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Social and Economic Influences on Restructuring Rural Landscapes for Biodiversity Conservation: Remnant Vegetation in the West Australian Wheatbelt as a Case Study

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Abstract

In Australia, biodiversity loss is a national concern, especially in agricultural landscapes such as the West Australian wheatbelt. Landscape restructuring offers a means of ameliorating such losses. If restructuring is to occur, the associated actions must match the 'triple bottom line', they must be economically gainful, socially adoptable and ecologically possible. This paper addresses one component of this bottom line, social influences. To further focus this discussion, remnant vegetation conservation, one important element of managing for biodiversity, is explored on private lands in the WA wheatbelt.

The social influences on the landscapes of the WA wheatbelt are cultural, political and economic. History and attitudes can be considered key elements of culture. Historically, the WA wheatbelt has experienced a number of 'waves' of clearing of remnant vegetation, generally directed toward improving the nation's agricultural production as well as populating rural areas. In terms of attitudes, the majority of landholders in the wheatbelt talk positively about nature conservation. Unfortunately, however, results from research in Australia and elsewhere indicates that the links between attitudes and behaviour are tenuous. In Australian agricultural areas behaviour is better predicted and influenced by landholders' perceptions of environmental problems, the financial constraints they face, and the farming subculture to which they belong. Politically in Australia, the character of rural landscapes is predominantly influenced by state governments. In terms of economic influences, if a change is not economically viable, rural landholders will not make it.

In Australia as elsewhere, governments seek to restructure rural landscapes through applying policy instruments. These are tools, generally used by government, to change how people behave. Instruments available to conserve remnant vegetation on private lands include motivational ones (eg, education, partnerships), financial (eg, subsidies), market-based (eg, tradeable rights), self-regulatory (eg, codes of practice) and regulatory (eg, regulations). Most are voluntary with current trends favouring such approaches. In particular, policy makers are interested in market-based and self-regulatory instruments, as both are perceived as righting current market failures.

A question vexing policy makers and others is selecting the 'best' policy instrument(s) to achieve biodiversity conservation. Principles can be derived to help answer this question. Of central importance is selecting more than one instrument and making sure the instrument mix is complementary. Clearly identifying the property rights associated with remnant vegetation on private lands, and therefore who pays for and receives the associated costs and benefits, is also important. Crucial too is matching the policy instrument with the appropriate institution, whether it is Commonwealth, state or local government, industry, a community group or individual. And last, because regions and their landscapes have different legal, social and environmental features, different landscapes will require different policy mixes.

Introduction

Rural landscapes are being restructured for a range of reasons. In Australia, landholders are being encouraged to retain native vegetation or replant it to improve water and soil quality and biodiversity. In the European Union, field afforestation is being used to control agricultural over-production (Selby and Petajisto 1995). Broader cultural and economic reasons also influence landscape restructuring. Changes in land tenure through shifts from communist to capitalise regimes have dramatically changed landscapes in the eastern bloc. For example, the Czech Republic has recently experienced, through the 'velvet revolution', increased concentration and intensification of land use resulting in a decline in landscape heterogeneity and biodiversity loss (Cudlinova et al. 1999).

Restructuring is obviously an immense topic. To make the subject manageable, I have assumed a focus on restructuring rural landscapes to achieve sustainability. Sustainable land management can only be achieved if activities are economically gainful, culturally (socially) adoptable and ecologically possible (Fig. 1, Firey 1960). If restructuring is to succeed it must meet these three criteria, also referred to as the "triple bottom line" (Elkington 1997). Recent policy initiatives in sustainable regional development (Dore et al. 2000) similarly base such development on integrating environmental, economic and community concerns. A great deal is now known about what is required to change the ecological structure and function of rural landscapes, and although much remains unknown a wealth of research continues. Less well understood are the economic factors influencing landscape change, although again research continues to focus on this area. Least well understood are the social factors and as such these are the predominant focus of this paper.

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To help further narrow the focus of this paper, I have assumed a central goal of landscape restructuring as improving biodiversity. Such a focus fits with the Australia State of the Environment Report (State of the Environment Advisory Council 1996) reporting biodiversity loss as a key area where the natural environment is under pressure. One of the landscapes where biodiversity loss has been greatest in Australia is in dryland agricultural areas. Broad-scale clearing has resulted in less than 20% native vegetation remaining. An estimated 80% of the remaining vegetated area in Western Australia is susceptible to salinity and likely to be lost without remedial action (Government of Western Australia 1998). One obvious way of improving biodiversity in these landscapes is through protecting remaining native vegetation and planting native species on private lands. As such, the following discussion centres on social influences on remnant vegetation protection on privately owned lands in the dryland agricultural areas of Australia and specifically, the WA wheatbelt.

Cultural Influences

Landscapes and their elements, such as remnant vegetation, are culturally as well as biologically and physically determined. Culture can be defined as the web of history, attitudes and values within which a society rests (Hall 1990).

Australia has been subject to human settlement for at least 40,000 -60,000 years (Dingle 1988, in Thackway and Brunkhorst 1998). Europeans have occupied the country for the

last 200 years. As such, the Australian landscape has been subject to extended periods of major, human-induced change (Flannery 1994). First, Aboriginal people strategically used fire to create browse and flush game. Then, successive waves of European settlers cleared land for agriculture, used rangelands for grazing domestic stock and removed timber for construction and more recently paper production purposes. Mining and urban development have also resulted in modification of smaller areas of the natural landscape. The middle part of the 20th century was characterised by government encouragement to clear native vegetation from large tracts of agricultural land, while the latter part of this century has seen increasing advocacy of native vegetation retention by some but not all sectors of Australian society. Thus, Australia has a history of successive waves of change to rural landscapes, the most recent being moves towards protecting remnant vegetation.

