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Resource Management and Duty of Care

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Australian farmers, and private land-owners in general, face a range of external controls or legal restrictions over the way they use natural resources. They are bound by common law that provides for a wide-ranging Duty of Care (DofC) to avoid directly injuring other people or their property (Bates, 2001). In addition, farmers have obligations under the various state environmental protection acts that govern the actions of all industries. Over and above these general obligations, farmers' management actions are constrained by provisions within various State land protection acts, and those who operate on crown pastoral leases confront a further array of land use controls that vary between states and territories (Productivity Commission, 2002).

Despite the extent of the existing explicit legal obligations imposed on farmers, there appears to be a widely held view that, for a number of reasons, the current level of conservation and environmental protection undertaken on privately managed rural land is not consistent with the efficient management of the resources involved. The Productivity Commission (2003) provides a useful summary of this issue. As a result there is a view in policy circles that Australia as a whole is under-investing in the conservation of important resources such as biodiversity, land quality and water quality.

In exploring ways that the deficit in conservation can be redressed some groups have suggested that the legal obligations of farmers to protect or improve the environment should be extended. In general terms, they argue that the current legal DofC that farmers and other land managers have to prevent damage to the natural resource base is too limited and should be extended by statute law.

For example, the then Industry Commission (1998:75) argued that the extended DofC, '… should require those responsible to take all reasonable and practical steps to prevent harm to the environment'.

More recently, the Standing Committee on Environment and Heritage (2001), the Wentworth Group (2003), the Victorian Catchment Management Council and Department of Sustainability and Environment (2003), and Young, Shi and Crosthwaite (2003) have discussed the possibility of redefining and extending the legal land management obligations of farmers. Young, Shi and Crosthwaite (p. 3), take the following position:

> An environmental duty of care requires duty holders and responsible persons to take all reasonable and practical steps to prevent harm arising from their activities.

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Interest in redefining and extending the DofC of farmers to the environment appears to stem from both a perceived need to establish rules as to who should pay for society's increasing demands for environmental services and a desire to find new policy tools to generate environmental protection. There would also appear to be a view that the existing legal obligations do not obligate farmers to pay a high enough share of the potential future costs of protecting the environment. In this regard it has been argued that the existing share of the legal obligation to protect the environment that farmers currently face provides the wrong incentive messages to farmers because they are not output based, do not provide sufficient funds to achieve environmental goals and do not accord with notions of distributional justice (for example, Young, Shi and Crosthwaite, 2003).

In exploring the case for extending the DofC that farmers and private land managers in general have to protect the environment there are three key issues to be addressed:

- Is there an economic case for extending the DofC farmers have to undertake on-farm?
- Can it be done in a workable fashion?
- Is the change politically acceptable?

In this paper we examine the first issue. Our key result is that the efficiency case for extending the DofC owed by farmers to correct off-farm environmental costs is weak. Policy makers need to be aware that the demand and delivery of conservation do not (and should not) have to be linked to the subjective decision of who should pay. It can be demonstrated that simply adhering to the Polluter Pays Principle can be economically inefficient. Instead, policy should be based on the principle of equating the marginal costs of conservation provision across all sources with the marginal benefits of conservation.

