

Policy mechanism choice for environmental management by non-commercial “lifestyle” rural landholders

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Abstract

For some environmental assets in rural areas, the landholders who are having the biggest impact are people with small holdings and an emphasis on lifestyle rather than commercial gains from their land. This paper aims to better understand the motivations and likely responses to policy for lifestyle landholders in Australia, in order to assess which policy mechanisms are likely to be most efficiently used to influence their land management. Through face to face interviews, we find that lifestyle landholders have important differences from commercial farmers, including much smaller properties, a stronger interest in environmental outcomes, a lack of land-management skills and a lack of time for land management activities. From the perspective of environmental policy programs, engaging with lifestyle landholders is likely to involve higher transaction costs, and there are likely to be higher learning and transition costs per unit area. A framework for selection of policy tools is modified to take account of these findings. It is concluded that the prospects for worthwhile public investments in land-use changes by lifestyle landholders are lower than for commercial landholders.

(JEL Q28, Q58)

1. Introduction

Pannell (2008) presented a framework for selecting policy mechanisms to encourage change in management of privately owned land in order to enhance environmental conservation or natural resource management. In attempting to apply the framework in rural Australia (Ridley and Pannell, 2008), the researchers encountered difficulties in understanding and accounting for differences between commercially oriented and non-commercially oriented or ‘lifestyle’ landholders. This paper reports results of a cross-disciplinary collaboration (economics and rural sociology) to address these difficulties. It was conducted as part of a multi-disciplinary project, also involving biological and physical sciences. The environmental management problem that provided the context for the research was dryland salinity in Australia (National Land and Water Resources Audit, 2001; Pannell, 2001; Ridley and Pannell, 2005)

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Landholder adoption of new management practices has been intensively studied (e.g., Pannell et al., 2006; Knowler and Bradshaw, 2006). In past studies of management options for dryland salinity, researchers have tended to focus on the commercial motivations of landholders (e.g., Kingwell et al., 2003; Trapnell and Malcolm, 2008). However, in certain areas of Australia where salinity is of concern, there has been rapid social change in recent decades, with rural lands converted from large-scale commercially oriented agricultural businesses, to small-scale 'lifestyle' holdings (Barr, 2001, 2004; Barr and Karunaratne, 2002).

We observed that Government agencies and publicly funded environmental management bodies, traditionally used to engaging with commercial farmers, have often struggled to engage successfully with so-called 'lifestylers'. Although we have good data recording the demographic changes that have occurred (Barr, 2004), and projections of likely future changes (Barr et al., 2005), the question of how environmental managers and policy makers should alter their approach for different types of landholders has received little attention (e.g. Barr and Wilkinson, 2005).

This study addresses this need through conducting a series of face-to-face interviews with a variety of landholders, in order to understand better their perceptions, motivations and constraints, and then applying that understanding within the Pannell (2008) framework for selection of policy mechanisms, based on public and private net benefits of land-use change. The objective is to assess which policy tools are most likely to be efficient for pursuing public environmental benefits when lands are managed by people who emphasise lifestyle rather than commercial returns.

2. Methods

Three regions were selected with a diversity of landholder types: Axe Creek and Wild Duck Creek, near the regional city of Bendigo in the state of Victoria, and Lake Warden, near the town of Esperance, in the state of Western Australia. All three regions face substantial problems with dryland salinity, and all three have large numbers of small non-commercial landholders.

Landholders were interviewed in each region with a focus on two questions:

- (a) How do lifestyle landholders perceive the adoptability of those practices that resource managers are trying to encourage them to adopt, in order to protect key assets? Discussions around this question addressed three factors judged likely to contribute to these landholders' adoption decisions: convenience, fit with landscape goals and fit with personal identity as a farmer.
- (b) How would lifestyle landholders then respond to the various policy tools already in use or proposed.

In-depth interviews were conducted personally with selected landholders in the case study catchments. To ensure a range of landholders were interviewed, they were selected using a variety of methods. Lists were obtained from various agency staff and community contacts. Snowball sampling was used, in which interviewees are asked to suggest other people who might be suitable for interview (Denscombe 1998). To ensure that some people who may not have had any contact with agencies or landcare groups were interviewed, the interviewer spent time on weekends cold-calling residents in known lifestyle areas. Wilkinson conducted all the interviews.

In Victoria, a total of 20 landholders were interviewed, 12 from Axe Creek and 8 from Wild Duck. All Victorian interviews were conducted at the interviewee's home during September 2006. In Western Australia, a total of 22 landholders were interviewed. Most Western Australian

interviews were conducted at the interviewee's home, but four were conducted elsewhere (generally the interviewee's workplace). The interviews were conducted during May 2007.

Interview topics included the landholder's:

- history on the property
- intentions for the future of the property
- personal identity as a landholder
- perception of any off-farm effects of their practices (unprompted and prompted)
- current use of practices that influence (positively and negatively) the condition of the nearby water body
- awareness and use of current policy tools
- perceptions of the recommended practice or practices
- likely future use of practices that are recommended to improve the condition of the water body
- likely response to different policy tools that might be used to encourage adoption of the recommended practice.

In Victoria, the commercial properties ranged from 400 ha to 800 ha in area and the lifestyle properties from 2 ha to 70 ha. There was also a group of landholders who we classed as hybrid, having some of the features of both lifestyle and commercial landholders. The Victorian hybrid properties ranged from 16 ha to 120 ha in area. In WA, the commercial properties ranged from 300 ha to 2000 ha in area, the hybrid properties from 40 ha to 200 ha, and the lifestyle properties from 2 ha to 150 ha.

Detailed notes were taken, using the interviewee's own language where possible. The quotations presented (in italics) are not necessarily verbatim, but are faithful to each interviewee's language. Each quotation is followed by an interviewee code (AC1 to AC12 for Axe Creek, WD1 to WD8 for Wild Duck, or LW1 to LW22 for Lake Warden, then L for lifestyle, H for hybrid or C for commercial).

A thematic analysis was conducted on the data. Results of the thematic analysis were used to analyse appropriate policy mechanism choices for lifestyle landholders using the framework of Pannell (2008).