Attitudes, a 'learned disposition to respond in a consistent...manner with respect to a given object' (Fishbein and Ajzen, 1975, 6), are often considered as a key component of culture. Ideally described, environmental stimuli are mediated by attitudes and behaviours result. According to this ideal, farmers with the right attitude (ie, conservation oriented) will act to address land degradation, while those with the 'wrong' attitudes (ie, non-conservation oriented) will not act to ameliorate land degradation (Vanclay and Lawrence 1995). Unfortunately in environmental matters at least, attitudes generally do not predict behaviour. A study of Darling Downs farmers by Vanclay (1992) showed that although farmers had positive attitudes to the environment and soil conservation, these attitudes did not translate into soil conservation actions or the amelioration of land degradation.

Of more importance and influence than attitudes, is how landholders perceive the problems they potentially face in managing their lands. In a study of Darling Downs farmers, their actions (or inaction) were more influenced by their perceptions of land degradation, and their personal and financial situation, than their attitudes (Fig. 2). Landholders consistently understate and misperceive the extent to which their lands are affected by land degradation. Often they recognise land degradation as a community problem but not as one affecting them personally (Vanclay and Lawrence 1995). In relation to salinity, Pannell (2001) offers an alternative perspective, noting that lack of awareness of salinity is probably not a factor in explaining the slow adoption of recommended practices.

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Interviews with farmers in southern Western Australia in 1986 and then 10 years later in 1996 about native vegetation on farms provide some interesting insights into attitudes, behaviour and perceptions of environmental degradation. Jenkins (1998) found no change, between the two surveys, in the high levels of awareness of the ecological and land conservation values of bush on farms. So, there was no change in attitudes. However, there was a change in on-farm actions. In 1986, 64% of farmers had planted trees and shrubs and by 1996, 84% of farmers had done so. Many fewer (41% in 1996 compared to 71% in 1986) used their bushland for grazing stock. Farmers attributed this change in behaviour to their greater knowledge of the problems of land degradation.

Other cultural elements likely to affect the actions of landholders in relation to landscape restructuring are financial considerations, the behaviours of other landholders, an individual's sense of identity, and their perceptions of risk, uncertainty

and complexity. Farming is a business as well as a life style. Landholders are most likely to change their land management practices if there are clear economic benefits, preferably in the short rather than longer term. The more expensive changes are in terms of capital outlay and labour, the less likely they are to occur (Vanclay and Lawrence 1995).

Landholders are likely to be more influenced by the behaviour of others, either their neighbours or others in the groups with which they are associated, than by their own attitudes (Vanclay and Lawrence 1995). Farming subcultures depend on the region, climate, product type and history. Each subculture defines 'acceptable' agricultural practices. Those with views and behaviours different to the mainstream tend to be ostracised. Farming subcultures in Australia are characterised by individualism – individual farmers have the right to do what they like with their farms.

As well, landholders are also influenced by their personal sense of identity, who and what they are (Moore 1997). A key element of this identity for many is having productive farmlands contributing to the economic wellbeing of their family and their community. Such an identity may be expressed as pride in stock or grain produced or in the neatness of a farm. More recently, part of this identity has been linked to successfully planting and growing trees and shrubs to arrest land degradation.

Restructuring rural landscapes requires change. As such, it is crucial to understand the risks for landholders associated with change and the intellectual energy required to master them. There will be financial risks if major capital outlays are required. Environmental risks will exist where there is uncertainty regarding the benefits of an action, such as digging deep drains to prevent waterlogging. For some, the intellectual task of mastering new technology and information may not be regarded as worth the effort and may not be possible. Many farmers do not have a formal education and being in their 50s and 60s, may not be motivated or have the money to undertake the further studies needed to deal with new approaches (Vanclay and Lawrence 1995).

The nature of proposed changes is the final important cultural consideration. If the likely changes are complex, indivisible and inflexible, then implementation is unlikely. Complexity makes the required changes hard to understand and to implement. The responses required today to land degradation concerns such as salinity are complex. The explanation behind problems may also be complex, as is the case with salinity and as such farmers may not believe or understand there is a problem. Greater management skills are also needed to deal with these complex problems. Salinity management, for example, may require whole-farm planning, strategic planting of perennials and drainage works, and major changes in cropping regimes and practices. Landscape restructuring is a problem requiring a holistic, 'indivisible' approach. As such, partial change may be insufficient. Adoption of changes is regarded as more likely if partial uptake, regarded as a trial, occurs and can then be followed by complete adoption (Vanclay and Lawrence 1995).

Political Influences

The Australian political landscape greatly influences land management practices and possibilities. This federalist landscape is comprised of six states and two territories, each with their own government, drawn together by a single Commonwealth government. A number of powers are specified in the Australian Constitution as resting with the

Commonwealth, however, land management, agriculture, mining and regional development appear to be state responsibilities (Saunders, 1996). Thus, environmental policy making and implementation is generally a state responsibility. The Commonwealth seeks to influence the states through financial incentives such as tax concessions and grants. The most recent example is the Commonwealth's \$1.5 billion Natural Heritage Trust to develop sustainable agriculture and natural resource management, as well as protect biodiversity (Commonwealth of Australia 1997). Because of the ability of the Commonwealth to guide the states through financial control, Australia's system of governance has often been described as coercive rather than cooperative federalism (Rydon 1989).

One other feature of Australia's system of governance warranting mention is the existence of a third tier of government - local government (about 780 across Australia in 1996). Their core functions in relation to the natural environment are fourfold: responsibility for developing and implementing detailed land use plans and associated zones; approving developments; managing significant areas of Crown land; and managing environmental risks such as fires and floods (Binning et al. 1999). Thus, there are three tiers of government providing potential sources of public policy for landscape restructuring.

Although the state government has primary responsibility for the environment in the WA wheatbelt they are dependent on the actions of numerous private landholders. This is because most of these lands are privately owned. As mentioned earlier, Australian landholders are characterised by strong beliefs in their right to decide how their lands are managed. Thus broadscale restructuring will require support and actions by large numbers of these private landholders.

Economic Influences

Unless a change is economically viable it is unlikely to occur (Pannell 2001). The need for economic viability underpins the concept of the triple bottom line (Fig. 1), along with changes being socially acceptable and biologically possible. For private landholders, this means that changes to how their lands are managed need to make them no worse off financially. Therefore, protecting existing or planting more remnant vegetation will only be undertaken if it makes the landholder no worse off.