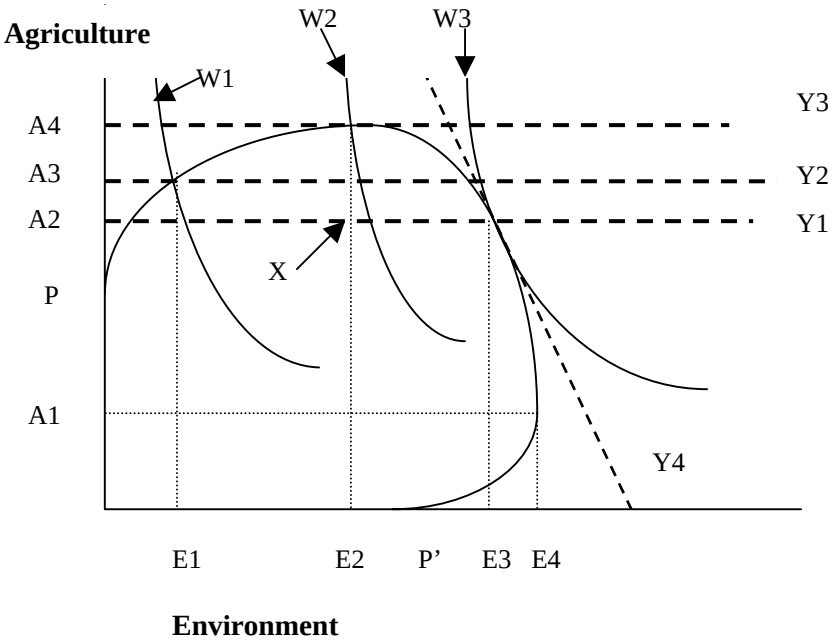
In the next section, we place the issue in an agri-environmental policy context allowing for interactions between agricultural production and environmental service flows. The efficiency implications of extending the DofC are then analysed within a more flexible economic framework. Specific allowance is made for differences in the comparative costs between on-farm and off-farm interventions to achieve environmental targets. The implications of transaction costs in negotiating between farmers and public sector environmental service providers are also considered. In the final section, we examine the policy implications of our analysis and summarise our findings.

The Policy Context

The current debate over extending the DofC of farmers towards the environment is best understood in a systems context. Agricultural product and environmental service flows from the rural sector are inter-related through a complex system of biological and human interactions. A highly stylized view of the essence of these interactions is presented in Figure 1. That is, the curves in Figure 1 are drawn to

portray the nature of these relationships in a generic sense rather than as an exact model of any particular agri-environmental system or management issue. However, the relationships characterised in Figure 1 are broad enough to cover a number of the fundamental systems problems that concern environmental policy analysts. Focusing on any particular case would potentially lose that generality.

Figure 1: An Environment-Agricultural Policy Trade-Off



The curve PP' in Figure 1 portrays the potential production relationship between agricultural output and environmental service flows. These environmental service flows include biodiversity protection, scenic quality and the protection of soil quality and waterways. The curve reflects the current level of our understanding of these relationships and shows the longer-term limits to our ability to produce environmental services and agricultural output. That is, the maximum sustainable level of agricultural output is A4 while the maximum sustainable level of environmental services is E4. These limits are determined by society's existing level of resources, including scientific knowledge. Farmers can produce more than A4 agricultural output in the short run but these levels would not be sustainable in the long run.

The curve shows the potential production relationship rather than the actual production levels. Actual production relationships reflect both the level of

understanding of individual resource managers of these relationships and the incentive structures they confront. These incentive structures are generally driven by some combination of market prices and government policies and they interact with private managerial objectives to yield resource management decisions on planned production of agricultural output and environmental services. The actual levels of outputs are also influenced by random factors such as weather conditions.

When actual production takes place inside the frontier PP' there is a cost to society in terms of foregone feasible production. For example, for any point like X in Figure 1 (A2,E2), there are a range of feasible production sets that could produce more agricultural output and/or more environmental services from our existing level of resources. That is, society would be better off operating on the frontier between A4,E2 and A2,E3 than at X.

The actual combination of agricultural output and environmental service flows that society as a whole would prefer reflects the aggregation of individual preferences for agricultural and environmental outputs — Hall, McVittie and Moran (2004) provide an interesting review of what the public in the UK wants from agriculture and the countryside and how this relates to the current array of agri-environmental policy initiatives. In this case it is assumed that society prefers higher levels of both agricultural output and environmental services but they are willing to trade these outputs off at some rate. The curves W1, W2 and W3 are three of a family of iso-welfare lines showing combinations of agricultural output and environmental services that give society an equivalent level of wellbeing. W1 yields a relatively low level of community wellbeing, while W3 is the highest level of community welfare that is consistent with the current resource base. The slope of the iso-welfare lines reflects the willingness of the community to trade-off agriculture for the environment and vice versa.

Given the community preferences as reflected in the iso-welfare lines and the feasible production set as reflected in the curve PP', the socially optimal mix of agricultural and environmental outputs is given by A2,E3. This co-ordinate is socially optimal because it reflects production constraints as shown by the production possibilities curve PP' and relative community preferences as reflected in the set of iso-welfare lines W1 to W3.

