PRODUCTIVITY COMMISSION

Cost Sharing for Biodiversity Conservation: A Conceptual Framework

Staff Research Paper

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BOXES

Glossary

'Beneficiary pays' principle	A principle that anyone who benefits from an activity to contribute to the costs of undertaking it
'Beneficiary compensates' principle	A sub-principle within the 'beneficiary pays' principle that requires anyone who derives an indirect benefit from an activity to contribute to the costs of undertaking it
Bequest value	In the context of the environment, the value that individuals derive from preserving the environment for the benefit of future generations
Biodiversity	Broadly defined as the variety of all life forms and the interactions between them
Cost sharing	Allocation of the funding of activities among individuals, groups and governments on behalf of the general community
Duty of care	An obligation not to harm another person or their property. In the context of conservation, it is a legal obligation requiring individuals to not use their land, or permit it to be used, in a way that interferes with another person's right to use and enjoy their land
Existence value	The intrinsic value placed on an environmental good. This value is unrelated to any actual or potential use of the good
Ex situ conservation	Conservation of species outside of their natural habitat — for example, in zoos or botanical gardens
Externalities	A 'spillover' where the actions of an individual result in costs or benefits to others that the individual creating them does not bear
In situ conservation	Conservation of species in their natural habitat
Internalising externalities	Processes causing individuals to bear the costs or receive the benefits of externalities created by their actions
On-ground activities	Activities, such as revegetation, undertaken at the property, catchment and/or regional level that aim to conserve biodiversity

Option value	The value to society of retaining the option to use or consume a good
'Polluter (impacter) pays' principle	A principle requiring polluters (impacters) to meet the full costs, including external costs, of their actions
Property rights	The bundle of ownership, use and entitlement rights and responsibilities that a user has over a good or resource such as land. These rights and responsibilities are given expression through law (common law or legislation), custom or tradition.
Public goods	A good displaying two characteristics: (1) once the good is provided to one individual, it is provided to all simultaneously ('non-excludable'); and (2) enjoyment of the good by one individual does not reduce the benefits available to others ('non-rival')
'User pays' principle	A sub-principle within the 'beneficiary pays' principle that requires anyone who derives a direct private benefit from an activity to contribute to the costs of undertaking it

Key points

- Many resource users undertake actions that conserve biodiversity. If, however, there were public demand for more conservation than would be provided voluntarily by the private sector alone, there are two broad principles for determining who should bear the costs — 'impacter pays' or 'beneficiary pays'. The two principles have different efficiency and distributional effects.
- A fundamental step in determining which cost sharing principle to apply is the clarification of the rights and responsibilities implied by existing property rights. This is an important issue that requires further work.
- If property rights effectively require resource users to meet an environmental standard, resource users who fail to achieve this may be considered to generate external costs. In these circumstances, on efficiency grounds, the impacter pays principle should generally be adopted to internalise external costs. This effectively amounts to enforcement of an individual's existing legal responsibilities. However, if the costs of implementing the impacter pays principle were to outweigh its efficiency advantages, the beneficiary pays principle may be considered.
- In the short term, the community may expect a higher environmental standard than is required under existing property rights. The beneficiary pays principle may be relevant to encourage additional consideration in this case, provided the benefits warrant the costs.
- If the 'beneficiary pays' principle were adopted and a government chose to meet some share of costs, its share need not equal the full public benefits of the additional conservation. In principle, the public contribution should be the minimum necessary to trigger additional conservation by the private sector. Calling for bids (auctions) for the voluntary provision of conservation by the private sector may be one way to determine this minimum.
- Long term payments to resource users for undertaking conservation can be costly for the community. Alternatively, property rights may change to reflect new social expectations. This may occur through the evolution of the common law, or through government legislation. This may in turn enable application of the 'impacter pays' principle if resource users subsequently failed to meet the new (higher) obligations. However, redefinition of property rights is rarely undertaken lightly, and give rise to questions of compensation or other assistance.

Overview

Conservation of biodiversity on private land can entail significant costs. This paper discusses the principles for sharing the costs of biodiversity conservation between individuals, groups and the general community. It illustrates situations in which the different cost sharing principles may be relevant and highlights some issues that arise in determining who should pay for biodiversity conservation.

Many resource users — either individually or collectively — undertake actions that conserve biodiversity. Although these actions may generate public benefits, governments need not bear any of the costs of these activities — the community can 'free ride'.

However, there may be community demand for conservation above what is already provided by the private sector and government reserves. A fundamental step in determining who should fund any additional conservation on private land — that is, which cost sharing principle should apply — is understanding the rights and responsibilities implied by property rights. These rights and responsibilities in relation to biodiversity are not always clear. This is an important issue that requires further attention.

If property rights effectively require resource users to maintain an environmental standard, resource users who fail to achieve it may be considered to generate external costs. In these circumstances, on efficiency grounds, the 'impacter pays' principle should generally be adopted to internalise the external costs. This effectively amounts to enforcement of an individual's existing legal responsibilities. In contrast, application of the 'beneficiary pays' principle in such cases would effectively undermine the responsibilities imposed by property rights. However, if the costs of implementing the 'impacter pays' principle were to outweigh its efficiency advantages, the 'beneficiary pays' principle may be considered. The final choice of principle, and how it would be implemented, would need to account for equity considerations.

The beneficiary pays principle is also more relevant if the community demands resource users to provide conservation beyond the level required by existing property rights.

Under the 'beneficiary pays' principle, governments should only provide funds where they generate net public benefits and where conservation would not already occur. To ensure accountability and to avoid establishing perverse incentives, such investment of public funds needs to meet other criteria, including that:

- public payments are clearly linked to the delivery of outcomes;
- funding does not cover costs related to private benefits (although there may be some exceptions); and
- funding achieves value for money by maximising the conservation benefits received for each dollar of funding.

If the 'beneficiary pays' principle is used to assign cost shares, a government's share need not be equal to the full public benefits generated. Governments need contribute only the minimum necessary to trigger appropriate conservation by the private sector. While it may be difficult to determine this minimum payment in advance, one way may be by calling for tenders or bids (auctions) for the voluntary provision of conservation. This may help governments achieve value for money by allocating its funds to issues and providers that deliver the greatest environmental gain for a given cost.

Long term payments to resource users for undertaking conservation can be costly for the community. Alternatively, property rights may change to reflect new social expectations. Changes to property rights may occur through the evolution of the common law, or through government legislation. This may enable application of the 'impacter pays' principle if resource users subsequently fail to meet the new (higher) obligations.