A limited amount of work has been done on the economic value of remnant vegetation. The Native Vegetation Working Group (2000) briefly reported on three broad options for using bush for financial benefit: using it for seed collecting, wildflowers or ecotourism; selling it and using the money to invest elsewhere; and clearing and developing the land for agriculture or other income-earning activities. The profitability of using bush is highly variable, with values varying widely from a minimal figure to over \$1,500 per hectare (ACIL Economics 1993 in Native Vegetation Working Group 2000). The benefit of selling the land and investing elsewhere depends on the market for bush blocks and the rates of return from alternative forms of investment. The profitability of clearing is similarly unclear, depending on clearing and production costs, the profitability of the new land use and the level of debt incurred to make clearing possible. Not included in any of these evaluations are the longer-term benefits of remnant vegetation such as the provision of ecosystem services such as soil protection and water quality contributions, aesthetic values and contributions to the general

wellbeing of the landholder and their community (Native Vegetation Working Group 2000).

Globalisation is an indirect but nevertheless important economic consideration in landscape restructuring. Transnational firms, a dominant feature of globalisation, are now in a position to stipulate where and how the raw materials they require will be produced. Contract farming, a related change, is also transferring responsibility for a number of production and environmental management decisions from farmers to corporations. Farmers are increasingly having to conform to using the required inputs, such as specified pesticides/herbicides applied at specified times, to produce the desired outputs. Corporations can maintain control over farmers by threatening not to accept their crops, leaving them with no market. And, corporate concerns about profits may result in less investment in conservation activities than farmers on their own might have done. As such, there may be little flexibility to change forms of production (Vanclay and Lawrence 1995).

Policy Instruments for Remnant Vegetation Conservation

The above social influences – culture, politics and economics – generally influence landscapes and hence their restructuring. How such restructuring is initiated and achieved is through policy instruments. These are tools, such as regulations and financial incentives, generally used by governments, to change how people behave. They often appear in policy documents, such as Australia's National Biodiversity Strategy (Griffin nrm P/L 1993) and Western Australia's Salinity Strategy (State Salinity Council 2000). Generally, a policy document is specific to a single tier of government. Policy instruments may also appear as amendments to or new pieces of legislation, as part of a political party's policy statements, or as part of governmental administrative procedures. Policy instruments are not the sole domain of governments. Industry codes of conduct and product accreditation, initiated by producer and industry groups, provide a means for private individuals and groups to guide their own change. Other non-government organisations such as the Australian Conservation Foundation rely on policy instruments such as education and partnerships in their efforts to facilitate change.

Categories of Policy Instruments

Policy instruments that could be evoked to conserve remnant vegetation in the WA wheatbelt can be categorised in many different ways (Bridgman and Davis 1998). Here they are grouped according to where activity is focused. For example, market-based mechanisms where implementation relies on the market place are separated from financially based instruments relying on government payments or financial adjustments. They are also separated depending on whether they rely on voluntary adoption by the landholder or if coercion is intended. In Table 1, the first four of the five categories rely on voluntary adoption by the landholder, while only regulatory instruments have elements of coercion. Current political and social preferences are for voluntary instruments.

Table 1. Policy instruments available to manage remnant vegetation as part of landscape restructuring

<p>1. Motivational Instruments</p> <ul style="list-style-type: none"> - information and education - management agreements (also linked to <i>Financial Instruments</i>) - partnerships - awards and prizes - farm planning
<p>2. Financial Instruments</p> <ul style="list-style-type: none"> - grants and payments - subsidies - taxes and rates - environmental levies - charges and fees
<p>3. Market-Based Instruments</p> <ul style="list-style-type: none"> - land purchases, revolving funds and land trading - tradeable permits and rights
<p>4. Self-Regulatory Instruments</p> <ul style="list-style-type: none"> - codes of practice/best management practice - accreditation and environmental management systems (EMS)
<p>5. Regulatory Instruments</p> <ul style="list-style-type: none"> - legislation and regulation - land use planning - direct provision

1. Motivational Instruments

Motivational instruments rely on individuals or companies being motivated to change their behaviour in desired ways. The most common motivational instruments are education and information, partnerships, awards and prizes, and management agreements. Young and Gunningham (1997) argued that motivational instruments are central to biodiversity management. They suggested that if people are positively motivated they are more likely to respond constructively to a range of instruments, including regulation.

Education and Information

Landholders in the WA wheatbelt seeking information on remnant vegetation management rely on a diversity of information sources, with the most popular being state government departments, community landcare coordinators and field days. Also

important are newspapers, community organisations such as Greening Australia, newsletters and television (Moore and Renton, in prep.). These authors noted that less than 10% of those surveyed relied on local government, the internet and radio. On the other hand, information provided by other farmers was important to over half of those surveyed.

Australia-wide, landholders continue to identify the lack of information in accessible, practical and implementable forms, as one of the stumbling blocks to remnant vegetation management (Williams 2000, Moore and Renton, in prep.). There are several reasons why the huge amount of information currently available is not necessarily useful (Morton 1999, Moore and Renton, in prep.). Much of the advice is very general while landholders want advice specific to their landscape and farm-level issues. Another concern is the lack of financial details accompanying the numerous technical options. And, the human, personal support, that is extension services, is often not available to interpret, modify and support the available technical information.

Williams (2000) in reviewing recent LWRRDC projects addressing information provision noted that the most effective form of communication is getting out and talking to people. Landholders also prefer to gain information this way (Moore and Renton, in prep.). Interestingly, Williams (2000) noted that while printed / electronic information is an essential component of any extension program, it must be promoted and interpreted for landholders and made relevant to their situation.

How effective is providing information and education in the absence of regulation? Williams (2000) drawing on the work of Kirkpatrick in Tasmania, noted that in 80% of cases, incentives, education and extension in the absence of regulation were ineffective in conserving native vegetation. Long-term conservation of vegetation remnants seems to require legal measures to prevent clearing or degradation.