The upward sloping sections of the PP' curve from P to A4,E2 and from P' to A1,E4 reflect ranges of complementarity between environmental services and agricultural output. For low levels of E (environmental services) it is considered that expansions in E are necessary to expand A (agricultural output). In other words, low levels of environmental quality can constrain agricultural production. For example, the protection of soil quality and the provision of native vegetation for wind breaks have the potential, over some range, to expand both A and E.

In the stylized diagram in Figure 1 this zone of complementarity is portrayed as a relatively large section of the production possibilities frontier. However, the actual size of this zone depends on the biophysical relationships inherent in the interaction between farming and the natural ecosystems. It could be expected that these relationships would differ substantially between industries and may also change over time with new technology.

Similarly, it could be argued (and often is in Europe) that some level of agricultural output is necessary to maximise the flow the environmental services. In Figure 1, the upward sloping segment between P' and A1,E4 indicates that E4 is only achievable if agricultural production takes place at some modest level like A1. This complementarity could reflect the preferences some members of the community have for man-made landscapes.

Farmers will choose a level of A and E that they perceive will maximise their own best interests. In doing so they will consider the relative returns they obtain from producing A and E. In the current policy environment most farmers are only paid for A and receive no direct return for E. The return from producing E comes indirectly in terms of its impact on levels of A. The income from the use of resources is shown in Figure 1 by the family of iso-income lines Y1, Y2 and Y3, where Y3 is the highest level of income. These lines are horizontal, as expanding E has no direct impact on the income of resource managers. Moreover, for the sake of simplicity it is assumed that farmers' preferences are such that they derive no welfare from expanding E unless they are paid directly for the provision of the service.

An industry characterised by informed and profit motivated resource managers would plan to attain the highest level of income that is consistent with their resource base so they would aim to produce at A4,E2 and earn Y3 income.

It is plausible to assume that, until recently, policy makers have implicitly placed Australia somewhere along the upward sloping segment of PP', say A3,E1 earning Y2. They clearly did not think Australia was at A4,E2 as the thrust of environmental policy in Australia has been directed towards fully realising the potential complementarity between agriculture and the environment. This is reflected in the emphasis on the Landcare program and similar initiatives that stress the importance of educating private resource managers about the value of conserving the environment for their personal benefit by enhancing the sustainability of their farming businesses. These policy initiatives are aimed at achieving win-win outcomes for land managers and the community. Cost effective education programs have the potential to move private resource mangers from A3,E1 to A4,E2 and in so doing expand resource manager incomes from Y2 to Y3 and lift overall community welfare from W1 to W2. This of course assumes that the cost of the education program is less than the value of the rise in community welfare from W1 to W2. Curtis (2000) provides an interesting review of the limitations of Landcare implementation.

The current interest in expanding the DofC owed by farmers towards the environment can be characterised as a reflection of the need to expand the provision of environmental services beyond E2 to the socially optimal level, E3. This shift around the frontier cannot be achieved by improving the information base of private resource managers. A fully informed manager will realise that moving down the frontier from A4,E2 to A2,E3 will reduce their private income from Y3 to Y1. That is, the cost of reducing agricultural output from A4 to A2 is Y3-Y1. In this case we have assumed that producers as a whole have no market power in the market for A, meaning that changes in the level of A do not influence

output prices. While there may be some potential to shift some way down the frontier by imposing moral pressure upon farmers and other resource managers, it is not unreasonable to assume that more interventionist government policies are likely to be needed to achieve the socially optimal outcome.

There is a range of policies available to the various state and territory governments and the federal government to motivate this resource shift. In terms of the scenario outlined in Figure 1, governments could motivate the required movement in resources through either of two basic policy directions.

They could offer an income subsidy to farmers who expand their supply of environmental services. If these farmers are fully informed, this subsidy would need to be at least as large as the difference between Y3 and Y1, their loss in private income from producing the socially optimum outcome. This subsidy could be paid as a direct payment for each unit of environmental services provided. Were this policy introduced the iso-income lines would become downward sloping and farmers and other resource managers would see the direct income result that comes from expanding E. The optimal payment structure would increase the price of E until farmers' incomes had risen to Y4.