The choice between long term payments under the beneficiary pays principle or changing property rights should be influenced by which option generates the highest net benefit. Any refinement of property rights is rarely undertaken lightly or without compensation or other assistance such as government meeting a greater share of costs in the short term to help resource users adjust. The merits of compensation or adjustment assistance would need to be assessed on a case by case basis.

1 Introduction

There is considerable demand among sections of the Australian community for the conservation of biodiversity. This reflects changing preferences for the environment, given factors such as an improved understanding of the significance of species loss (Bennett, Backhouse and Clark 1995) and rising income levels. Governments have responded to these demands with legislation and policies at both the Commonwealth and State levels, and with national strategies such as the National Strategy for the Conservation of Australia's Biological Diversity and the National Strategy for Ecologically Sustainable Development. Australia is also a party to international agreements dealing with biodiversity, such as the Convention on Biological Diversity and the Convention on International Trade in Endangered Species of Wild Flora and Fauna.

In addition to highlighting a role for governments, the National Strategy for the Conservation of Australia's Biological Diversity recognises a need for biodiversity conservation to be integrated with private land management. In Australia, this is particularly important because the private sector controls or manages over 60 per cent of land (AUSLIG 2000).

Several policy options are available to governments to prevent or slow the loss of biodiversity or to enhance biodiversity. Some options, such as support for research and development or the provision of information, may be comprehensive in nature — that is, they target all natural resource users. Others may target specific problems, regions or resource users. Examples of both types of policy options available to governments include:

- directly providing *in situ* conservation — for example, by establishing or managing World Heritage areas, national parks and nature reserves;
- providing *ex situ* conservation — for example, by collecting and preserving specimens of selected species in zoos and botanical gardens;
- regulating activities that affect biodiversity — for example, by prohibiting land clearing without approval;
- undertaking or providing funding for research into the effects of resource use decisions on biodiversity and ways to address biodiversity decline;

- educating, informing or persuading resource users to undertake (or refrain from undertaking) certain actions, given their likely effects on biodiversity;
- removing legislative and policy impediments to private sector conservation — for example, by clarifying property rights over natural resources; and/or
- implementing cost sharing arrangements to support on-ground activities (box 1.1) for *in situ* conservation on private land.

This report focuses on cost sharing for on-ground activities to conserve biodiversity that are undertaken at the property, catchment and/or regional level. Often a narrow definition of on-ground activities is taken, including only those activities that involve significant investment in capital. This report recognises a broader definition, which includes these activities as well as those that do not necessarily require capital investment, but that may still contribute to conservation outcomes — for example, changes in irrigation practices.

Box 1.1 **On-ground activities**

Examples of on-ground activities and their intended effects include:

- intercepting rainfall to reduce the impacts of salinity by slowing the rise of water tables;
- building structures to promote soil conservation and increasing surface cover to control erosion; and
- protecting riparian zones and stabilising stream banks to improve water quality and reduce erosion.

The nature of biodiversity means that on-ground activities directed at primarily one conservation issue may also affect other issues simultaneously. Revegetation, for example, can provide buffer strips around existing remnants, protecting them from encroachment; provide additional habitat for animals; and contribute to preventing soil erosion.

Several government programs provide funding to help resource users conduct conservation, for example, programs of the Natural Heritage Trust, such as Landcare and Bushcare, distribute large sums for conservation on private land. The recently announced National Action Plan for Salinity and Water Quality also intends to combine funding contributions from the Commonwealth, State and Territory Governments and the private sector. State Governments (and some local governments) also administer resource management programs that involve cost sharing arrangements. An example is the Land Protection Incentive Scheme in Victoria.

Sources: MDBC (1996); Prime Minister of Australia (2000); RIRDC, LWRRDC and FWPRDC Joint Venture Agroforestry Program and Environment Australia (2000).

While this report focuses on cost sharing for on-ground activities, many policy options directed at delivering biodiversity conservation goals reflect decisions about how the costs of conservation will be shared between individuals and governments. Further, cost sharing arrangements are relevant not only in the context of biodiversity conservation but also in other areas of government policy where governments and the private sector work together in the pursuit of specific goals.

The ongoing nature of biodiversity conservation, along with the costs it is likely to impose, highlights the need to determine effective and efficient cost sharing arrangements for undertaking conservation. The aim of this study is to contribute to the debate surrounding cost sharing for conservation on private land, by assessing cost sharing principles from an economic perspective and by highlighting some practical issues affecting their implementation.

1.1 What is biodiversity conservation?

Biodiversity is broadly defined as the variety of all life forms and the interactions between them. It consists of all plants, animals, micro-organisms, the gene pool and the ecosystems they form (Saunders and West 2000). Biodiversity may be classified on three levels — genetic, species and ecosystem diversity (SEAC 1996). Genetic diversity occurs within a particular species, providing its characteristics and influencing its resilience or adaptability to change. Species diversity refers to the interactions between species to form ecosystems, while ecosystem diversity occurs at the level of entire biological communities such as wetlands, rainforests and grasslands, and also extends to include the entire biosphere (Farrier 1995). Biodiversity involves many dynamic processes and is enhanced by evolutionary change, but reduced by extinctions and habitat degradation and loss (DEST 1996).

Conservation of biodiversity is important for several reasons (Brown et al. 1993; DEST 1996; SEAC 1996; Tisdell 1991).

- Biodiversity underpins the processes that support life, such as the maintenance and regulation of water resources, atmospheric quality and climate, soil formation, and the recycling of nutrients. As a result, biodiversity sustains human life and industries that depend on biodiversity, such as agriculture.
- Biodiversity provides natural ecosystems with resilience — that is, the ability to recover from natural disasters such as drought, fire, flood and climate change.
- Biodiversity provides potential future access to resources for goods and services such as medicines, foods, fibres and tourism services.

- For many people, biodiversity has aesthetic or recreational benefits, contributes to a sense of cultural identity and/or has non-use values such as existence, option and bequest values.
- For some people, biodiversity should also be conserved for ethical reasons, reflecting a belief that no generation has the right to use the earth's resources solely for its own benefit.