3. Lifestyle landholder motivations

3.1 Productive use

Most of the lifestyle landholders wanted to have or already had a small-scale commercial agricultural enterprise on their land. Some knew exactly what they wanted to do; others were still looking around for a suitable enterprise. Some talked of earning money to help pay for their property, others spoke of a sense of duty to make productive use of good land. Agricultural production was only a sideline to their off-farm activity:

I've always been interested in growing something but I don't know whether it's suitable here. Something to bring in a buck, but I don't want to be greedy ... It's all a hobby [LW8 L].

3.2 Lifestyle

Lifestyle motivations for owning rural land were acknowledged almost universally. The term 'lifestyle' covers a diverse range of aspects, including peace and quiet, freedom from restrictions, recreation, enjoyment, a good place to raise children, being able to impart values to your children, a place to recapture one's sanity, and not being tied to the property.

3.3 Healing the land

The motivations of some so-called 'lifestylers' go beyond merely lifestyle. Some want to heal the land. Looking after the land can give meaning to life that takes it beyond simply being a hobby.

Fishing would be my hobby. This place is more than a hobby. It's what you live for [WD2 L].

For some, ownership of land was seen as something that was almost distasteful, and building a relationship with the land was what was important:

I find it hard to actually say it's ours. My husband says we're custodians of it. ... I even find it hard giving it a name. That puts ownership on it. We just call it 'the land'. Even the planting we have done recently has domesticated it, because it's in lines, rows [AC1 L].

The Victorian landholders interviewed were aware that they lived in a catchment and that their practices had effects downstream of their properties. Some needed no prompting when asked about downstream effects, others needed some prompting, and a few knew that it was important but had little knowledge. In contrast, Western Australia landholders generally displayed little knowledge of catchment issues. If they did have some awareness of their impact on the lake, it usually related to chemical residues and nutrients rather than excessive water entering groundwater or running off (which are issues of concern to environmental managers in these regions).

3.4 Landscape goals

Having the property looking attractive was valued, particularly by lifestyle and hybrid landholders, and trees were seen to make an important contribution to an attractive looking property:

We've planted trees and shrubs, about 50 different species of eucalypts, to see which ones would grow the best. Mainly just to have a big paddock, a thing to walk around and enjoy, a personal parkland. When it's all mowed it's nice and green, really attractive [LW6 L].

However, trees were sometimes seen to block out views, not only landholders' own views, but also those of their neighbours:

We want to green it up a bit, but we're still a bit selfish, we don't want to block the views. ... We don't want trees on all of it [AC1 L].

Having a biologically diverse rural landscape was important to several landholders. This took many forms. Native plants and animals were mentioned, as well as exotic species:

We're just revegetating it. Putting natives back in. ... The idea is to restore it to what it used to be, which is heathy woodland [WD2 L].

3.5 Personal identity

There was little evidence of lifestyle and hybrid landholders having formed a personal identity as a farmer. The lifestylers recognised their lifestyle aims and did not describe any desires to be a farmer:

I'm not planning to be a farmer. The whole thing is a hobby [LW8 L].

The one symbol of personal identity as a farmer appeared to be the tractor. Several lifestyle landholders either had one or wanted one.

I've had money for a tractor four times, but had to spend it on something else. This is a discretionary spend, up here. [Local farmers would have tractors.] But I want a tractor! ... If I had a tractor I'd like to be able to put some super [a phosphate fertilizer] in [WD4 L].

The privacy many lifestyle landholders said they treasured may well work against the sharing of equipment:

There's 20 houses in this little area and there's probably 15 tractors and 20 ride-on mowers. We should work together but we don't [LW9 L].

4. Adoption of environmentally beneficial practices

4.1 Planting trees

Planting trees was being promoted by government agencies and environmental managers to increase water use relative to grasses or other annual pasture species. The benefits of higher water use include reduced risk of dryland salinity through water-table rise, and in the Western Australian case, reduced water levels in Lake Warden. In recent years, water levels in this Ramsar-listed lake have been high due to excessive run-off, resulting in degraded feeding environments for wading birds, and damage to fringing vegetation that provides nesting and feeding grounds for the birds.

The trees being planted were mostly non-commercial native Australian species. These were considered to be both aesthetically attractive and environmentally beneficial, thereby resonating with the goals of environmentally oriented landholders, and those most concerned with beautifying their land.

Almost all of the interviewed landholders were at least mildly enthusiastic about trees and had planted some trees on their properties. No single reason for planting trees predominated.

I want to plant some trees to turn the front paddock into a park [LW13 H].

4.2 Perennial pasture

Deep-rooted perennial pastures are promoted in both states for similar reasons to planting trees. However, they differ from trees in that there is the potential for them to provide commercial benefits from more productive grazing of livestock, and in their lack of the same aesthetic benefits as trees. For these reasons, we would expect lifestyle landholders with a strong interest in beautifying their land to prefer trees over perennial pastures.

Effective utilisation of improved perennial pasture requires rotational grazing (Barr 1996). Stock are not left in a paddock for long periods, but rotated around a number of paddocks to allow pastures time to recover from being grazed. This requires a large number of small paddocks,

which involves subdivisional fencing. A cascade of management changes is needed to take advantage of the increased pasture production from perennial species:

If you increase your stocking rate you need more paddocks so you can rotationally graze. A whole new management regime is going to be coming in on this place [LW19 C].

Most of the lifestyle landholders are not interested in rotational grazing, as it is too complicated for them, or simply not a priority. Landholders who just wanted to have a few animals had minimal knowledge and interest in pasture species and management. The rest of the lifestyle landholders, who just wanted a place in the country, paid little attention to their pastures. Few lifestyle landholders have enough equipment to sow pastures.

I thought about ploughing up and sowing the old trotting track area but I don't have a tractor and I don't know anything about ploughing it up and sowing it down. [AC8 L]

5. Responses to existing policy tools

In the case study areas, advice and modest financial assistance are offered to landholders to encourage them to do things that will improve the condition of the catchments.

Almost all the tree planting that had been done by the Victorian landholders had benefited from some form of grant.