The alternative policy direction is to tax farmers for not producing the socially optimal level of E. If farmers were confronted by a tax or legal liability of marginally greater than Y3-Y1 for not producing E3, they would chose to produce E3 rather than face the penalty. Extending the legal DofC owed by farmers is equivalent to the tax solution.

Either a tax policy or a subsidy policy could be equally feasible in terms of measurement and enforcement. In a distributional sense, a tax policy adversely impacts on the financial position of farmers while a subsidy arrangement would improve the position of farmers compared to the wider community. However, the economic efficiency implications of the two alternatives are less clear and these are addressed in following section.

An Economic Framework

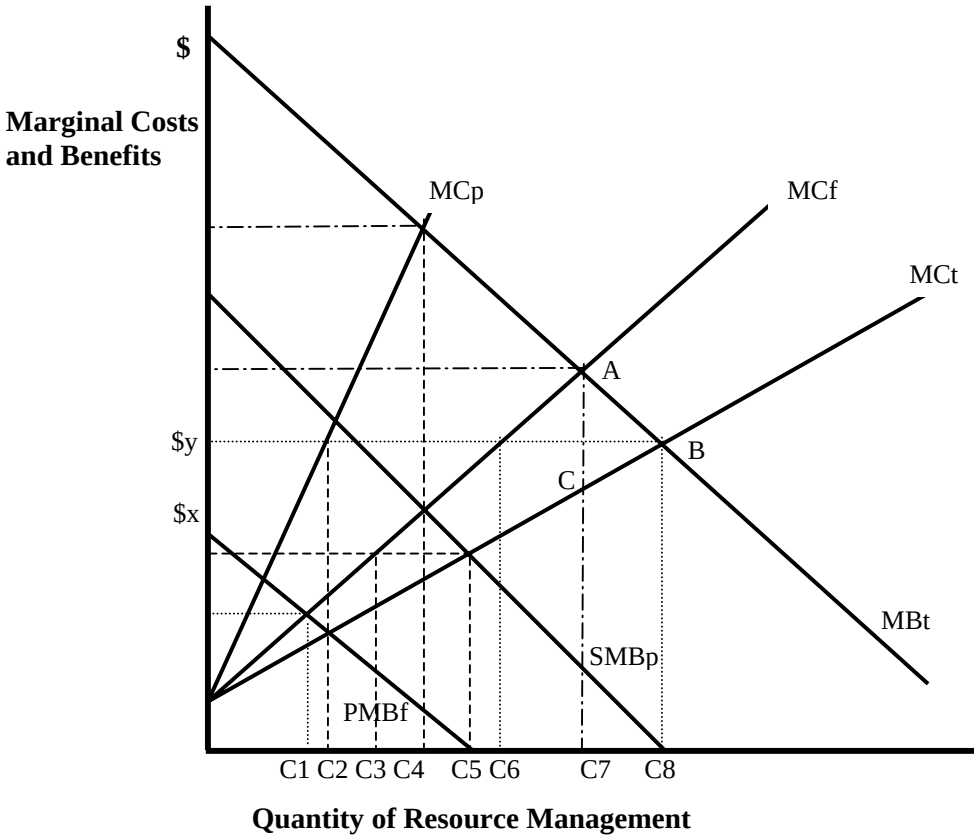
While economics offers little insight into what distributional goal is desirable, it does clarify the environmental implications of establishing entitlements and clear precedents for the courts to follow. In this section we employ a simple model to illustrate how the allocation of liability typically assumed under DofC may yield sub-optimal resource allocations.

We assume that the desired level of resource management can be undertaken at differing costs either on-farm through the actions of individual farmers (or groups of farmers) or off-farm by a government department. Both parties are seeking to minimise the total costs (resource management plus legal damages) of resource management. This is an obvious behavioural assumption for a farmer. It is also an appropriate assumption regarding a government department, as it will also be subject to a limited budget (Spash and Simpson, 1994).