It is difficult to establish the current status of biodiversity in Australia because many species have not yet been identified or described, let alone surveyed (SEAC 1996). From an economic perspective, it is also difficult to know whether more or less biodiversity should be conserved because estimates of all the costs and benefits of conserving biodiversity are not available. However, the State of the Environment Advisory Council (SEAC 1996) considers the loss of biodiversity as perhaps the most serious environmental problem in Australia. The potentially irreversible nature of its destruction and the lack of knowledge or certainty about the significance of what is being destroyed (Farrier 1995) also suggest that a prudent approach to biodiversity conservation is sensible. Further, the existence of legislation and policies directed at biodiversity conservation indicate that governments have determined, on behalf of society, that biodiversity conservation is important and that it should increase above current levels.

Conservation of biodiversity refers to a range of actions that can:

- protect biodiversity — such as the establishment and management of public and private parks, reserves and sanctuaries;
- maintain and manage biodiversity — undertaking activities in ways that do not lead to long term reductions in biodiversity (such as altering irrigation practices to reduce water use and sustain water flows and aquatic habitat), refraining from activities that reduce biodiversity (such as clearing of native vegetation that has adverse impacts on ecosystems and native wildlife), and responding to threatening processes (such as by undertaking pest and weed control);
- sustainably use biodiversity — such as the sustainable use of native forests, grasslands, crocodiles and kangaroos; and
- restore and enhance biodiversity — such as re-planting native vegetation.

All of these actions may involve cost sharing arrangements, depending on property rights and legal responsibilities for conservation (chapter 4).

1.2 Paying for biodiversity conservation — what is cost sharing?

Biodiversity conservation on private land depends on the behaviour and decisions of resource users. The incentives provided by market forces to conserve biodiversity are discussed in chapter 2. Some government policies also aim to encourage additional conservation by the private sector.

The costs of conservation include the direct financial costs of conducting on-ground activities and the forgone rate of return from alternative uses of the land and resources used for conservation. The majority of these costs are likely to be incurred by individuals (such as landholders) at a local or property level where on-ground activities are implemented. Yet many benefits of biodiversity conservation (for example, environmental stability) are experienced at a national, as well as local, level. Further, while the current generation may bear the costs of biodiversity conservation, the long term nature of environmental improvements means that future generations accrue the benefits, at least in part. (Similarly, the current generation could reap any short term benefits of resource degradation and pass the longer term costs on to future generations).

Because different parties bear the costs and benefits of biodiversity conservation, some on-ground activities that are desirable from a national perspective may not occur because they do not generate net benefits to those implementing them — that is, they are not privately profitable. As a result, insufficient conservation may occur from a social perspective (chapter 2). This raises the question of whether it may be in the interests of society for the wider community to meet some costs related to on-ground activities to ensure they proceed. This would involve the government meeting some costs of conservation on behalf of the general community, or 'cost sharing'. Cost sharing is sometimes called 'investment sharing' to reflect the notion that investments in activities or practices promoting the long term health of the environment earn an implicit return (Leybourne and Crawford 2000).

This report discusses a range of factors that affect whether, and how, governments should be involved in cost sharing arrangements for biodiversity conservation. It provides an economic perspective where the efficiency of cost sharing arrangements is a key concern. However, other factors, particularly the equity or distributional implications of cost sharing arrangements, will also need to be taken into account by decision makers as part of the policy making process.

Some criteria for assessing cost sharing arrangements

Governments may seek to achieve various objectives through cost sharing arrangements, including social, environmental and economic objectives. In doing so, governments have a responsibility to meet society's goals at least cost to the public and without unnecessarily interfering with or 'crowding out' private sector conservation efforts. In addition to being feasible and transparent, cost sharing arrangements should aim to reflect other criteria, including:

- effectiveness;
- efficiency;
- cost effectiveness; and
- equity.

Effectiveness is concerned with the achievement of objectives. It relates to overall outcomes, the quality of outcomes and the extent to which required standards are met. Cost sharing arrangements must contribute to the achievement of conservation goals if they are to be effective. Various factors can influence effectiveness, such as the extent of community acceptance of a cost sharing arrangement, and the integration of cost sharing arrangements for on-ground activities with other conservation policies.

Economic efficiency is concerned with society obtaining the highest net benefits from the allocation and use of its resources. Cost sharing arrangements are likely to promote this outcome when they provide ongoing incentives for improved efficiency in resource use over time. If cost sharing arrangements produce incentive structures that encourage the desired outcomes, then they are also likely to be more cost effective in terms of administration, compliance, enforcement and information costs.

Cost effectiveness is concerned with achieving objectives at least cost — that is, achieving 'value for money'. Cost effectiveness may be improved by targeting activities or practices that produce high environmental benefits for a given cost.

'Equity' is about fairness and means different things to different people. One type, for example, requires individuals in like circumstances to be treated the same — 'horizontal equity' — while 'vertical equity' is concerned with the distribution of benefits across individuals with different income levels. Cost sharing arrangements that are perceived as equitable are more likely to receive support and therefore may incur fewer enforcement costs. Transparent and predictable processes are likely to enhance the perceived equity of cost sharing arrangements.

Decisions about cost sharing arrangements may involve trade-offs between some of these criteria; for instance, equity considerations and administrative feasibility and cost can affect the efficiency or effectiveness of cost sharing arrangements.

1.3 The structure of this report

Market incentives for individuals to conserve biodiversity are discussed in chapter 2. The cost sharing principles are introduced in chapter 3, while chapter 4 highlights some issues that affect which principle should be adopted as the basis for cost sharing arrangements for biodiversity conservation.

2 Market incentives to conserve biodiversity

In Australia, markets are generally considered an efficient means to distribute resources to their most valued uses, and the role of governments in allocating resources is limited. This chapter outlines how the market fares with respect to biodiversity conservation by considering market incentives for private sector conservation. It also considers whether there may be a role for governments to encourage more conservation on private land than would otherwise occur through private decisions in the marketplace.

2.1 The market for biodiversity conservation

Many individuals recognise the personal benefits they can derive from improving biodiversity. However, individuals can only be expected to voluntarily undertake actions that conserve biodiversity if these actions result in net benefits to them. Benefits may be financial and/or intangible. Some individuals, for example, may be motivated solely by altruism or philanthropy.