All of it [tree planting] has been under some sort of grant. Most of the costs, 90%, apart from the labour, have been grants. I doubt we would have done it if it wasn't, because the costs would have been too much. [WD7 C].

In contrast, although most WA landholders had planted some trees, few of the lifestyle landholders had made use of grants. Sometimes this was because they did not know about the availability of grants. Some of them had received non-financial assistance, such as labour and loans of equipment.

In Australian environmental programs, the available small grants are usually not intended to pay for the entire cost of works, let alone for any opportunity costs of land-use change. For those who are already keen to undertake the works, grants help to speed it up. For reluctant or wavering landholders, grants are offered to encourage them to attempt the operation, in the hope that they will see the benefits and do more on their own in future. For the most part, this seems to have been how the grants worked for the interviewed landholders.

The extent of change in most cases has been modest on any one farm. We would expect larger changes to be prompted by payment of larger grants, but in view of the non-financial motives of most lifestyle landholders, we expect that the payments required to compensate for changes that do not align well with the landholders' goals may need to be particularly large. For example, in some situation salinity mitigation requires establishment of perennial plants over a large proportion of the land. Given their expressed goals, many lifestyle landholders are likely to be highly resistant to this. Lifestyle landholders appear to be more receptive to assistance with logistics than to financial incentives.

Whilst landholders generally found grants attractive, some ambivalence was evident. Several landholders flatly refused to accept incentives, sometimes based on mistrust after previous dealings with government departments. Others did accept them, with misgivings.

I don't want a handout, but in a way I do want a handout ... I've never had a handout. Well, I have had one from DPI for fencing and some trees, but [for me to be willing to accept the payment] they had to be the trees I wanted and the type of fence I wanted [WD5 C].

For some lifestyle landholders, land management is something new, and perhaps scary. These landholders are most likely to respond to a combination of awareness raising, information provision, technical support, and sometimes a financial incentive. Financial incentives at usual levels are unlikely to prompt changes in their land management. They almost need the project to be organised for them. Other lifestyle landholders (and some commercial landholders) are keen to do the project, and have the required skills. In these cases the effect of grants would be to speed up adoption of the new practices.

6. Overview of lifestyle landholders

The most striking feature of the interviews is the diversity of landholder motivations. This diversity occurred not only between lifestyle and commercial landholders but also within each type. Diversity among small lifestyle farmers has been described by Hollier and Reid (2006). This means that any one policy instrument is unlikely to be effective in influencing adoption by all or even most lifestyle landholders. (The same is likely true also for commercial landholders.)

The interviewed lifestyle landholders fall into two major groupings of interest to policymakers. The most environmentally conscious ones are motivated to look after the land and they mostly know how to do it. They need help with logistics and labour to achieve their land management goals. Incentives are not needed to convince them to undertake environmental works such as tree planting, but would speed up their activities. Given the lack of financial and labour resources for many lifestyle farmers, the lag to adoption in the absence of support may be even longer than for commercial landholders.

Most lifestyle landholders look after the land because it makes for a nicer place to live. They favour revegetation that makes their property look good and that does not place great demands on their time or land management ability. Financial incentives alone are not enough to motivate them. They need advice and guidance, and ideally someone to organise the environmental works for them.

Overall, these lifestyle landholders seem likely to be willing to undertake the suggested environmental works, but in most cases, only at a modest scale – probably too low to achieve the environmental manager's salinity management goals. Pushing them to a higher scale of change is likely to conflict with their aesthetic goals for their properties.

The other issue of concern to environmental managers would be the transaction costs of engaging with lifestyle landholders. Because their properties are relatively small, large numbers of them need to alter their land management if catchment-scale environmental objectives are to be achieved. This will have much greater costs than engaging with a small number of commercial farmers with large landholdings. In addition, many lifestyle landholders spend much time away from their property in paid work, and so may be difficult to contact during normal working hours, further increasing the transaction costs of communicating with them.

7. Framework for selection of policy mechanisms

Pannell's (2008) framework assists in the selection of policy mechanisms to encourage land-use change. Here we consider Pannell's framework in the light of the above findings to identify policy responses that are likely to be cost effective for lifestyle landholders.

Mechanisms are selected from five broad categories, as shown in Table 1. Figure 1 shows the allocation of policy tools to projects or interventions depending on the levels of (a) private (or internal) net benefits, and (b) public (or external) net benefits from the changes in land management.

Table 1. Alternative policy mechanisms for seeking changes in management of private lands

Category	Specific policy mechanisms included
Positive incentives	Financial or regulatory instruments ^A to encourage change
Negative incentives	Financial or regulatory instruments ^A to inhibit change.
Extension	Technology transfer, education, communication, demonstrations, support for community network
Technology change	Mechanisms that alter the benefits of land management options, such as strategic R&D, participatory R&D with landholders, provision of infrastructure to support a new management option, and training to enhance the performance of existing technologies.
No action	Informed inaction

^AFinancial or regulatory instruments include polluter-pays mechanisms (command and control, pollution tax, offsets) beneficiary-pays mechanisms (subsidies, conservation auctions and tenders), and mechanisms that can work in either way depending on how they are implemented (define and enforce property rights, such as through tradable permits).