The efficient allocation of resource management effort between farmer and government will depend on the relative marginal costs of each party. Hence, we

may have one or both parties undertaking resource management depending on who can perform the functions at least cost. Importantly, there need not be any direct relationship between who caused the damage and the socially efficient allocation of resource management efforts. The point is developed further in Figure 2.

Figure 2: A Comparison of Private, Legal and Social Conservation Objectives



As with Figure 1, this is a highly stylized view of the general relationships in an agri-environmental system. In this case, the perspective is that of a cost-benefit framework, but again, no attempt has been made to reflect any particular policy case. While the particular shape and relative positions of the curves may well differ both between cases and over time, the principles discussed below are not sensitive to these differences. That is, case specific differences due to diversity in factors such as climate, soil types, agricultural and conservation technology,

community preferences and institutional arrangements may impact on outcomes such the socially optimal conservation goal, but not how those outcomes should be determined.

The vertical axis denotes marginal costs and benefits in dollar terms of resource management while the horizontal axis indicates the extent of resource management activity that is undertaken. Resource management is broadly defined to include all those activities that can reduce and/or minimise resource damage associated with typical agricultural land use activities. For example, resource management on-farm might be tree planting and reduced stocking rates. Off-farm it can take the form of amelioration activities such as silt traps in rivers to deal with soil erosion from farm land or public reserves for endangered flora and fauna to protect biodiversity placed at risk from changes in land use patterns.

The marginal cost curves associated with undertaking these types of activities are MCf and MCp respectively. While we assume that public and private resource management activities are, to some degree at least, substitutable, the difference in marginal cost curves reflected in Figure 2 is consistent with them being less than perfect substitutes. Summing these marginal cost curves horizontally yields the societal least cost marginal cost curve (MCt). It is assumed that these curves are continuous and upward sloping reflecting diminishing returns to resource management activities as reflected in the increasing cost of achieving higher goals. However it is *not* assumed that off-farm activities must be funded by the general public and on-farm activities must be funded by farmers. In fact this paper explicitly considers the implications of alternative funding regimes for MCf and MCp. But it is assumed for the sake of generality that the least cost level of resource management activities will always involve a mix of some on-farm and some off-farm activities. This follows from the construction of Figure 2 with both the MCp and MCf curves starting at the same point on the vertical axis.

The private benefits of resource management to the farm sector are reflected in the marginal benefit curve PMBf. This curve indicates the value to individual farmers of resource management activities they undertake on their own land in the absence of any legal sanctions or obligations. These private benefits indicate the increase in the net present value of the stream of benefits that flow to individual farmers from environmental management activities. We can assume that benefits include higher profits and higher land values stemming from more attractive land. Government conservation initiatives such as Landcare and Bushcare play an important role in making farmers aware of these benefits and facilitating local co-operation to maximise their extent and minimise their cost.

The extent of existing legal obligations towards on-farm resource management is reflected in the social marginal benefits curve SMBp. This curve shows how the farm sectors' expected legal obligations are reduced as they undertake on-farm resource management activities. (The marginal benefit curves are all assumed to be downward sloping reflecting diminishing marginal utility from the consumption of conservation goods and services.) These obligations are reflected both in the case law of torts and legislative law such as the various environmental protection acts in state and federal law and are generally consistent

with the environmental obligations of firms in other sectors of the economy. In broad terms these obligations take the form of a requirement to take reasonable actions to ensure that production activities do not directly damage the person or physical property of other members of society.

The total area under the curve SMBp represents the dollar value of the expected liability of the farm sector, under current legislation, if the farm sector was to undertake no resource management. It reflects the cost of direct damage to other people and their property under common law as well as damage to land and water resources protected under specific statute law. As farmers undertake more resource management their expected liability declines and at any level of resource management the *ex-ante* damages are equal to the area under the SMBp curve in Figure 2 and to the right of the current level of resource management. SMBp is further to the right in Figure 2 than PMBf to capture the notion that the common law interpretation of the law of negligence and the current statute and regulatory controls on farm management impose greater conservation obligations on farmers than the market imperative of profit.