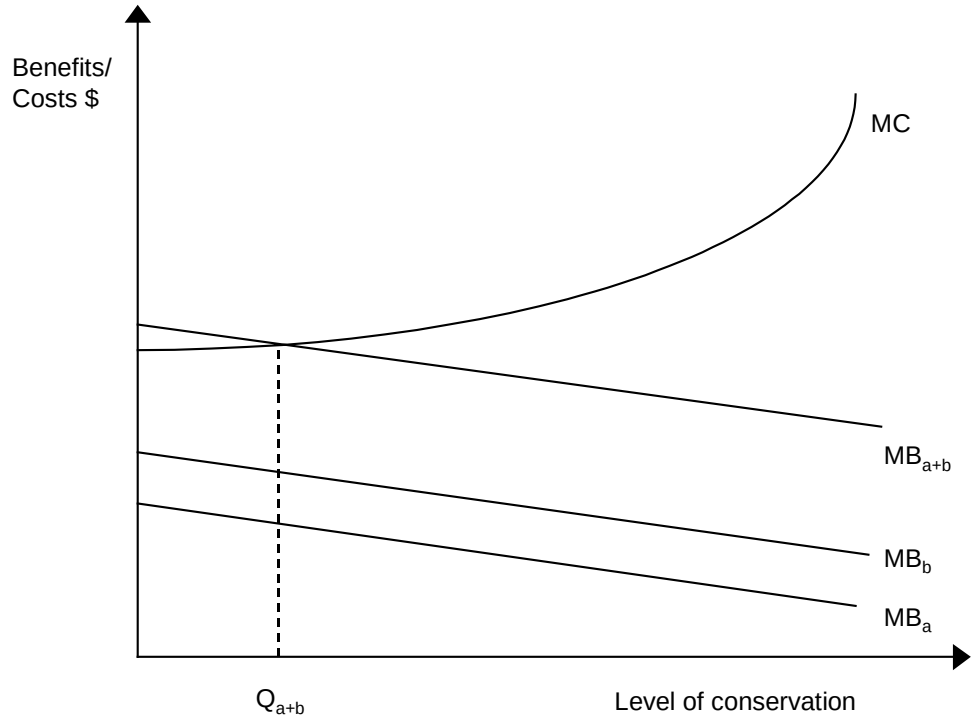
In some cases, activities that conserve biodiversity may not be viable for individual resource users to undertake on their own because the costs of doing so may exceed the benefits. However, the activity may be viable if it is jointly funded and undertaken (box 2.1). In this case, those involved may be able to negotiate an arrangement that results in net benefits to all of them. These arrangements may involve more than one individual or other parties such as companies, associations or community groups. Governments need not be involved in cost sharing for conservation activities that voluntarily result from private arrangements such as these, even though the community as a whole may derive some benefit from these activities. The private benefits of conservation in these cases are sufficient for the activities to proceed with private funding alone. The general community can thus effectively 'free ride' on the provision of any public benefits that may arise:

> It is common to find public goods supplied by the private sector simply because they are joint in supply with a private good. There is generally no need for the public sector to supply [such goods] … Such are the private benefits enjoyed … that private provision is voluntary, with the public good benefits being incidental to the decision but being provided all the same. (Bennett 1995, p. 428)

Box 2.1 **Sharing costs within the private sector**

The figure below presents the benefits and costs of a biodiversity conservation activity for each of two resource users, A and B.

There is no incentive for either A or B to undertake individually any level of the conservation because the benefits derived would be less than the costs incurred. In this example, both individuals face the same marginal costs (curve MC) of undertaking the activity, and these costs always exceed individual marginal benefits (curves MB_a and MB_b).



On the other hand, if A and B were to cooperate in this case, their joint benefits would be sufficient to warrant conducting the activity. The joint benefits to A and B of undertaking the activity are represented by curve MB_{a+b} which rests above both MB_a and MB_b because it represents the sum of both individuals' benefits. If A and B cooperate, they have an incentive to conduct Q_{a+b} of conservation activity, from which they both benefit.

In this example, the amount of conservation undertaken is expressed as homogenous units. This may be, for example, the number of trees re-planted or the hectares of native vegetation re-established. In practice, the units of conservation undertaken will not be homogenous and the curves indicated above will not be smooth. However, the general principles for the nature of costs and benefits apply.

In other cases, there may be uncertainty about the benefits of conservation, particularly when these occur in the distant future. Alternatively, it may be too difficult or too costly for individuals to negotiate and enforce payment arrangements

for the activities to proceed. In these cases, markets may fail to distribute resources to their most valued uses, so government action may be needed to establish the incentives that will enable conservation to occur.

Market failure

Generally in market economies, the existence of clearly defined and enforceable property rights (see below) creates incentives for individuals to allocate resources to their most valued uses, because to do otherwise would result in a personal loss to the resource owner or user. This allocation may include selling resources to others who value them more, or making other arrangements to maximise their value.

Property rights comprise the bundle of ownership, use and entitlement rights that a user has over a good or resource such as land, and include any responsibilities that the user may have to others. Entitlements may include the right to grow crops and develop land. Responsibilities may include using the land in a specified way (such as grazing on pastoral lease land) or refraining from activities or practices that interfere with the activities or enjoyment of others. As such, property rights govern access to resources and reflect the community's expectations about what resource uses are acceptable. Land values generally reflect the current and potential permissible uses encompassed in property rights (Wiebe, Tegene and Kuhn 1996).

These rights and responsibilities are given expression through law (common law or legislation), custom or tradition. The rights and responsibilities implied by property rights may change over time as community expectations change (chapter 4). An efficient property rights structure is needed if markets are to work well at directing and coordinating the use of resources. Such a structure has four main characteristics:

- universality — all resources are privately owned and all entitlements (rights over how they can be used) are completely specified;
- exclusivity — all benefits and costs that result from owning and using the resource only accrue to the owner, either directly or indirectly by sale to others;
- transferability — all property rights are transferable from one owner to another in a voluntary exchange; and
- enforceability — property rights are secure from involuntary seizure or encroachment (IC 1998).

When all these features of a property rights system exist, individuals will accrue all the benefits and incur all the costs of an action. In such cases, economic theory indicates that what is in the best interests of an individual (what is privately

optimal) also results in outcomes that are optimal for society as a whole. However, where all these property rights features do not exist, decisions made by individuals in markets may not result in socially optimal outcomes. Property rights over aspects of biodiversity are often poorly defined and some biodiversity values are poorly reflected in markets. This may limit the potential of markets to conserve biodiversity (Hodge 1997), resulting in market failure. Potential sources of market failure affecting the conservation of biodiversity are:

- public goods;
- externalities; and
- shortcomings in information.

Public goods

A public good displays two characteristics: first, once it is provided to one individual, it is provided to all simultaneously (it is 'non-excludable'); second, enjoyment of the good by one individual does not reduce the benefits available to others (it is 'non-rival' in consumption). Conservation activities often generate a mix of private and public goods; for instance, the existence value of a species may be considered a pure public good (Tisdell 1991), while benefits such as improved stock shelter from retaining vegetation cover are private.