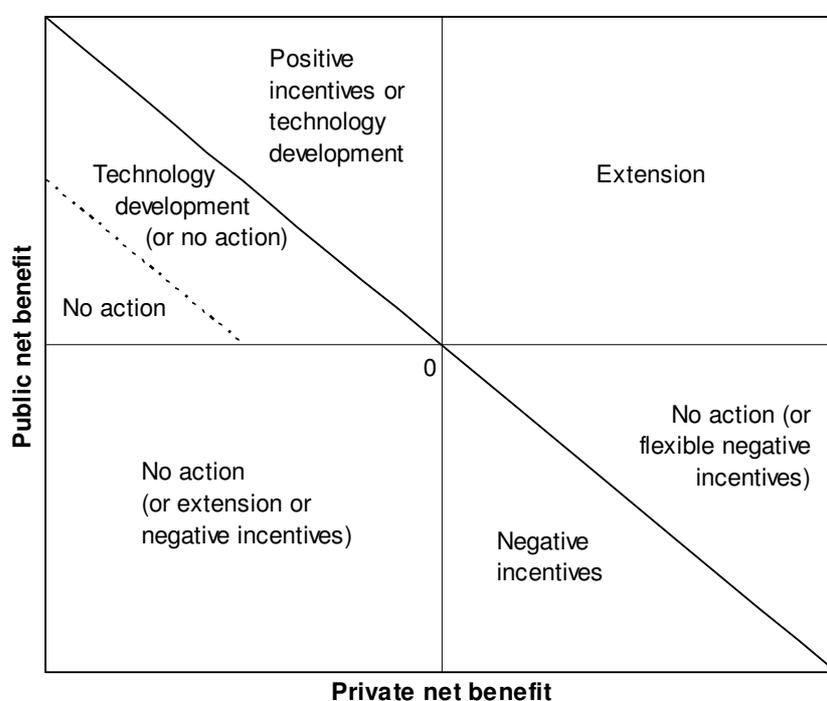


Figure 1. Suggested classes of policy tools for different levels of public and private benefits

In the simple version of the framework in Figure 1, it is assumed that landholders will adopt all land-management practices with positive private net benefits, provided that they are able to learn about those practices. Zero learning costs for landholders are assumed. Given this assumption, the following rules for selecting policy mechanisms are used.

1. *Do not use positive incentives for land-use change unless public net benefits of change are positive.*
2. *Do not use positive incentives if landholders would adopt land-use changes without those incentives.*
3. *Do not use positive incentives if private net costs outweigh public net benefits.*

The following two rules are based on the use of extension to improve decision making, rather than to improve skills. They relate to the use of extension as the main policy tool, rather than as a support to other policy mechanisms.

4. *Do not use extension unless the change being advocated would generate positive private net benefits¹. In other words, the practice should be sufficiently attractive to landholders for it to be 'adoptable' once the extension program ceases.*
5. *Do not use extension where a change would generate negative net public benefits*

The remaining rules are as follows:

6. *If private net benefits outweigh public net costs, the land-use changes should be accepted if they occur, implying no action. Alternatively, if it is not known whether private net benefits are sufficient to outweigh public net costs, a relatively flexible negative incentive instrument may be used to communicate the public net costs to land managers (e.g. a pollution tax), leaving the ultimate decision to the land managers. Inflexible negative incentives, such as command and control, should not be used in this case.*
7. *If public net costs outweigh private net benefits, use negative incentives to discourage uptake of the land use.*
8. *If public net benefits and private net benefits from a set of land-use changes are both negative, and landholders accurately perceive this, then no action is necessary. Adverse practices are unlikely to be adopted. If there is concern that landholders have misperceptions about the relevant land uses, adoption of environmentally adverse practices could be discouraged by extension, or more strongly by negative incentives.*
9. *Invest in technology change in the following combination of circumstances: (a) after technology change, the resulting land-use change projects would lie in the north-east quadrant or in the Positive incentives area, (b) the benefits of technology change would include public benefits, either through increasing adoption of environmentally beneficial practices, or through increasing the environmental benefits of practices that have already been adopted, and (c) the benefits of investing in technology change would outweigh the costs.*

The simple framework in Figure 1 is useful as a communication tool, particularly for communicating the underlying economic principles to non-economists.

¹ In principle, private net benefits would be the benefits assessed ex post by the landholder, rather than the ex ante values perceived by landholders prior to conducting extension activities. The expectation would be that extension would result in ex ante perceptions converging on ex post values more rapidly.

Pannell (2008) describes a number of additional complexities that influence the choice of policy mechanism:

- There are learning costs that inhibit land-users from adopting new technologies;
- There are time lags between the availability of a practice and its adoption by landholders;
- The time lag to adoption for a specific technology is likely to be inversely related to the private net benefits of adoption;
- Extension is likely to reduce but not eliminate the lag to adoption;
- There are transaction costs involved in any intervention.

Capturing the influences of these factors in the framework requires specific assumptions about functional forms and parameter values. For the purposes of illustration, the following assumptions are made (largely based on Pannell, 2008).

- Learning costs are the same for every project: \$10/ha/year in annualised form.
- The lag to adoption (λ) is ∞ for private net benefit (π_i) ≤ 0 , and decreases at a decreasing rate as π_i rises above zero. The specific form for this relationship is an empirical question. For illustration, assume that $\lambda = k/\pi_i$; $\pi_i > 0$, where k is a constant, assumed to equal 50.
- Extension reduces the time lag to adoption (α) by two years, based on Marsh et al. (2004).
- The real discount rate is 5%.
- Transaction costs are \$2.50/ha/year for positive incentives (excluding transfers such as subsidy payments), negative incentives, and extension.
- Technology change increases the private net benefits of land-use change by \$37.50 per ha per year.

These assumptions are treated as being relevant to commercial landholders. Adjustments to the assumptions for lifestyle landholders are made later.

All numerical values in subsequent figures are expressed as annuities. Calculations are available at <http://cyllene.uwa.edu.au/~dpannell/archive/pub-priv3.xls>.

With these assumptions, the revised framework is shown in Figure 2. The boundaries shown in Figure 2 map those projects where the BCR of intervention = 1, and any project inside the areas labeled *Positive incentives*, *Negative incentives* or *Extension* would have a BCR > 1. The graph is similar to Figure 1. In broad terms, the differences are: (a) the boundary between *Technology change* and *Positive incentives* is raised slightly due to learning costs, (b) for projects with positive but low private net benefits, the recommended response is *Positive incentives* rather than *Extension*, as the time lag to adoption is high for these projects and it is assumed that positive incentives can eliminate that lag, (c) *Extension* is not recommended as the main policy mechanism for projects with positive but low public and private net benefits, because the transaction costs outweigh the resulting benefits, and (d) the left boundary between *Negative incentives* and *No action* is moved to the right because, with learning costs considered, landholders would not adopt changes with low private net benefits².

² The private net benefits axis of the graphs does not include learning costs.