The MBt curve in Figure 2 represents an aggregation of SMBp plus other resource management benefits that flow from resource management activities. These additional benefits include reduced risk to biodiversity, improved scenic values and improved water quality in rivers. They capture environmental benefits that it is argued the current legal regime "fails" to deliver from the farming sector. For example, the benefits to society from the existing controls on the clearing of native vegetation are captured under the SMBp curve in Figure 2. But the benefits to society from legislating that farmers increase tree planting on-farm is outside SMBp but within MBt. While some of the benefits contained within SMBp would take the form of public goods, the area between SMBp and MBt can be assumed to be mainly public goods or at least private goods that are non-rival in nature. Current DofC arguments (for example, Young, Shi and Crosthwaite, 2003) imply that society will impose increasing resource management requirements on farmers regarding land management so that this gap between SMBp and MBt will close.

The model we have developed allows us to draw four conclusions about the issue of legal liability.

No legal liability for farmers

In the absence of both legal obligations on either party and of subsidies from the public sector to farmers for conservation work, the farm sector would undertake C1 units of resource management. That is, farmers would act so as to achieve MCf = PMBf. This level, C1, is likely to be substantially less than the social optimal of C8 where the cost of additional conservation, MCt, is just equal to the marginal social value of that activity, MBt.

How much, if any, resource management the public sector authorities would undertake would depend on their corporate objective functions and the attitudes of governments. Public authorities may equate MCp with MBt and undertake C4 units of resource management. Also, it is possible that public authorities may

strive to fill the gap left by farmers by expanding total resource management efforts to C8. However, the presence of weeds and pests on public lands administered by government agencies demonstrates that it may not be appropriate to assume that government authorities will be able to, or will chose to, undertake a socially optimal level of conservation activities on their own account.

If off-farm conservation activities do not produce on-farm benefits, the issue of bargaining between farmers and public authorities would not be relevant when farmers are focused on on-farm returns.

Existing legal liability for farmers

Faced with a potential set of legal obligations equal to SMBp, (the current legal scenario) the actions of farmers would depend on their ability to bargain with the public providers of conservation activities. This form of bargaining, where farmers pay public authorities to undertake off-farm conservation activities, is not unknown in Australia. For example, until recently Victorian farmers paid annual levies to local catchment authorities to undertake resource management activities within the local catchments. Conceptually, one could imagine this bargaining taking the form of an extension of the existing voluntary research levy system to fund public conservation activities. The ability of farmers to potentially bargain in this form is important from an efficiency perspective because it allows them access to a wider range of conservation approaches (and potentially lower costs) to meet their legal obligations.

However, where farmers are unable to contract with the public authorities to buy off-farm conservation services, farmers would act to effectively equate MCf and SMBp and undertake around C4 units of conservation. This would result in both substantially less than C8 units of conservation (the implicit target of the current legislation) and a potentially significant residual liability for farmers (the area under SMBp between C4 and C8). Farmers would not plan to carry out the whole C8 units because the cost of going beyond C4 is greater than the benefit in terms of reduced potential liability in the courts.

In practice the potential liability would only be enforced if this liability was held to be substantial. The size of this liability would rest on the gap between C8 and C4 and the height of SMBp beyond C4.

In a Coasian world (Coase, 1960) with low transaction costs, when farmers are able to enter into cost effective side deals with the public sector to undertake off-farm resource management activities, the farm marginal cost curve effectively falls from MCf to MCt. That is, farmers are able to source preventative and remedial actions from their own activities or pay public authorities to undertake actions on the behalf of the farmer. An example of this could be farmers paying water authorities to filter water rather than ceasing all cultivation near streams that results in sedimentation.

Under these conditions, making farmers liable for all of SMBp would induce C5 units of resource management with the optimal mix of on-farm and off-farm initiatives. Farmers would expand the total level of resource management

activities from C4 to C5 with C3 units undertaken on-farm and they would have the remainder (C5 – C3) undertaken off-farm. Producing C5, under this scenario, means MCp = MCf = MCt = SMBp which implies that the C5 units of conservation are undertaken in a least cost fashion. That is, MCp, MCf, MCt and SMBp are all equal to $x per unit of resource management and it is impossible to identify another combination of on-farm and off-farm activities that would produce the target of C5 at a lower total cost.