Management Agreements

Management agreements are a contract between a landholder and a third party regarding the use and management of their land. They are usually voluntary and provide a flexible policy instrument that can be tailored to meet the need of individuals and the values being managed. A range of levels of commitment from landholders is possible, from non-binding through to binding. They are often used in combination with other instruments, for example, financial incentives may be added to encourage landholders to enter agreements. Management agreements continue to be a favoured policy instrument by government and conservation groups.

Binning and Young (1997) identified three types of agreement involving varying commitments from landholders: non-binding, fixed-term and in-perpetuity. Non-binding agreements depend on the voluntary participation of landholders. The objectives are to establish networks of like-minded landholders and provide management advice. Such agreements formally recognise landholder's conservation efforts without binding them or precluding future land uses. Land for Wildlife in Victoria and Western Australia are examples of this approach.

Fixed-term agreements do not bind the landholder in perpetuity so a small incentive may secure their participation. The best example from Australia is the WA Remnant Vegetation Protection Scheme, providing assistance to landholders to fence remnant

vegetation. Funding is tied to a 30-year contract deed for the protection and management of the vegetation. Binning and Young (1997) reported that as of 1997 over 1,094 projects had been funded with more than 38,000 hectares fenced at a cost of \$2.25 million. Assistance has ranged from 50-100% of material costs with the labour provided by the landholder.

Binning and Young (1997) regarded agreements such as those reached under the WA RVPS as 'transition agreements'. They see these agreements as securing a permanent change in property rights through a one-off incentive payment. They are also suggesting that managing the fenced area for nature conservation then becomes part of the landholder's duty of care and hence further costs become the landholder's responsibility.

In-perpetuity agreements involve placing a covenant on the title of the land, with the entitlements and obligations contained in the management agreement binding on the current and future landholders. Such agreements help re-define the duty of care and secure future conservation outcomes, however, their binding nature can discourage landholders from signing up. Programs actively encouraging perpetual covenants are in place in NSW, Victoria, South Australia and Western Australia. Such arrangements may be negotiated with an independent body such as the Trust for Nature in Victoria or with a government department such as the Parks Service in NSW.

In North America, 'easements' on private lands are acquired either by public agencies such as the US Fish and Wildlife Service or private conservation organisations, to protect fish and wildlife habitats. Such easements are generally perpetual and payment levels depend on the extent of rights acquired from the landholder (Johnson et al. 1994). Efforts are then made to restore many of these areas to more 'natural' states.

These different types of agreement can be seen as complementary. Non-binding agreements can function as a starting point for landholders. Over time they may become more comfortable with the concept of a binding agreement. For example, of the 3,500 registered properties in Land for Wildlife in Victoria (based on non-binding agreements), a significant number of landholders have gone onto perpetuity agreements with the Victorian Trust for Nature with its 230 covenants in place (Platt and Ahern 1996, in Binning and Young 1997). Binding agreements are usually tied to some form of financial assistance for the landholder.

There is a suite of possible payment mechanisms (Binning and Young 1997). Compensation may be paid for the loss of rights to alternative land uses, such as clearing for cropping. This is payment for the acquisition of property rights. Upfront payments for management can be made as an inducement to sign up. The payment can be based on an assessment of management required or a payment for the area of land covered by the agreement. Competitive bidding is a novel potential approach with landholders bidding for the price and accompanying management actions at which they would be willing to enter an agreement. Another alternative is paying the costs of management incrementally as they occur. This could have high administrative costs. Payment could also be based on performance, measured against clear management objectives. Trusts and discretionary funds could possibly provide recurrent payments. Non-financial payments could also be helpful. An example is extension services provided free-of-charge by the contracting organisation.

Bowers (1999) writing about management agreements for nature conservation in the United Kingdom, identified payments as based on the management objectives of the agreement. He classified agreements as critical site (objective: maintenance of scientific interest), standard payment (maintenance of landscape), enhancement (enhancement of environment) or rehabilitation (re-creation of habitat) agreements. All are voluntary and fixed term. For critical site and rehabilitation agreements, the payments are specific to the particular site. For the other two, standard payments are based on certain restrictions to landholder operations while a standard set of management practices and payments exists for enhancement agreements.

Crabtree and Chalmers (1994) noted that standard payments are an efficient management agreement because, with their fixed rates, they do not need to be negotiated with individual landholders. They are most effective when used for habitat and landscape enhancement rather than restricting landholder's activities. Most apply to grassland and restricting fertiliser application, stocking rates and grazing periods (Bowers 1999). If landholders can be placed into broad categories, such as those with similar quality lands or vegetation types or management requirements then an equitable level of payment can be determined for members of homogeneous groups. Such grouping of landholders should reduce administrative costs and improve equity between participants. They are being increasingly used in the UK and EU (Crabtree and Chalmers 1994). These authors suggested that effectiveness could be enhanced by complementary use of other instruments such as regulation.

The strength of management agreements, over other instruments, lies in their focus on management arrangements for an individual site (Binning and Young 1997). They establish new entitlements and responsibilities for an area of land, individually tailored for a site and its owner. However, because they are site-specific they are more expensive to set up and administer and thus are best targeted to areas of high priority.

Partnerships

Partnerships seem to have been the catchword of the last half of the 1990s. There is no doubt that the ownership and commitment engendered by partnerships between landholders, government and in some instances industry can lead to significant improvements in remnant vegetation management on the ground. An example of a successful partnership of this nature is the Gabby Quoi Quoi catchment in Western Australia, a partnership between the local catchment group and its landholders, the WA government and Alcoa Australia. The on-ground outcomes of this collaboration include managing 839 ha of land with 312,600 trees planted, 25 km of surface drainage, protecting 133 ha of remnant vegetation and treating 490 ha of saltland (Landcare Vision 1996). More recently Greening Australia WA, a non-government conservation organisation, has joined this partnership through the Living Landscapes project.

Awards and Prizes

Competitions, awards and prizes are another way of motivating and rewarding changes in practice. The annual, national landcare awards are an example of rewarding best practice.