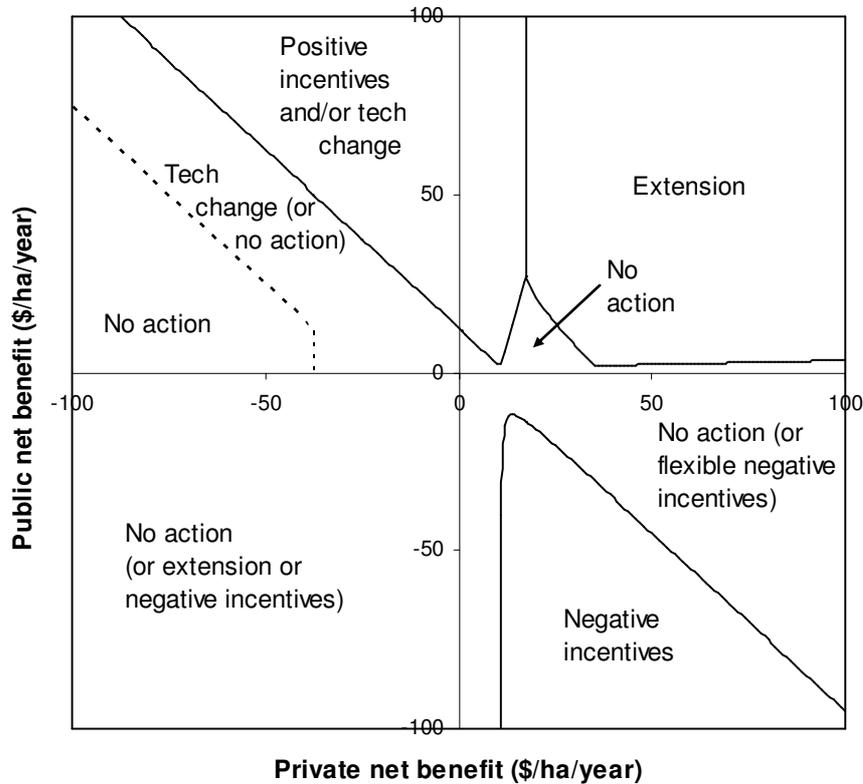


Figure 2. Refined framework for allowing for lags to adoption, learning costs and transaction costs.

8. Lifestyle landholders in the policy mechanism framework

Based on the qualitative research results described in Sections 4 to 6, we seek to represent the following features of lifestyle landholders in the policy mechanism framework.

- Substantially higher transaction costs (C_T) for mechanisms that require close engagement with landholders (positive incentives, negative incentives and extension). (up from \$2.50 to \$12.50/ha/year)
- A longer time lag until adoption of new land management practices, in the absence of intervention. (increase parameter k from 50 to 100) and as a result a greater potential reduction in that lag due to extension (increase α from 2 to 5 years)
- A willingness to make environmentally beneficial changes that are modest in scale (i.e. such changes have positive private net benefits and small but positive public net benefits).
- A strong reluctance to make environmentally beneficial changes that occupy the majority of their land (i.e. such changes have highly negative private net benefits and relatively large positive public net benefits). We expect, however, that they would tolerate such changes on a sizable minority of their land.

- The likelihood that training of inexperienced lifestyle landholders can substantially improve their private net benefits from land management changes. This sort of training will be treated as a form of technology change.
- Higher levels of learning and other transition costs (C_L), per unit area of land. (up from \$10/ha/year to \$50/ha/year). We assume that the cost of learning would be comparable in absolute terms for commercial and lifestyle landholders, but due to differences in farm size, the cost per ha would be much higher for lifestyle farmers.

Whilst we have qualitative evidence for these assumptions in general terms, we lack quantitative evidence for the specifics of these assumptions. The purpose of the analysis is to illustrate the differences in appropriate policy responses for lifestyle landholders compared to commercial farmers. The analysis illustrates the types of change, their directions and plausible magnitudes. Greater specificity would require additional research to provide stronger evidence for the parameter values used. We recognise that, in reality, there is great heterogeneity within each group (commercial and lifestyle landholders). We are only examining the consequences of the broad differences identified in Sections 4 to 6.

Figures 3 and 4 illustrate results for “commercial”, “lifestyle” and “intermediate” (parameter values half way between the other two categories) landholders. They show iso-BCR lines for positive incentives and extension only, and so are limited to the top half of the graph.

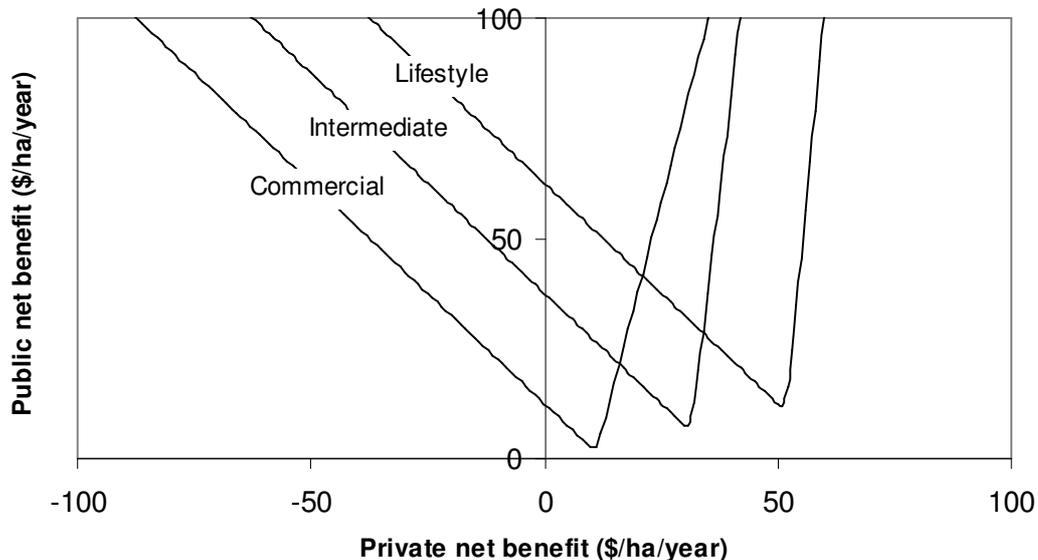


Figure 3. Iso-BCR lines (BCR = 1) for positive incentives for commercial, intermediate and lifestyle landholders.