Existing liability but imposed upon public authorities

If the farmers were not held legally liable for any off-farm implications of their actions, a Coasian world with low transaction costs would produce the same outcome of C5 as long as the other party, the public authorities, effectively had the obligation of SMBp imposed upon them. The public authorities, seeking a cost effective outcome, would then pay farmers to undertake C3 units of the target C5 units of resource management on-farm.

If the public authorities could not contract with farmers, the public authorities would equate MCp with SMBp and undertake just over C2 units of conservation with a potentially substantial shortfall relative to the legislative target of C8. This is a reflection of the assumption that the off-farm conservation cost curve rises more steeply than the on-farm curve.

Expanded duty of care for farmers

The socially optimal level of conservation in the case portrayed in Figure 2 is C8 units. At this level of conservation the cost of achieving another unit of conservation (MCt) is just equal to the value of the reduced damage that comes from conservation activities (MBt). In terms of the situation described by Figure 2, C8 units of resource management will only be truly efficient if the necessary activities are divided between farmers and government such that C6 units of conservation are undertaken on-farm and the remainder (C8 – C6) units are undertaken off-farm (note that units on the conservation axis need not be equal — that is, C2 – C1 is not equal to C3 – C2). Any other mix of conservation delivery, either more or less on-farm activity, will entail a higher total cost of achieving the socially optimal level of conservation.

In a world where bargaining and side contracts are not possible, making farmers liable for MBt, or an enhanced DofC, would result in farmers expanding their conservation activities out to C7. The socially optimal level of C8 would not be achieved unless the public authorities came in and provided the difference between C7 and C8. If the authorities did make up the difference (C8 – C7), the target of C8 would be achieved but the cost would be higher than if the farmer's share had been only C6.

If bargaining is possible between farmers and the public authorities, farmers confronted by the enhanced DofC and an effective marginal conservation cost curve of MCt (achieved through the gains from contracting out) would equate MCt with MBt and produce the target level of C8 with the socially optimal mix of

C6 from on-farm activities and the remainder from off-farm actions. Importantly, the same result could have been achieved with costless bargaining if a liability rule was adopted such that there is no obligation on farmers to conserve at all, but conservation must be provided by government. There is also the possibility of some intermediate solution — mixed provision by farmers and government.

So extending the resource management target from C5 to C8 would improve efficiency but in a world with low transaction costs the issue of legal liability is irrelevant to both the case for extending the target and the mix of resource management activities between on-farm and off-farm. In the situation where bargaining is difficult, making farmers liable for all conservation would result in an under provision of conservation when compared with the target, and higher costs for those conservation activities that are carried out.

In essence this shows that to hold that one should improve the quality of rivers or air says nothing about who caused the damage and who should pay. Figure 2 shows that the efficient allocation of resource management activities between farm and government department depends entirely on relative conservation costs. This allocation does not change or depend in any way on who caused the damage. Moreover, it says nothing about who should pay.

Policy Implications and Conclusions

The models developed above are useful in understanding the conceptual basis behind the extension of the existing DofC as well as providing us with an explanation for many of the arguments against it. For example, the model developed in the preceding section illustrates that even if one assumes that the entire gap between the current level of degradation in farming regions and the socially optimal level was due solely to environmental damage associated with farming activities, there is no strong efficiency case for saying that farmers should be held liable for all conservation activities necessary to achieve the social optimum.

The divergence between the current legal and social optima coupled with notions of distributive justice or polluter pays are probably important in motivating the current interest in extending the DofC of farmers. The appropriate policy response to this divergence between private and social returns from resource management activities depends in part on the feasibility of farmers and public authorities entering into cost minimising side deals to shift conservation obligations between the two groups.

In a world where bargaining and contracting between farmers and public authorities is difficult, making farmers liable for an enhanced DofC runs the risk of ensuring that the socially optimal level of conservation is not achieved and that conservation costs will be higher than is necessary. On the other hand, in a Coasian world, making farmers fully liable would produce a socially optimal outcome. However, the same optimal outcome would be produced if farmers faced a zero liability and the onus for funding both on-farm and off-farm activities

rested entirely with the tax payer. In this context, any decision to make farmers liable for more conservation activities must rest on non-efficiency objectives.

