for farmers is that, as the failure of 'business as usual' to deliver desired environmental outcomes (Auditor General 2008; Pannell and Roberts 2010) becomes more apparent, community attitudes may harden, leading to demands for stronger environmental regulations. To some in the community, unaware of situations such as that depicted in Figure 1, regulation may appear a relatively cheap method for improving environmental outcomes. However, governments have shown themselves to be reluctant to rely on regulation as their front-line environmental policy in agriculture. Compared to, say, the mining industry, transaction costs of enforcing regulation over large numbers of small businesses are very high, and the technical feasibility of reducing some of the threats is perhaps lower. Information requirements for successful enforcement can be hard to meet. Political costs due to farmer outrage can be high. Even where regulations already exist, it is not uncommon for them to be left unenforced. In such cases, they serve only as a weak signal of community expectations. Overall, my judgment is that, while restrictions on clearing of native vegetation will remain in place, it is unlikely that farmers will face a substantial increase in regulatory approaches to environmental policy over the next decade or two. Mitigation of greenhouse gas emissions may be an

exception, but even in this case, agriculture seems likely to receive special treatment relative to other sectors of the economy. Under current proposals, agriculture has the best of both worlds. It is not included within the emissions cap that would be imposed as part of the national emissions trading scheme, but it has opportunities to sequester carbon and sell offsets to businesses that are included.

The next possibility is a dramatic increase in funding for rural environmental programs. In my judgment, this also seems highly unlikely over the next decade or so. Community concerns about issues such as nutrient pollution and biodiversity loss do not seem to have increased over the past 20 years. With the exception of climate change, from a political perspective, the environment remains relevant but of secondary importance. The community's environmental concerns are being closely focused on issues around climate change, arguably leading to neglect of other, perhaps more tractable, environmental issues. For these reasons, there is no sign of environmental budgets being greatly increased, outside the climate-change sphere.

The remaining option is to take a more targeted approach to spending public funds for the environment, carefully identifying projects for which it is most likely to be possible to generate large environmental benefits per dollar spent. I and other colleagues have been promoting this approach through tools like SIF3 (Ridley and Pannell 2005) and INFFER (Pannell et al. 2009). Although this comes up against some resistance to the idea that not all environmental problems can be solved, it is, in my judgment, the approach that will deliver the greatest environmental benefits given a limited budget. Under a targeted approach, there is a potential concern for farmers who have enjoyed participating in programs like Landcare and the Natural Heritage Trust. This is that only a minority of farmers would receive funding support: those for whom actions could best help to protect or enhance high-priority environmental assets. In reality, however, it is already the case that most farmers do not receive funding under the current national program, *Caring for our Country*. Further moves in this direction would be a matter of degree, rather than a fundamental change. In my view, adopting a more business-like approach to the selection of environmental projects, and demonstrating meaningful outcomes from past investments, are essential if proposals for increasing the budget for these sorts of programs are to win sufficient support,

especially from influential treasury and finance departments.

Operating with less water

Perhaps the most contentious issue in Australian agriculture in recent years has been the plan by the Murray-Darling Basin Authority (MDBA) to purchase water from irrigators, in order to benefit the environment. In fact, governments had been buying water on the open market for some time prior to the issue becoming contentious. The trigger for dramatically increased public concern was the release in 2010 of a 'Guide' to a new Plan by the MDBA, spelling out how much additional water they intended to purchase in coming years.

The strategy of the plan was to buy water only from willing sellers, so from a business point of view, the main challenge facing irrigation farmers would be deciding whether they wish to sell their water at the going price. It appears that there were two elements to the controversy: (a) a misunderstanding by some farmers about the voluntary nature of the program (or perhaps mistrust that it would remain voluntary), and (b) concerns about perceived social impacts, especially losses of jobs in rural areas. A number of economic modelling studies concluded that, in the long run, impacts of the Plan on employment would be minor – of the order of 1000 jobs lost. However, members of the community in the basin found this implausible, given the large volumes of water that would be diverted to environmental uses. It was also acknowledged by economists that the impacts could be large in certain local areas.

The political controversy led to a partial back-down by the Australian Government. The final level of water to be purchased is not yet determined, but appears certain to be significantly less than the minimum level specified in the original Guide.

This episode highlights the tension between the business and social priorities of farmers and city dwellers who are concerned about the environment. Of course, many rural people care about the environment as well, but this issue was often portrayed by protesters as an us-versus-them, rural-versus-city issue. Indeed, given the contrast between the voluntary nature of the plan and the strength of protests that it caused, it may be that the protests were largely a reflection of broader rural-urban tensions, rather than being primarily about the Plan itself. Perhaps this is a sign of things to come. Perhaps there will be increasing political demands for water for environmental purposes, as well as increasing resistance and militancy by rural

residents concerned about local social impacts.

Irrigation farmers who face the need to cope with reduced water availability, face the challenge of how best to adapt their management practices and land uses. They may need to keep up with water-conserving innovations, requiring time, effort and expense, but hopefully resulting in economic benefits to the farm business.

Assessing new opportunities

The final group of challenges relates to the difficulties farmers may have in assessing new farming practices or systems that are promoted to them as suitable responses to environmental problems. There are not usually great difficulties in adopting new practices that are similar to existing farm practices, such as a new variety of a familiar crop. However, some environmental practices are quite novel, and so have additional learning requirements. Their novelty may make it relatively difficult to learn by observation, slowing down the process of decision making (Pannell 2001; Pannell et al. 2006).