There is no incentive to pay for the provision of a public good because once it is provided an individual cannot be excluded from enjoying the benefits of it. Thus, there is an incentive to 'free ride' on the provision of public goods by others. As a result, there is a lack of effective demand for public goods, implying that suppliers would be unlikely to cover their production costs. Market forces thus fail to supply — or undersupply — public goods, even though their supply would enhance community welfare (Panayotou 1993). This often leads to underinvestment in public goods relative to what would be socially optimal.

Externalities

A common consequence of inadequate specification of property rights is the emergence of externalities. Externalities reflect a 'spillover' effect and occur where the actions of an individual result in costs or benefits that affect others but that the individual creating them does not have to bear. Externalities can result in underinvestment in biodiversity conservation (or excessive loss of biodiversity) relative to what would be socially optimal.

When there are spillover benefits from the conservation of biodiversity, the market value of land in commercial use can be less than its social value for conservation purposes. Nevertheless, the land may be used for commercial purposes because the market value reflects only the benefits that can be appropriated by its owners, who may not be compensated for providing services associated with conservation. An example is the spillover benefits generated by land uses that retain high levels of tree cover, thereby regulating water flow in a watershed and reducing the risk of flooding. Conversely, spillover costs occur when the tree cover is removed. A problem occurs when the land is developed for commercial use by individuals acting in their own self interest, when it is in the community's interest to leave the area in an undeveloped or less developed state (Tisdell 1991).

Information shortcomings

The efficient functioning of markets relies on individuals taking into account all relevant information when making their production or consumption decisions. However, many environmental processes are complex and poorly understood. It may not always be possible to improve this understanding because the relevant information does not exist or because the benefits of collecting it may not warrant the costs. Where information is limited or poor, markets may not function efficiently and individuals may make poor decisions. Information problems are complicated by time lags and uncertainty: the full effects of decisions on biodiversity and the environment are often not known; relationships between cause and effect are not always clear, and environmental impacts often do not appear for many years. Information problems could result in too little (or too much) biodiversity conservation relative to what would be socially optimal.

2.2 A potential role for governments?

Given that markets for environmental goods and services may not function well, there may be a role for governments to:

- improve the definition of property rights over time;
- ensure individuals' decisions account for the effects on others (externalities);
- supply, or provide a means to ensure the supply of, public goods; and/or
- encourage the production and dissemination of relevant information (IC 1998).

However, the existence of market failure is not a sufficient condition for governments to act because such action is not costless. Freebairn and Zillman (forthcoming), for example, argue that the total cost of raising $1.00 of tax

revenue for government funding of programs is likely to exceed $1.30 as a result of various factors such as collection and compliance costs. Thus government action should occur only when the expected benefits of action exceed the costs. Ideally, government actions should also be consistent so the effects of one action do not unduly compromise the goals of another. For example, until 1983 a tax concession was provided for clearing vegetation on land to be used for farming (Dumsday and Chisholm 1991). While pursued for other reasons, such policies may reduce the effectiveness, and increase the costs, of government actions to conserve biodiversity.

2.3 Summary

- Individuals have a market incentive to conduct conservation activities that result in a net benefit to them.
- Governments need not necessarily be involved in cost sharing arrangements for activities that are the result of voluntary private decisions, even though these activities may generate public benefits.
- Market failure may limit the potential for markets to conserve biodiversity at a socially optimal level, so there may be a role for governments to encourage the private sector to undertake additional conservation.
- Government action is not costless and should occur only when the expected benefits exceed the costs.

3 Cost sharing principles

This chapter introduces two principles that can form the basis of cost sharing arrangements to achieve conservation outcomes. The 'polluter (impacter) pays' principle generally implies that governments do not share any of the costs of conservation undertaken on private land unless the government is itself an impacter. In contrast, the 'beneficiary pays' principle may imply some sharing of costs by governments on behalf of the community. Some efficiency and equity aspects of these principles are outlined in this chapter, while chapter 4 discusses some factors that affect which principle should be adopted in practice as the basis for cost sharing for biodiversity conservation.

3.1 'Polluter (impacter) pays' principle

When individuals do not bear the full cost of their decisions, resources are misallocated and market failure occurs (chapter 2). This failure may be avoided if individuals are required to incur the full costs of their actions, including any negative externalities their actions may impose on the community through environmental damage and biodiversity loss.

In 1972, the Organisation for Economic Cooperation and Development (OECD) adopted the 'polluter pays' principle, which requires individuals to meet the full costs of their actions, requiring them to bear the costs of implementing pollution prevention and control measures necessary to maintain the environment in an 'acceptable state' (OECD 1975). The 'polluter pays' principle has since been extended to cover a wider range of environmental damage including biodiversity loss and is thus more accurately termed the 'impacter pays' principle (SLWRMC 1999).

Under this principle, impacters are required to contribute to the costs of activities that ameliorate or prevent biodiversity damage in proportion to their impacts on biodiversity. As impacters may pass on some of these costs as higher prices, consumers who benefit from activities that adversely impact biodiversity may also meet a portion of the higher costs.

As a general rule under this principle, governments should not subsidise individuals to conserve biodiversity, so the government's cost share is generally zero, unless the

government is also an impacter and therefore required to pay. This compares with the government's cost share under the 'beneficiary pays' principle (see below) which could be as high as 100 per cent, depending on the public benefits of conservation and other factors (chapter 4).

As impacters are forced to meet the full costs of their actions, the 'impacter pays' principle is embodied in obligations or compulsory measures to achieve conservation. In contrast, enticements for resource users to voluntarily undertake conservation reflect the 'beneficiary pays' principle (see below).

The 'impacter pays' principle may be implemented through various means (Pearce, Markandya and Barbier 1989):

- command and control mechanisms such as regulations that require resource users, in the first instance, to bear all the costs of undertaking conservation measures or refraining from actions that have an adverse impact on biodiversity;
- charges levied on environmentally harmful outputs, inputs or practices; and
- tradeable rights or permits to achieve environmental standards.

Efficiency aspects

In theory, adopting the 'impacter pays' principle forces producers and consumers to bear the full cost of their actions by internalising externalities. Depending on the characteristics of supply and demand, this in turn may raise the price of goods and services that damage the environment. This could improve resource use efficiency by removing production and consumption biases towards goods and services that previously 'overused' underpriced environmental resources.