Farm planning

Managing remnant vegetation on private lands requires its consideration and inclusion in whole farm planning and management (Williams 2000). Instruments already exist at both Commonwealth and state levels to help farmers manage their farms as viable businesses. For example, the Better Business Program in Western Australia (this state's version of the Commonwealth's Property Management Planning Program) aims to help landholders and their families set goals for their farming enterprise and future. Rather than focusing on traditional farm business approaches, the Native Vegetation Working Group (2000) suggested re-focusing this program on sustainability planning, including providing advice on bushland protection and management.

2. Financial Instruments

Binning and Young (1997) commented that financial incentives are the most powerful and direct means of encouraging more people to participate in nature conservation programs. Australia has only modest funds available for incentive payments. However, this is not necessarily an impediment, given that payments have a strong symbolic as well as practical element. Even offering a small incentive may be highly regarded by a landholder who sees it as due recognition for the conservation service they are providing the public. Such incentive instruments fall into one of three categories: (1) those that give money to landholders (ie, through grants and subsidies); (2) those that enable landholders to keep money that otherwise would have been taken away (ie, changes to rates and taxes); (3) and those that take money away either from landholders who are doing the wrong thing (ie, through fees and charges) or from everyone to support remnant vegetation management (ie, through an environmental levy).

Grants and Subsidies

Both terms refer to financial assistance provided to groups or individuals, usually by governments. Both are very flexible instruments and can either be tied to an outcome such as x kilometres of fencing or be untied. The source of grants can be equally as varied, from Commonwealth, through State to local government (Cripps et al. 1999). Recent UK and EU environmental policy has tended to rely on voluntary incentive schemes rather than regulation. The two instruments regarded as most important in these regions are standard payments and capital grants (Crabtree and Chalmers 1994). The first is a voluntary arrangement where payments are used to induce constraints on farm activities to achieve nature conservation objectives. It has been the main method used to support forest planting. Fixed rates of payment are offered for prescribed activities. Capital grants are subsidies on environmentally beneficial capital investment with the grant given as a proportion of cost. They are input subsidies restricted to capital works and based on notions of cost-sharing.

Another incentive payment falling under the umbrella of grants and subsidies is stewardship payments. The National Natural Resource Management Task Force (1999) suggested such payments (which are essentially the same as the standard payments discussed above) could facilitate fundamental land use change by providing an income for conservation activities. Payments could be a lump sum or an annuity. Payment could be for retaining and managing an area of remnant vegetation, for example to abate dryland salinity. The payments would be linked to managing for ecosystem values

benefiting the public interest. Payments would not be for works perceived to be part of a landholder's duty of care for sustainable land management.

Where regional action is required but it is not critical where it occurs, auctions or a tendering process could be used to determine which landholder(s) get to do the work. For example, landholders could bid for rehabilitation grants. Such an approach aims to achieve least-cost delivery (National Natural Resource Management Task Force, 1999).

Many of the possible ways of subsidising landholders in undertaking management of remnant vegetation are detailed above under *Management Agreements* as the incentives helping landholders enter agreements. One of the most commonly mentioned subsidies is for fencing remnant vegetation, with such subsidies being contingent on landholders entering a management agreement (Elix and Lambert 1998).

Taxes and Rates

Conservation is among the most highly taxed land uses in Australia...land that is managed for business purposes and monetary donations to charities receives more favourable taxation treatment than land that is owned and managed for the protection of high conservation value native vegetation in the public interest (Binning and Young 1999a).

Revision of the existing land tax and rating structures provides practical possibilities for improving the conservation of native vegetation. Land tax is the annual charge on the unimproved value of land levied by state government. It is generally only levied on land held as an investment, with rural land and land occupied as principal place of residence exempt. Land tax can be simply viewed as a tax on 'wealth'. Rates are the main way local councils raise revenue, approximately 50% of their revenues coming from this source. They have two components: service charges and general rates, with money from the latter directed to providing and managing community infrastructure and services. General rates are based on the land value, so are also a tax on wealth (Binning and Young 1999b).

Given that both forms of revenue collection are based on land value it seems that how land is valued is of crucial importance. Many states use unimproved or site value which would give a similar value and therefore rate for both a largely cleared and largely uncleared farm even though the latter may have a much smaller relative area generating income. Binning and Young (1999b) suggest using an improved value so 'unimproved land' such as that covered in native vegetation is not included in the valuation.

Another way of managing land rates and taxes to assist in conserving native vegetation is to make vegetated areas exempt from tax. A clean way of doing this would require landholders to enter into a legally binding conservation agreement in return for rates and taxes exemptions. A compromise position is to differentially rate conservation lands at a lower rate. Councils could identify high conservation value lands and rates notices could then inform ratepayers that they could apply to have their land revalued if it is being managed for nature conservation.

Another possibility centres on deducting expenses from income tax payments. If landholders are using their land for income-generating purposes they can deduct expenses, such as rates and taxes, from their income. Currently, they can not seek such deductions if they are not generating income from the area. For example, a family that

owns an area of bush and keeps it for nature conservation purposes with no associated income generated, can not claim any tax deductions against it. Changing the tax provisions to allow deductions such as rates and taxes against income from other sources would be another financial incentive to keep an area under bush. Binning and Young (1999b) suggested that such provisions would also require landholders to have entered a legally binding conservation agreement.

As land values, tax and rates vary widely across Australia, so will the impacts of these suggested rate and tax changes. Where rates are low, such as remote rural sites, rate relief would be largely symbolic and help reinforce existing motivations. In other areas, especially the coastal zone with its rapid development and often highly-valued but poorly represented conservation sites, rate and tax relief could be a major incentive for greater investment in nature conservation (Binning and Young 1999, Williams 2000).

Binning and Young (1997) suggested that the initial costs be borne by the Commonwealth and State governments and then after this 5 year transition period rate rebates be 'built into the rating base of local governments by reviewing the basis for land valuation and rating' (Binning and Young 1999).

Environmental Levies

These are a charge imposed on a household. Cripps et al. (1999) suggested using a levy to fund land purchase and management for nature conservation. Currently, local government, suggested as the appropriate level of government to impose such a levy by Cripps et al. (1999), does not have the required powers. One possible means is through legislative change enabling councils to add an environmental service levy to their annual rates.