In the current context, a standout example where it may be difficult for farmers to assess new opportunities is soil carbon sequestration. Under the Australian Government's Carbon Farming Initiative (CFI), farmers are to be paid for adopting practices that lead to increased levels of sequestration of CO₂, including in agricultural soils. The practices that may increase sequestration are likely to be relatively familiar to farmers, such as changes in land uses and stubble retention. However, participation in the CFI itself involves complexities and uncertainties that create difficulties for farmers, including:

- Uncertainty about which practices will be considered to be 'additional' under the scheme, thus qualifying for payments. An effective way to increase sequestration of carbon in agricultural soils is to practise stubble retention. However, stubble retention is already considered to be good agricultural practice, and has been widely adopted, particularly in some regions (Llewellyn and D'Emden 2010). According to the rules and principles that underpin the scheme's design, this would likely rule out stubble retention as a valid activity for claiming credits, although it is not completely clear at this point whether it will be included in the scheme.
- Opportunity costs from changing land use. If stubble retention is not covered by the scheme due to lack of 'additionality', the main farming practices that would increase sequestration are changes in

land use, such as switching from cereal cropping to perennial pastures. However, this involves opportunity costs for farmers – they must give up the income from cropping for a smaller income from perennial pasture. Whether payments under the CFI scheme are sufficient to outweigh this reduction in income requires difficult judgements and calculations. For the case of the Western Australian wheatbelt, an analysis by Kragt et al. (2011) indicates that the opportunity costs are likely to outweigh the benefits from payments under the CFI, unless the price of offset credits reaches much higher levels than the initially proposed carbon price under the Carbon Tax scheme. It is unclear what the future trajectory of prices will be, beyond the first few years.

- Leakage. Switching land-use from cropping to perennial pastures would probably involve an increase in livestock numbers on the farm. However, this would result in an increase in emissions of methane, another greenhouse gas, resulting in a reduction in net benefits under the scheme. In some cases, leakage may be large enough to outweigh the benefits of increased sequestration. In principle, such leakage should be deducted from any sequestration estimates used to determine offset credits, although whether this will actually occur remains to be seen.
- Uncertainty about the levels of CO₂ sequestration attributable to different practices. There is some disparity between the likely levels of sequestration claimed by some enthusiastic farmer groups and the peer-reviewed scientific evidence. Whatever the correct average level of sequestration is, levels are likely to vary considerably from region to region, from time to time, and from soil type to soil type.
- Permanence – the need to commit to changes in the long term. A feature of the CFI is the requirement for participating farmers to maintain any credited sequestration for 100 years beyond the last date for which they receive payments under the scheme. This creates considerable costs and uncertainties for farmers. Over such a long time frame, there are likely to be major changes in agricultural technologies and prices of agricultural commodities. A commitment to the CFI currently may exclude farmers from substantial future benefits that cannot currently be foreseen. In other words, there is likely to be a significant 'option value' from not joining the

scheme and waiting to see what happens to technologies and prices.

Clearly, the complexities and uncertainties of participation in the CFI scheme will create challenges for farmers. It will require considerable effort on their part to learn about the scheme, and even then it may be difficult to judge whether the benefits of participation outweigh the costs.

A less extreme example of difficulty in assessing a new option is the potential adoption of novel land uses that are different to traditional crops and pastures. For example, the Future Farm Industries CRC is developing and promoting new perennial-based farming systems, including novel pastures, shrubs and trees. It is these more novel land uses that are likely to be needed for major improvements in environmental conditions. However, even without the complexities of a scheme like the CFI, the learning and trialling process for these new farming options is more challenging than for new options that are relatively minor variations on established land uses, such as new crop varieties.

Conclusion

Environmental issues associated with agriculture have increased in prominence in recent decades. Government programs to address these issues are now on a much larger scale than they were prior to the 1990s, reflecting increased expectations by the community that there should be reductions in environmental degradation in rural areas. Nevertheless, the budgets available under schemes like the Natural Heritage Trust and Caring for our Country remain very small indeed compared to costs that would need to be incurred to manage environmental degradation comprehensively. Thus one of the key challenges for agricultural industries in coming decades will be meeting community expectations in relation to the environment. It is unlikely that these expectations will be met with current approaches to environmental policy. In particular, a reliance on farmers making voluntary changes, with or without small temporary grants, is unlikely to turn around salinity, biodiversity loss and nutrient pollution in waterways in most cases where these problems are serious. I have argued that two of the possible policy responses to this situation, increased use of regulation, and dramatically increased program budgets, are both unlikely to occur. If that is true, it leaves policy makers with a choice between a business-as-usual approach, and more strategically targeted use of the available resources. The latter inevitably means that fewer farmers would receive funding support

for their environmental actions, but is more likely to deliver significant environmental outcomes in the long term.

The recent controversy related to purchase from irrigators of water for the environment was discussed. I argued that this was primarily about social issues, rather than impacts on farm businesses. Indeed, the community's political success in scaling down the planned purchases of water will come at a cost to individual farmers who would have benefited from being able to sell their water at higher prices.

Finally, farmers face challenges in evaluating some of the farming practices that are promoted to them within environmental programs. This was illustrated by the example of the Carbon Farming Initiative, which involves considerable complexities and uncertainties for farmers.

Overall, it appears that the challenges discussed here are not insurmountable. They may add to the difficulties of farm management, but seem unlikely to have devastating impacts on many farm businesses.

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Appendix

Figure 1. Marginal value of increasing lucerne area in Fitzgerald region of Western Australia. Source: Bathgate and Pannell (2002)