Over time, full cost pricing also provides incentives for the identification and dissemination of 'environmentally friendly' technologies (Tilton 1995). This is likely to reduce the scale of environmental problems to be addressed in future. If applied through a market mechanism, such as tradeable permits, adoption of this principle can also allow conservation goals to be achieved at least cost to the community, because such mechanisms account for the variability in the costs of control measures across resource users. Government outlays for achieving conservation are also minimised when the 'impacter pays' principle is adopted as the basis for cost sharing because producers and consumers meet the environmental costs of their decisions. Budget savings by governments may then be directed to meet other goals (box 3.1).

Box 3.1 **Achieving goals: paying the minimum**

Government funds are not limitless, yet demands on governments to meet the needs of the community are many. Where governments seek to meet as many objectives as possible using limited resources, it is in the community's interests for governments to pay the minimum amount necessary to achieve conservation (or other) goals. This implies a lower level of tax to fund the provision of government goods and services and/or allows savings to be spent on the achievement of other objectives.

The notion of a government paying the minimum amount necessary to achieve conservation outcomes is supported by a number of agencies. For example, the Sustainable Land and Water Resource Management Committee (1999, p. 5) suggests:

> Governments should, in general, contribute to works only up to a level sufficient to trigger the necessary investment towards self-correcting, self-perpetuating natural resource management systems that operate effectively.

Consistent with this approach is the notion that the public should 'free ride' on any public benefits that may be provided by private initiatives:

> When we decide interfering with the market is justified on public benefit grounds, we only need to do just enough to change the behaviour of market participants in the manner desired … Throughout the economy public benefits frequently free ride private investment. Good policy takes advantage of this … (Hussey 1996, p. 11)

Public 'free riding' on the delivery of public benefits provided through private initiatives is considered good policy because it embodies an efficient use of government funds:

> … governments in the long run will be unable to address more than a small proportion of the costs of environmental problems associated with agricultural activity (Batie 1986). Thus there is a pressing need to maximise the conservation dividend from the limited government funds that are available. (Marshall 1998, p. 1)

The minimum expenditure required from governments for conservation largely reflects whether the 'impacter pays' or the 'beneficiary pays' principle is adopted. If the 'impacter pays' principle is adopted, the private sector meets the costs of biodiversity conservation and government's cost share is generally zero (unless the government is also an impacter). Under the 'beneficiary pays' principle, the minimum amount of government funding necessary may be greater than zero but need not necessarily cover the full value of public benefits (chapter 4). Even low levels of government funding may be sufficient to encourage additional conservation by the private sector. However, governments should only provide funding where the benefits of doing so exceed the costs.

However, for actions that aim to internalise external costs, the efficiency gains of adopting this principle may be reduced if requiring impacters to meet the costs of avoiding harm reduces incentives for the 'victims' to avoid it:

> … sometimes the most efficient way to limit the damage done by diseconomies is not to limit or change the activity of the offending parties, but rather to have the victims of the diseconomy deal with it. The cost of moving away from or otherwise adjusting to

> the diseconomies may be less than the costs of preventing or limiting the diseconomy at its source. (Olson and Zeckhauser 1970, p. 516)

However, this depends on the extent to which the 'victims' have opportunities to avoid harm, including the ability to negotiate a solution. These opportunities may be limited in the case of many impacts on biodiversity, because the impacts are diffuse, long term or uncertain.

Further, the 'impacter pays' principle is reflected in compulsory requirements for resource users to undertake conservation. Therefore, its adoption may achieve only limited compliance, and thus limited conservation outcomes, if resource users are forced to adopt practices they might not otherwise choose. In fact, individuals may have an incentive to try to avoid meeting costs under the 'impacter pays' principle. For example, they might remove some special biodiversity features from their land to avoid responsibility for them (Environmental Defense 2000, NSW Farmers 2001). Environmental Defense (2000) refers to this as the 'scorched earth' technique for avoiding responsibility. It may be possible to limit such behaviour by effective monitoring and enforcement but the costs of doing so may erode some of the efficiency benefits of adopting this principle.

Equity aspects

The 'impacter pays' principle has been considered an equitable approach for sharing the costs of biodiversity conservation because producers and consumers who benefit from biodiversity loss are required to bear the social costs of their actions. This occurs through increased costs to producers which may be passed on as increased prices to consumers. In the case of salinity, for example, Kennelly (1989, p. 3) remarks:

> This principle is economically efficient because it forces the polluter to accept society's valuation of salinity ... Not only does this principle encourage landholders to stop polluting, but it allows for an equitable distribution of costs among those who are directly profiting from the practices which cause salinity.

From another perspective, adoption of this principle may also be considered equitable because those who 'suffer' the burden of biodiversity loss ('victims') are not required to bear the costs of conservation.

3.2 'Beneficiary pays' principle

The 'beneficiary pays' principle (also known as the 'victim pays' principle — Siebert 1992) requires anyone who benefits from an activity to contribute to the

costs of undertaking it (MDBC 1996). In contrast to the 'impacter pays' principle which obliges (forces) resource users to pay for conservation, the 'beneficiary pays' principle can only be used to encourage *voluntary* conservation. This is because compulsory conservation is equivalent to an obligation under existing property rights. (Accordingly, introducing a new obligation for conservation would be equivalent to changing property rights.)

An important feature of the 'beneficiary pays' principle is the recognition that conservation activities may generate private benefits to specific individuals or groups of individuals, as well as public benefits to the community in general. Therefore, it may be appropriate under this principle for individuals or groups to contribute to the costs of undertaking activities that benefit them. It may also be appropriate for governments to contribute to the costs of conservation, on behalf of the general community, if the conservation generates public benefits.

Adoption of this principle is relevant to encourage voluntary conservation when resource users do not have an obligation under existing property rights, or when there is no financial incentive to undertake it (chapter 4).

Reflecting the potential private and public benefits of conservation, the MDBC (1996) has identified two components of the 'beneficiary pays' principle — 'user pays' and 'beneficiary compensates' — which should be applied together. The cost sharing guidelines of some other agencies, such as the Victorian State Groundwater Council (1997), also adopt this breakdown.

'User pays' principle

The 'user pays' principle requires anyone who derives a direct private benefit from a conservation activity (for example, landholders benefiting from increased on-farm production) to contribute to the costs of undertaking that activity (MDBC 1996). In practice, adoption of this principle often involves individual beneficiaries making payments to a collective provider, typically the government (Marshall 1998). An example is national parks that charge entry fees to users to recover or share some of the costs of conservation.