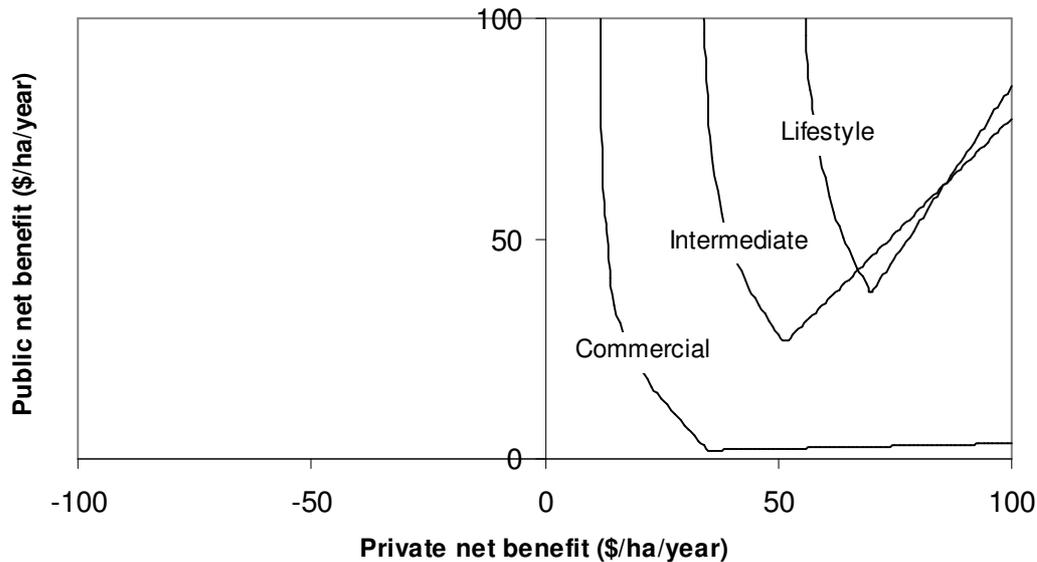


Figure 4. Iso-BCR lines ($BCR = 1$) for extension for commercial, intermediate and lifestyle landholders.

For *Positive incentives*, there are three effects of changing parameters from commercial to lifestyle values. The main change is to move the iso-BCR line horizontally to the right. This is due to the higher learning costs of adoption (per ha) assumed for lifestyle landholders, due to the smaller areas of their properties. The second effect is to raise the iso-BCR line towards the top of the graph, due to higher transaction costs. Thirdly, there is an increase in the slope of the iso-BCR line to the right of the kink, also due to higher learning costs per ha. Overall, the mix of public and private benefits needed to justify use of positive incentives is somewhat different for commercial and lifestyle landholders, with a need to identify projects with higher private net benefits for lifestyle landholders. Alternatively, if private net benefits are negative, higher public net benefits are needed to justify use of positive incentives for lifestyle landholders.

For *Extension*, there are two prominent changes for lifestyle landholders. The iso-BCR lines move upwards and to the right, and the part of the lines to the right of the kink increases in slope. The kink occurs at the point where the reduction in lag to adoption due to extension equals the full lag to adoption. To the left of that point, extension only partially reduces the lag to adoption. To the right, the lag to adoption is so short (because the land-use is so attractive to landholders) that extension eliminates it entirely. The right movement of the iso-BCR lines is mainly due to higher learning costs, while the upward movement and the rotation of the right part of the line is mainly due to the higher transaction costs that must be borne (per ha) to engage with lifestyle landholders. Again, this is largely a function of the smaller areas of most lifestyle properties.

Figure 5 shows how Figure 2 is modified when the lifestyle assumptions are applied. Overall, there are smaller areas for which intervention is justified, especially for negative incentives and extension, compared with Figure 2. For positive incentive mechanisms (incentive mechanisms used to encourage land-use change) the private net benefits per hectare of the changes being considered would need to be higher for lifestyle landholders than for commercial landholders, by an amount approximately equal to the increase in learning costs per ha. This reduces the likelihood that positive incentives will be appropriate, even though the area of the graph allocated to them is

only slightly smaller in Figure 5 than in Figure 2. In other words, when dealing with a population of lifestylers, other things being equal, it is less likely that mechanisms such as grants, subsidies, conservation auctions, land-use planning restrictions or commend-and-control regulation would be economically justified compared with commercial landholders.