Charges and fees

Site-specific charges could be levied on individuals who contribute to environmental damage (NNRM Task Force 1999).

3. Market-Based Instruments

An increasingly popular trend in natural resource policy making is to assume that many of the problems being experienced are due to market failure. The assumption is then made that if the market can be corrected by valuing previously un-valued goods, such as remnant vegetation, and creating markets then the failure can be corrected and the resources will be properly managed. The following approaches to land purchase and creating tradeable rights and permits are both efforts to create markets for previously un-valued goods.

Land Purchases, Revolving Funds and Land Trading

This group of policy instruments is directed toward creating a viable, functional market for remnant vegetation. Revolving funds involve purchasing land, placing that land under covenant and then re-selling (Cripps et al. 1999). This enables the land to be purchased by someone who values it, through the market place, for nature conservation. The only formal revolving fund in Australia is operated by the Victorian Trust for Nature. This fund focuses on nature conservation, however, a broader focus on protection and restoration of the rural landscape is also possible (Native Vegetation Working Group 2000).

Bush Brokers in Western Australia is an example of an organisation established to buy and sell bush blocks. It is a partnership between the World Wide Fund for Nature, the Real Estate Institute of Western Australia and the Soil and Land Conservation Council. The partnership aims to provide a structured program for trading in bush blocks, training and accreditation of estate agents and developing sales procedures with the relevant government departments (Native Vegetation Working Group 2000).

Land trading and swapping is an innovative approach. Support could be provided for a group of landholders to re-configure their farms to focus production in areas where it can be sustained and retire non-productive and high conservation value lands. A farm or farms could also be retired to make other units viable (Native Vegetation Working Group 2000). Another feature of land trading could be establishing land banks for lands of conservation value or likely to be degraded by agricultural activities. Such lands could be purchased by regional communities and then leased under specific conditions, resold with covenants attached or placed in government hands (National Natural Resource Management Task Force, 1999).

Tradeable Permits and Rights

Although not in existence, tradeable permits could be used for salt or greenhouse gases. The income raised from permits could be reinvested (National Natural Resource Management Task Force 1999). They are used where property rights are poorly defined. A ceiling on the level of damage to a common resource such as surface water or groundwater, or maximum amount of pollution is defined. Permits are then issued to allow use/pollution of the resource, in this example release of saline water into off-site water systems, within the limits of the agreed ceiling.

Young and Gunningham (1997) listed development rights, tradeable drainage rights and tradeable clearing rights as possible instruments available for biodiversity conservation. Similarly to the permits discussed above, each involves determining an agreed limit followed by trading within that limit of the rights to clear, drain or develop remnant vegetation.

4. Self-Regulatory Instruments

Over the last decade there has been an increasing focus, especially in the mining and manufacturing sector, on self-regulation to improve environmental management. Such self-regulation has been sought through industry codes of practice and best management practice, and accreditation, predominantly through quality assurance means.

Codes of Practice/Best Management Practice

Where native vegetation can be integrated into whole farm management, then industry codes of practice/best management practice are possibilities. Examples include TOPCROP for the grain industries and PROGRAZE for grazing industries (ANZECC 2000 in Williams 2000). Codes of practice may also be developed by government and then voluntarily adopted by landholders. An example is codes of practice developed by local government for managing roadside vegetation. The ANZECC Native Vegetation Consultancy (2000) recommended state government departments in Western Australia investigate the applicability of codes of practice or best management practices for vegetation management.

Accreditation and Environmental Management Systems (EMS)

Consumers are becoming increasingly concerned about the environmental and ethical impacts of production systems. As such, assurance regarding the environmental management of production and associated accreditation are likely to be features of agricultural production in the future (National Natural Resource Management Task Force 1999). Examples of possible standards guiding Australian agricultural production include ISO 9000 and ISO 14000. ISO 14000 in particular is concerned with environmental management (Standards Australia and Standards New Zealand 1996). The development and implementation of these voluntary, industry-based management systems and associated accreditation are the responsibility of these industries. There is, however, a role for government in making sure these systems are compatible across industries and are accepted by markets as sufficiently rigorous (National Natural Resource Management Task Force 1999).

Similarly to the above policy instrument, the usefulness of accreditation and EMS is linked to remnant vegetation management being an integral part of farm business and whole farm planning and management (Elix and Lambert 1998, Williams 2000). With this inclusive scenario, retention of remnant vegetation or even replanting could become a measurable condition of environmental performance.

5. Regulatory Instruments

These instruments rely on legislation and associated regulations to influence landholder behaviour. These are the most coercive of the policy instruments discussed in this paper. Also included are land use planning by local government and direct provision through conservation reserves.

Legislation and Regulation

Almost all dependable policy mixes rely on a 'substantial underpinning of government regulation' (Young and Gunningham 1997). Without accompanying regulation, other policy instruments are unlikely to succeed (Binning and Young 1997). In Western Australia, controls over clearing are achieved via a suite of some 10 statutes, the first enacted in 1928 (*Town Planning and Development Act, 1928*) and the most recent in 1995 (*The Local Government Act, 1995*). Most of the controls have been achieved through accompanying regulations and administrative guidelines and procedures (Native Vegetation Working Group 2000). South Australia is the only Australian state with legislation specifically directed toward comprehensively controlling native vegetation clearing (*Native Vegetation Act, 1991*). NSW and Victoria, similarly to WA, have sought regulatory control through a State Environment Planning Policy (SEPP 46, 1995) and amendments to the *Planning and Environment Act, 1987*, in 1989 respectively. Queensland has no vegetation clearing control on freehold land (Binning and Young 1997). The other states and territories all sit somewhere in between.

Young and Gunningham (1997) cautioned against relying on regulation alone. Regulations can 'fail' especially if there are not the resources to implement and enforce them. They should be regarded as a safety net to be relied upon if all else fails and are needed to cover those who do not respond to other incentives. Often too, regulations address the symptoms of the problem, not the underlying causes. It seems more efficient and effective to address the underlying causes rather than regulate once the symptoms

have appeared. For example, if a farmer receives a tax concession for clearing, it is more efficient to remove this concession than to regulate to prevent clearing (Young and Gunningham 1997).