The pursuit of non-efficiency objectives in tandem with efficiency goals through the use of one policy instrument is fraught with dangers and is inconsistent with the Tinbergen Principle. In Australia, there is an elaborate and explicit taxation and welfare payment system for directly dealing with equity or distributional issues. It is questionable that manipulation of individual resource management initiatives to achieve distributional goals can really improve on the distributional outcomes achieved by an efficient resource market and an economy-wide redistribution system. Moreover, if there are problems in the taxation or welfare payments system it would probably be more appropriate to address them directly rather than in an *ad hoc* policy by policy basis (Freebairn, 2003).

One of the dangers in trying to use environmental policy to achieve distributional goals is that the policy process may become dominated by rent-seeking activities (Anderson, 2004). The allocation of property rights between farmers and other potentially competing users of natural resources has the potential to have significant wealth effects. The discussion of applying Polluter Pays or Beneficiary Pays may well be more about bidding for rents rather than either efficient resource use or distributional equity. In this context, the use of established precedents on liability has the advantage of predictability and as a consequence, could be expected to be consistent with reduced disputes over resource use.

The model developed in the preceding section also illustrates that, in the presence of high transaction costs, it is potentially important to base relative liabilities on comparative conservation costs rather than notions such as 'distributive justice or 'polluter pays'. At the extreme, adopting a policy of making one party liable for all costs (even if they are the polluter) has been shown to have the potential to produce both a sub-optimal level of conservation and excessive conservation costs. Moreover, attempting to enforce regulations that farmers perceive to be onerous may impose substantial regulatory costs upon the system. It is difficult to police on-farm conservation obligations because critical areas are often difficult to access as farms can be large and remote. Furthermore, conformance to regulations is often problematic due to the highly variable climatic conditions that can characterise the farming environment. Consequently, it can be difficult to draw a link between *ex ante* resource management activities and *ex post* environmental outcomes.

In a world where transaction costs are high (making it difficult to negotiate or enforce side deals between farmers and the rest of the community) and farmers have no way of avoiding their obligations, there is a unique social optimum with respect to legal obligations for farmers. In our models this is equal to C6 units of resource management. Any other level of obligation, either greater or smaller, would be suboptimal in terms of either the cost of achieving the target or the extent of the conservation undertaken.

While the Australian agricultural sector is not without significant transaction costs, there clearly exist some opportunities for farmers and the rest of society to

negotiate and alter the mix of resource management effort. The extent of these opportunities is changing over time and depends in part on the policies and regulations that are put in place. In Australia, an example of a new initiative which offers the potential to realise some of the gains from taking advantage of differences in conservation costs between farmers and public agencies is the Bush Tender scheme (Stoneham *et al.*, 2003). Apart from demonstrating how to gain from differences in conservation costs, this scheme illustrates that in the Australian legal and political systems there is no binding nexus between the socially efficient distribution of conservation activities and the socially efficient distribution of the legal obligation to undertake resource management.

The Bush Tender scheme involves the public sector entering into contracts with individuals to fund private on-farm conservation. Conservation funding also runs from the farm sector to the public sector with farmers funding conservation activities by the public sector through the tax system. In addition, there have been examples where farmers have paid conservation levies to regional catchment management authorities to fund public off-farm conservation activities.

In the final analysis, it is clear that if society does demand a higher level of expenditure on natural resource management issues in farming regions, the money will have to come from either farmers or the wider community. The purpose of this paper has been to show that there is no strong efficiency case for arguing that farmers should be the ones that pay. It is for this reason that it is equally valid for the Productivity Commission (2003:xxii), in a wide-ranging review of native vegetation and biodiversity regulations, to conclude that 'the community should pay for the provision of environmental services, such as biodiversity conservation, that it demands'.

Similar judgements have been made in the EU and the US with regard to agri-environmental policy (Fraser and Hone, 2002). Indeed, recent policy changes in the EU as part of the 2003 Luxemburg Agreement indicate that farmers will receive financial payments for complying with land management requirements very similar to those of an Australian DofC.

From an efficiency perspective the key questions are what conservation needs to take place and who should carry it out. The question of who should pay is entirely different. The decision on the later question will likely rest largely on notions of political acceptability.

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