'Beneficiary compensates' principle

The 'beneficiary compensates' principle requires anyone (including government, on behalf of the general community) who derives an indirect benefit from an activity to contribute to the cost of undertaking it (MDBC 1996). This principle has also been

labelled the ‘provider gets’ or ‘community pays’ principle (Hanley et al. 1998; Kennelly 1989; Stoneham et al. 2000).

The general community could include the local, regional or state community and not necessarily society as a whole, particularly if benefits are largely localised. Under this component, governments may meet a share of the costs of conservation in recognition of the public benefits generated by conservation on private land. Thus, in contrast to the ‘impacter pays’ principle, a government’s cost share under the ‘beneficiary pays’ principle may be greater than zero as a result of the existence of public benefits.

Governments may implement the ‘beneficiary compensates’ component of the ‘beneficiary pays’ principle through a variety of means, including:

- non-financial ‘payments’ such as education and advisory services, and the provision of other goods and services in-kind;
- payment schemes whereby governments provide financial grants or concessional loans to the private sector to undertake particular conservation activities (these may involve uniform payments for each activity);
- annual financial payments to resource users to cease or reduce environmentally damaging activities or practices (often used with management agreements — see chapter 4);
- indirect financial incentives, such as tax deductions and rate relief; and
- payments for the acquisition of rights or land (Tobey and Smets 1996).

Efficiency aspects

Adoption of the ‘beneficiary pays’ principle may encourage efficient resource use by requiring the beneficiaries of conservation to pay the costs of it. Without a pricing system for conservation, demands for it may be excessive and more conservation may occur than is optimal for society. Charging consumers of conservation for its benefits can thus encourage a more efficient level of conservation (Kennelly 1989; Tilton 1995).

By requiring direct beneficiaries to share some of the costs of conservation, the ‘user pays’ component of this principle also reduces the call on government funding for conservation under the ‘beneficiary pays’ principle (box 3.1).

However, by requiring beneficiaries to pay for conservation, this principle can imply payment of subsidies from government, which Baumol and Oates (1975) suggest could reduce incentives for firms to develop or adopt ‘environmentally

friendly' technologies. This is because their adoption by firms would result in a reduction in subsidy payments to them in the future. By comparison, the 'impacter pays' principle generates an incentive for firms to adopt these technologies, since their adoption would reduce future liabilities for costs.

The potential efficiency benefits of adopting the 'beneficiary pays' principle may not arise if the user pays component is not applied because payment for costs in such cases may default to the broader community. The 'beneficiary pays' principle may thereby become synonymous with government funding under the 'beneficiary compensates' principle which would result in the community meeting costs that should be attributed to specific beneficiary groups. It is generally not efficient (or equitable) for governments on behalf of the general community to meet the cost of activities that generate private benefits (although some potential exceptions are discussed in chapter 4). Further, resources can be misallocated if adoption of the 'beneficiary pays' principle results in over-compensation of individuals to provide conservation.

Payment by government (subsidies) under the 'beneficiary pays' principle can have other potential disadvantages (Bromley 1996; Dumsday and Chisholm 1991; IC 1998; Marshall 1998; Stevens 1994; Tobey and Smets 1996).

- Subsidies could create incentives to damage the environment in order to qualify for payments to restore it (Marshall 1998) or create incentives to threaten to damage the environment ('greenmail').
- Once established, subsidies may be difficult to phase out and often increase over time and in breadth.
- Payments to resource users for undertaking conservation may reinforce perceptions of a right to degrade or to continue socially undesirable practices, and of a right to an entitlement when biodiversity is conserved or restored in future.
- Long term payments to resource users for undertaking conservation can be costly for governments with competing responsibilities; for example, the total estimated cost of the South Australian land clearing compensation scheme (established under the *Native Vegetation Management Act 1985* and removed in 1991) was around $70 million.

Equity aspects

The 'beneficiary pays' principle has been considered an equitable approach for sharing the costs of biodiversity conservation to the extent that it requires those who benefit from an activity to pay the costs (MDBC 1996). If beneficiaries of

conservation are not charged, it can reinforce perceptions among those involved in cost sharing arrangements that they are unfairly burdened with the costs of conserving natural resources (AACM 1995).

Adoption of this principle may also be considered equitable because the community contributes to meeting the costs of activities that otherwise may not be in the interests of the individuals required to undertake them.

However, this principle has been criticised as being inequitable where it requires those who 'suffer' the consequences of biodiversity loss to pay to stop the activities that cause suffering or harm (the 'victim pays' principle — Siebert 1992). This is because the 'benefits' of conservation often occur as costs of harm avoided. The principle has also been criticised as an inequitable basis for cost sharing if incorrectly applied, which has implications for efficiency as well (see above). Kennelly (1989, p. 5) observes that the 'beneficiary compensates' principle may provide an excuse for policy makers not to apply the 'user pays' component:

> Direct beneficiaries cannot always be identified so 'the community' is listed as the beneficiary. Thus BPP ['beneficiary pays' principle] incorrectly becomes CPP ['community pays' principle or 'beneficiary compensates' principle].

Thus, if specific beneficiaries are 'lumped' into the category of the general community and their private benefits are described as 'public benefits', the general community may be burdened with costs that individuals should meet under the 'user pays' component. This potential misapplication may occur because the 'beneficiary compensates' component is easier to adopt. It avoids the problems of having to identify specific beneficiaries, and requires identification of only:

- the suppliers of conservation services;
- a mechanism to transfer funds to them; and
- an appropriate level of conservation that they are to supply (Hanley et al. 1998).

3.3 Summary

- There are two broad cost sharing principles — 'impacter pays' and 'beneficiary pays'.
- The 'impacter pays' principle requires producers and consumers to meet the external costs of their decisions. Thus it generally implies that government's cost share for conservation is zero (unless the government is an impacter). This principle is reflected in policy approaches that compel resource users to conduct certain conservation activities or to refrain from activities or practices that have adverse impacts on biodiversity.

- The ‘beneficiary pays’ principle requires those who benefit from an activity to contribute to the costs of undertaking it. It recognises that biodiversity conservation may generate private benefits to specific individuals as well as public benefits. Thus, this principle has two components — ‘user pays’ and ‘beneficiary compensates’.
- The ‘user pays’ component requires anyone who derives a direct private benefit from an activity (for example, increased on-farm production) to contribute to the costs of undertaking it.
- The ‘beneficiary compensates’ component applies when activities generate indirect benefits experienced by the general community.
- When governments are involved in cost sharing arrangements under the ‘beneficiary pays’ principle, they need only pay the minimum necessary to trigger additional conservation by the private sector. Consistent with this approach, the community should ‘free ride’ on public benefits that may occur as by-products of private initiatives.