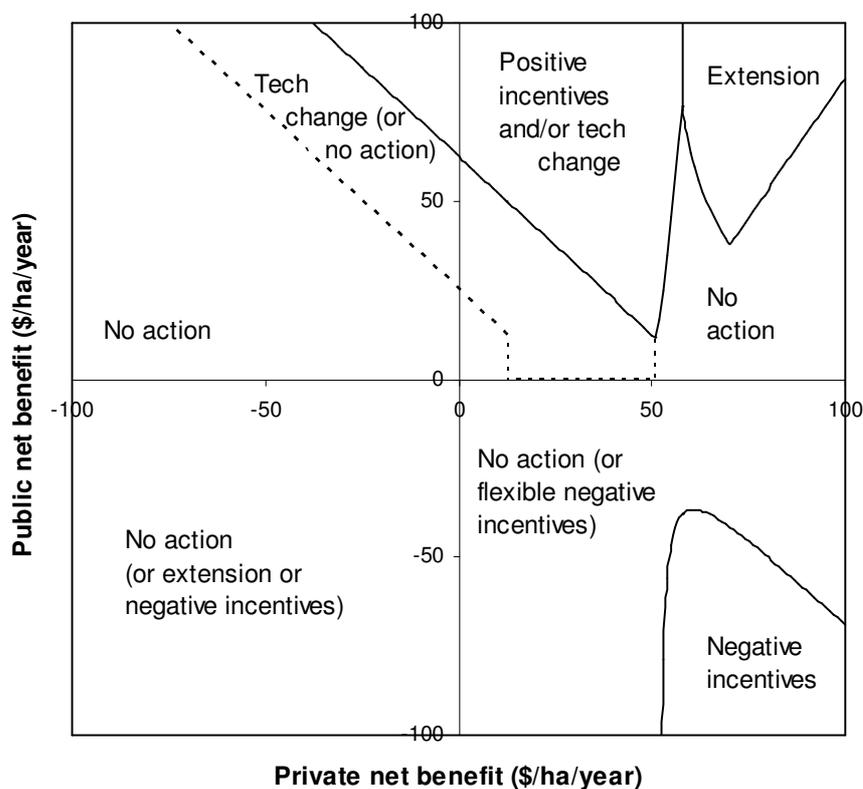


Figure 5. Modified public: private benefit framework for lifestyle landholders for $BCR \geq 1$ ($k = 100$; $\alpha = 5$ years; $C_t = \$12.5/\text{ha}/\text{year}$; $C_L = 50/\text{ha}/\text{year}$).

For negative incentives (incentive mechanisms used to discourage land-use change), the public net benefits per hectare need to be more highly negative for lifestylers than for commercial landholders. That is, the damage being avoided through negative incentives needs to be greater to justify the transaction costs. In addition, the private net benefits of adopting the land-use changes would need to be more positive to outweigh the higher learning costs per ha. It is assumed that lifestylers will not adopt practices with only small to moderate private net benefits, because these benefits will be outweighed by the learning costs.

For extension, the changes are approximately a mirror of those for negative incentives: both public and private net benefits need to be higher. To the left of the *Extension* area, learning costs are so high that adoption is not worthwhile (in the absence of positive incentives). To the right of the *Extension* area, private benefits are so high, that the lag to adoption is so short that the benefits of extension are not sufficient to outweigh the transaction costs, which, recall, are relatively high for lifestylers.

For technology change, the set of recommended projects is similar, but displaced to the right, again reflecting the higher learning costs per ha borne by lifestyle landholders. The qualitative research results reported in sections 4 to 6, showed that lifestyle landholders are interested in undertaking environmentally friendly works, but need considerable advice and guidance on how to do so. Therefore technology change in the form of training is likely to be an important option, particularly if, without training, the land-use change sits in the *Positive incentives and/or technology change* area.

The results above for incentives and extension are based on an assumption that learning costs will be high. If the new practices have low learning costs for lifestyle landholders (e.g. they are simple, or are similar to practices that have already been adopted), then the iso-BCR line would be nearer to the vertical axis. Figure 6 shows the framework for lifestyle landholders if their learning costs are \$10/ha/year, the same as assumed for commercial landholders. For positive and negative incentives, the result is broadly similar to Figure 2, but for extension, the change is substantial. For lifestyle landholders, even if their learning costs are low, in Figure 6 extension is recommended for a much smaller set of projects than in Figure 2 – those projects with high public net benefits and moderate private net benefits.

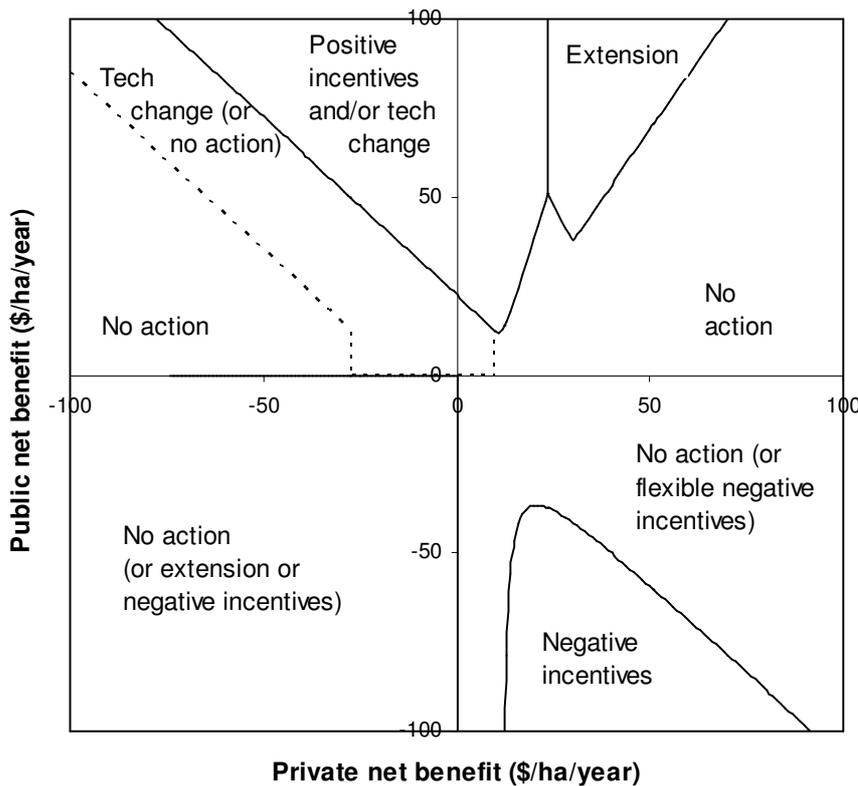


Figure 6. Modified public: private benefit framework for lifestyle landholders for $BCR \geq 1$, if learning costs are low ($k = 100$; $\alpha = 5$ years; $C_t = \$12.5/\text{ha}/\text{year}$; $C_L = 10/\text{ha}/\text{year}$).

Pannell (2008) noted that a BCR of 1.0 may not be sufficient to justify public investment. This is because program resources are limited and budgets are often insufficient to fund all worthwhile

projects, and also because of the need for benefits to outweigh the overhead costs of running the program. For illustration, Figure 6 shows the framework with lifestyle assumptions, and a threshold BCR of 2.0. Given the assumptions used here, if a higher BCR is required, there would probably be very few projects with lifestyle landholders for which incentives or extension would be justified. The sensitivity of results to increasing the threshold BCR is substantially greater for lifestyle landholders than for commercial farmers, as shown in Pannell (2008).