A useful role for regulations is a precautionary one. In Western Australia, for example, permission is required to clear native vegetation. This precautionary regulation is backed by a precautionary standard stating that each local government area and farm must retain at least 20% of its land under native vegetation. Where this precautionary standard is not met, a landholder who still wishes to clear must show how this will not adversely affect the environment. This standard offers a means of triggering the application of other instruments such as management agreements and grants. For example, approval to clear one area might be made conditional on a covenant being placed on another area and it being fenced (Young and Gunningham 1997).

Land Use Planning

Local government has the ability to create land use zones that are specifically devoted to nature conservation (Binning et al. 1999). In the past, de facto zoning for recreation has been the only means of getting areas set aside for conservation purposes. Land use zones for nature conservation are now increasingly being voluntarily applied to public and private lands by local government. They may also use by-laws to make clearing of native vegetation a development action requiring council consent (Binning et al. 1999). Councils in all states are also required to take account of the environmental impacts of developments before giving approval.

Direct Provision

One of the oldest and commonest means of protecting high conservation value lands has been purchase by the state government using either its own money or Commonwealth grants. These lands are then added to the broader reserve system and managed by the state government. Land purchases are still the preferred option, where there is a willing seller, for areas that fill gaps in the current reserve system or have unique ecological values requiring the highest level of protection. Examples of the latter include rare flora that is known from only 1-2 populations and is threatened by clearing and threatened ecological communities that are similarly few in number and require active management to address threats such as salinity or clearing.

Making the Choice

Given this suite of available instruments the challenge is to select the 'best' instruments. The response to this challenge has two components: first, determining what best is and second, providing design principles to get to 'best'.

Selection Criteria

A standard set of criteria for evaluating public policy exists. Included are economic efficiency, administrative feasibility and cost, political acceptability and equity considerations (Table 2). Young and Gunningham (1997) suggested two additional criteria specific to biodiversity – dependability and precaution. Both are included because of the lack of knowledge regarding the best ways to conserve biodiversity and the likely social and economic responses to instruments. The prospect of irreversible loss also underpins these two criteria.

Table 2. Evaluation criteria for determining the 'best' policy instruments for biodiversity conservation (derived from Young and Gunningham 1997)

Criteria	Explanation
1. Economic efficiency	Trade-offs created by the instrument are achieved at least cost and the reassignment of property rights makes at least some one better off and no one worse off
2. Administrative feasibility and cost	Instrument creates minimal enforcement and monitoring costs, and its requirements and associated decision-making processes are easy to understand
3. Political acceptability	Instrument motivates people, and is regarded as legitimate, consistent with government policy and has bipartisan support
4. Equity	No individual or group, now or in the future, is disadvantaged by the instrument
5. Flexibility	Instrument can cope with changing technology, prices and climate, as well as encouraging innovation and going 'beyond compliance'
6. Dependability	Instrument will deliver the desired target even when knowledge about biodiversity, and the social and economic consequences of the instrument, are uncertain
7. Precaution	Instrument avoids the chance of serious, irreversible consequences, especially where there is scientific uncertainty

Fundamental Design Principles

Several fundamental design principles can be invoked to help achieve the best outcomes, that is outcomes that meet the criteria listed above (Table 2).

Principle 1. Develop and rely on a complementary mix of policy instruments.

Commentators have suggested a mix of policy instruments rather than a single response to environmental problems such as biodiversity conservation. The challenge is to provide this mix while avoiding the dangers of 'smorgasbordism', that is, wrongly assuming the more instruments the better (Gunningham and Sinclair 199X). Providing information inherently complements all other instruments. Such provision motivates individual and community action and makes them more likely to respond positively to a range of instruments (Young and Gunningham 1997). The lack of knowledge and certainty in relation to biodiversity management makes the flexibility inherent in information provision invaluable.

Voluntary instruments should also be part of the mix. To re-cap, a voluntary instrument is one which allows an individual or group to chose whether or not they use it (the first four of the five categories in Table 1 are voluntary instruments). The freedom of choice

offered by voluntary instruments provides the flexibility needed to deal with the lack of knowledge and uncertainty associated with biodiversity conservation. Binning and Young (1997) commented, however, that voluntary programs are unlikely on their own to change behaviour in the short term. They are most effective in creating behavioural change incrementally in the long term. Where substantial changes in the short term are required, then financial incentives (one form of voluntary instrument) and legal means (ie, legislation, regulation) are required. During these short-term transitional periods when property rights are being redefined, voluntary instruments may be useful in developing and maintaining positive community attitudes.

The last important element in this policy mix is regulatory instruments. Young and Gunningham (1997) argued that a regulatory safety net is essential for biodiversity conservation. Regulations are needed to encourage compliance by those with little commitment to biodiversity conservation. They are also needed to complement market-based instruments, for example tradeable clearing rights where a ceiling on the acceptable level of damage needs to be set.

Principle 2. Clearly identify the property rights associated with remnant vegetation on private land and select and apply policy instruments accordingly.

As mentioned earlier, the majority of land in the WA wheatbelt is privately owned. Thus, a key consideration in choosing policy instruments is clearly defining property rights and the associated entitlements and obligations. Landholders in Australia strongly believe they have the right to do as they wish on their own land. However, associated with this ownership is a private obligation to manage their remnant vegetation in a sustainable way. This obligation extends across the whole farm, and is recognised as a duty of care (Binning and Young 1997).

Duty of care is an attractive concept, however, landholders may not recognise it or what responsibilities are entailed. As such, the best approach is using instruments that enable the costs associated with landholders' duty of care to be incorporated into the normal costs of production. This suggests the development and use of market-based, self-regulatory and regulatory tools. There will also be a role for financial tools such as tax and rate changes. Binning and Young (1997) emphasised that landholders should not receive ongoing financial support for activities within their normal duty of care.

There is also a public element provided by remnant vegetation through its contribution to the aesthetic value of rural landscapes, regional soil and water quality and broader biodiversity values. These public goods currently have no market value. They can be regarded as a public conservation service provided by the landholder (Binning and Young 1997). Examples include remnant vegetation management at a regional scale to enhance biodiversity conservation and sustaining sites of unique conservation value (Williams 2000). It seems reasonable to use public subsidies, through financial instruments, to support landholders providing a public conservation service.

Transitional payments are an innovative approach to encourage landholders to change their ideas about the obligations associated with their remnant vegetation. For example, a landholder may sign a management agreement and receive a one-off payment for fencing. The payment recognises that the landholder is providing a public conservation service. However its one-off nature signals that ongoing management costs should be met by the landholder. In other words, managing the remnant for conservation has

become part of his or her duty of care. In this situation, the payment is a circuit breaker assisting a transition to a more stringent duty of care. Such an approach is effectively redefining property rights (Binning and Young 1997).

Principle 3. Recognise that the choice of policy instruments depends on the context.

Preliminary research findings reviewed by Williams (2000) suggest that different instruments for remnant vegetation conservation are needed in different places in Australia because of differing legislative, environmental and social circumstances. For example, rates rebates are more effective where land values and development pressures are highest. Financial incentives are best tailored to meet the management needs of specific ecological communities faced with specific threats. The choice of level of incentive offered may also be influenced by the social circumstances of the landholders. Pannell (2001) similarly noted that for salinity policy to be effective it had to be able to deal with a heterogeneity of economic, social and environmental circumstances.

Principle 4. Recognise, analyse and work with existing institutional structures as an essential first step in choosing policy instruments.

In Australia, the institutions most likely to be developing and applying instruments for remnant vegetation conservation are the three tiers of government, industry and the community. The Commonwealth government, with its current financial ascendancy over the states, uses grants to dictate policy in areas nominally the responsibility of the states. The Natural Heritage trust is a case in point, with the Commonwealth specifying how the \$1.5 billion is to be spent on environmental matters. However, the choice of policy instruments available to the Commonwealth is generally restricted to educational and financial incentive ones, with regulatory means beyond its control. The states on the other hand can draw on regulatory as well as motivational and financial instruments. Local governments are the 'dark horse' in many discussions of environmental policy instruments. Contrary to perceptions, they have a range of instruments available, especially regulatory ones such as zoning and providing financial benefits to landholders through rate relief (Binning et al. 1999). Elected officials (ie, politicians) from all levels of government usually prefer the least coercive instruments possible. They thus show a preference for motivational rather than regulatory instruments.

A diversity of policy instruments is available to the non-government sector. Industry members may enter into partnerships with landholders, a motivational instrument, with or without accompanying financial incentives. Alcoa's involvement in landcare activities in Western Australia is an example. Another role for industry is through establishing producer codes of practice or accreditation, both self-regulatory instruments. Non-government conservation organisations may become involved through administering land purchasing schemes (a market-based instrument) or providing education and information (motivational instrument).

Policy instruments developed and used by communities have been advocated as the solution to environmental problems. Partnerships between communities and others, as a motivational instrument, is popular rhetoric in natural resource management (Moore et al. submitted). However, farmers are becoming increasingly tired and disillusioned with partnership approaches to land management, such as Landcare (Pannell 2001). It thus seems more effective to design other instruments so they facilitate ready and practical

implementation of the desired changes rather than continue to dwell inordinately on partnerships as a preferred instrument.

Young and Gunningham (1997) commented that policies for biodiversity conservation will be more effective if they use and adapt to existing institutional arrangements. Existing weaknesses, such as inequitable tax systems, should be addressed rather than new remedial structures superimposed. Their views imply a faith in the ability of existing systems to cope with and adjust to change, an optimism that may not be shared by all commentators.

Remnant vegetation conservation and the underlying goal of biodiversity conservation is based on the tension between the need to act locally while thinking and planning more broadly. Ultimately, the success of such conservation in agricultural areas such as the WA wheatbelt depends on the actions of individual landholders. Thus, authority and responsibility for action should be transferred to the lowest level (Young and Gunningham 1997). This idea underlies current enthusiasm for landcare and catchment groups and local government taking lead roles in designing and implementing policy instruments. However, not all decisions need to be made at this lowest level. To achieve regional, state and national biodiversity outcomes, policy involvement at all decision-making scales is crucial.

Principle 5. Consider the views and preferences of landholders when developing and implementing new policy instruments.

In the WA wheatbelt and most agricultural landscapes, the actions of individual landholders are fundamental to the success of landscape restructuring efforts. It is crucial therefore, to find out from them what instruments they think will work, what they favour and how should equity concerns associated with existing and changing property rights and obligations be resolved. A range of views will be provided based on a range of experiences and levels of intellectual ability. But, like all of us, landholders have much to contribute to discussions on changes to their workplace and where they live. The benefits of such discussions for landscape restructuring include better ideas and decisions, and hopefully better acceptance of the suite of possible instruments, including regulation and market-based mechanisms.

Conclusions

Restructuring rural landscapes depends on the actions that meet the triple bottom line (Fig.1). As such, they must be economically gainful, culturally (socially) adoptable and ecologically possible. This paper has focused on social and economic influences on landscape restructuring by private landholders for remnant vegetation conservation. Of these, economic considerations are centrally important – if a change is not economically gainful or at least makes the landholder no worse off, it will not be made.

Also important in terms of understanding social influences is decreasing the attention given to landholders' attitudes. Most landholders espouse a conservation ethic, but as with many attitudes expressed by people, these are often not translated into action. It is far more valuable to gain an understanding of the influences of landholders' perceptions of environmental problems as these directly influence the actions they take.

Numerous policy instruments, ranging from voluntary to involuntary, with and without financial incentives, can be used to assist landholders to change their behaviour. Design

principles suggest a mix of regulatory, financial and motivational instruments, with the mix varying from place to place. Also essential is working with and understanding existing institutions. Key institutions are the three tiers of government, industry, community groups and individuals. Each institution has different instruments it has the mandate and capability to use. For example, only the Commonwealth can use changes to income tax as a policy instrument. Community groups and industry often have the flexibility lacking within government to trial market-based instruments.

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