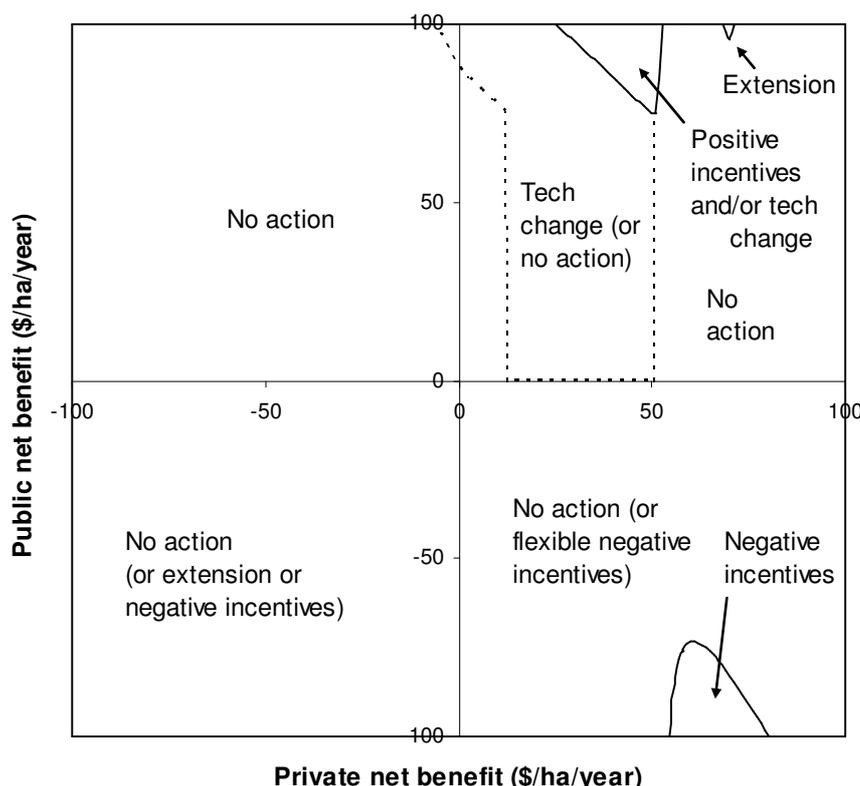


Figure 7. Modified public: private benefit framework for lifestyle landholders for $BCR \geq 2$ ($k = 100$; $\alpha = 5$ years; $C_T = \$12.5/\text{ha}/\text{year}$; $C_L = 50/\text{ha}/\text{year}$).

It was noted earlier that, in the study regions, lifestyle landholders tend to be willing to make environmentally beneficial changes that are modest in scale. Such changes have positive private net benefits (presumably with small learning cost) and small but positive public net benefits. Considering Figures 5, 6 and 7, it seems likely that the recommended response for environmental managers in these cases would be either “no action” or “technology change”. If there are opportunities to increase the benefits of land-use change through technology change, in the form of training or R&D, this would accelerate the adoption of practices with positive public benefits. If these opportunities are not available, the recommendation would default to “no action” – we would allow adoption to occur at its own rate, driven by the private net benefits of the practices.

It was also noted that most lifestyle landholders have a strong reluctance to make environmentally beneficial changes that occupy the majority of their land. Such changes may

have relatively large positive public net benefits, but they also have highly negative private net benefits. Looking at Figures 5 to 7, the recommended response is again likely to be no action. If learning costs are low, and public net benefits are sufficiently high, then the recommended response may be “technology change”, or even “positive incentives” in exceptional cases.

9. Conclusion

Lifestyle landholders in the study region have a number of different characteristics compared with commercial farmers, and these differences have important implications for the prioritisation of interventions to encourage land-use change (e.g. for environmental purposes) and for the selection of appropriate policy mechanisms.

The key differences identified in this study include:

- Higher learning and other transition costs per unit area associated with adoption of new practices;
- Higher transaction costs per unit area of the property associated with the intervention;
- Considerable diversity of motivations, but falling into two broad groups: those with strong environmental interests, and those who seek to beautify their properties;
- A greater need for training and advice;
- Possibly a longer time lag until adoption of new land management practices, in the absence of intervention.
- Need for logistical support as distinct from financial support.

The policy framework of Pannell (2008) was used to test the implications of these characteristics for the prioritisation of public investments, and selection of policy tools. Results indicate that the factor to which results are most sensitive is the learning and transition costs of land-use change. The postulated higher levels of these costs per ha, due to much smaller property sizes for most lifestyle landholder, makes that the long-term private net benefits from adoption of new practices have to be high to justify intervention with incentive mechanisms or extension.

The selection of extension as a policy mechanism was highly sensitive to the program’s transaction costs, again assumed to be higher due to the larger numbers of lifestyle landholders per unit area. Projects that suit extension would have particularly high public net benefits and moderate to high private net benefits. This relates specifically to extension used to improve decision making about an existing technology. Implicit is the assumption that there are land-use practices that are highly attractive to landholders, but have not yet been adopted. Presumably, this would mainly relate to new technologies, rather than well established, well known technologies.

Training activities (represented here under the heading “technology change”) appear to have greater prospects, being suitable for projects where existing public and private net benefits are lower. Existing extension officers may be well placed to conduct training activities. R&D may also play a useful role, particularly if it can generate new practices that are simple to apply and so have low learning costs (and preferably greater public and private net benefits).

Extension as a support for incentive-based programs may also have a role, especially in cases where learning costs per ha would be low. Positive incentives are recommended particularly where practices are of marginal interest to landholders; that is, where private net benefits post adoption are approximately offset by learning costs. These positive incentives would need to involve logistical as well as financial support. Negative incentives are also relevant to discourage changes with particularly high public net costs, and moderate private net benefits that are sufficient to prompt adoption in the absence of public intervention.

If program budgets are limited, such that a high threshold BCR is required to justify a project, then the prospects for worthwhile public investments in land-use changes by lifestyle landholders do not seem great. The project would need to be one of exceptional public net benefits, and preferably one with low learning costs. In this light, the decisions by public agencies in Victoria to direct their extension programs more to commercial than to lifestyle landholders may have been justified on efficiency grounds.

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