4 Some practical considerations

The previous chapter introduced the cost sharing principles. This chapter highlights some issues that may affect the decision about which principle to adopt as the basis for cost sharing.

4.1 Clarifying property rights and responsibilities

Clarifying property rights is an important step in determining whether the 'impacter pays' or the 'beneficiary pays' principle should be adopted as the basis for cost sharing. This is because property rights determine not only the entitlements or rights of resource users over resources, but also their responsibilities. These rights and responsibilities are given expression through law (common law or legislation), custom or tradition (chapter 2).

By determining individuals' responsibilities, well-defined property rights implicitly reflect the extent to which the community has a right to be free of the unwanted consequences of individuals' resource use decisions (Bromley and Hodge 1990), such as biodiversity loss. Thus, depending on how they are defined, property rights could imply an environmental standard that natural resource users are required to meet.

If property rights are well-defined — such that individuals have a responsibility to ensure a certain environmental standard — failure to meet that standard breaches this responsibility and may be considered to impose external costs on the community. In principle, the 'impacter pays' principle should be adopted to internalise external costs and promote efficient outcomes. This is equivalent to compelling individuals to meet their obligations under existing property rights (chapter 3). By comparison, application of the 'beneficiary pays' principle to activities generating external costs would effectively undermine the responsibilities imposed by existing property rights because individuals would not be forced to meet their obligations. Instead, application of the 'beneficiary pays' principle restricts the property rights of beneficiaries. For example, for a community to pay smokers not to smoke in restaurants is essentially deeming that smokers have the right to smoke in restaurants and the community does not have the right to a smoke free restaurant environment.

Nevertheless, in practice, adoption of the 'impacter pays' principle may provide an incentive to avoid paying for conservation, so implementation requires effective monitoring and enforcement. If these costs offset the positive incentive effects of adopting the 'impacter pays' principle, the 'beneficiary pays' principle may be preferred. However, the adoption of the 'beneficiary pays' principle would provide less incentive to constrain inefficient resource use over time (chapter 3).

In practice, property rights are not always clear and research and public discussion is required to clarify them. For instance, a duty of care might be used to define resource users' environmental responsibilities but, as Bates (2001) observes, it is not clear whether, and to what extent, duties of care for conservation apply in Australia. The NSW Farmers' Association (2001, p. 1) observes that exploring the status and meaning of a duty of care is an important element of clarifying property rights:

> The key to clarifying property rights for land and ensuring that the entire community equitably pays for public good environmental restrictions is to define an appropriate 'duty of care' for landholders.

Clarification of property rights is likely to be an on-going issue. This is because community expectations of what is considered an acceptable environmental standard may change over time to reflect a standard either higher or lower than that implied under existing property rights. For instance, community preferences for biodiversity conservation may increase in the light of improved understanding of the significance of biodiversity loss.

Property rights may change to reflect changing community expectations. This idea is not new as Bromley and Hodge (1990, p. 212) observe:

> Institutional arrangements are social creations, fashioned to serve collective objectives. The status quo property rights arrangements which serve agriculture so well exist for historical reasons and may not necessarily be appropriate for the future … To assume that these entitlements are necessarily pertinent and socially advantageous to the future is unwarranted. Shifting values and changing perceptions of the role of agriculture will surely bring about at least marginal shifts in property rights and policy entitlements.

Changes to property rights may evolve gradually over time or may be instigated by government. Common law generally evolves slowly, depending on the cases brought and judicial decisions made. Government can also change property rights through legislation. Government changes can be refinements to existing rights and responsibilities, or may be significant.

Frequent or significant changes to property rights can create uncertainty which adds to the costs of doing business. This means that government changes to property rights are only likely to be worthwhile if they reflect persistent (long term) changes

to community preferences. Thus these changes are unlikely to be in the interests of the community where changes in preferences are of a short term nature. Short term changes would likely need to be funded within the confines of existing property rights. If such changes reflected demands for a higher environmental standard, adoption of the 'beneficiary pays' principle is relevant to encourage additional voluntary conservation.

If community preferences for a higher environmental standard are sustained in the long term, governments may choose to change the property rights of resource owners or managers or to adopt the 'beneficiary pays' principle. Adoption of the 'impacter pays' principle in this case effectively implies a change in property rights. The choice would be influenced by the net benefits of each option. For example, some observers have argued that total annual payments made to landholders under the United States Conservation Reserve Program could have been better spent on outright land purchase by the government (Wiebe, Tegene and Kuhn 1996) — that is, the acquisition of property rights by the government. If property rights are changed to require a higher environmental standard, this could imply application of the 'impacter pays' principle if resource users subsequently failed to meet the new (higher) obligations.

Some groups may consider it unfair for the government to change property because this it can shift the cost burden of conservation. For example, resource users might be expected to conserve biodiversity to a greater extent than they were expected to previously. Thus, the West Bogan Landcare Group (2000, p. 1) remarks:

> … for the vast majority of the twentieth century, landholders have been encouraged/required to carry out property development at their own expense with some tax incentives to induce such activities, to then be told that all that went before was wrong and landholders must now wear the cost of the reverse activity or inactivity as the case may be, is quite absurd.

Franks (2000) considers that changes (restrictions) to property rights should not be imposed unless those who benefit from them are made to compensate those who suffer. In contrast, the New Zealand Ministerial Advisory Committee (2000, p. 40) suggests that compensation may be inappropriate:

> We all forgo rights, freedoms and bear opportunity costs for the public good. Urban dwellers are typically entwined in a web of land use regulation imposed for public good reasons. The important [factors are] the *extent* and the *implications* of any restriction. In particular, can the landholder still make reasonable use of their property as a whole?

This issue is not settled and requires further examination. Decisions by governments to change the definition of property rights are rarely taken lightly because of their social and economic implications. If a government were to decide to change

property rights to reflect changing social expectations, there may be arguments for temporarily offering resource users assistance to help them adjust.

4.2 Applying the 'impacter pays' principle

By internalising external costs, the 'impacter pays' principle may be applied to create incentives to reduce actions that have an adverse impact on biodiversity.

Identifying impacts and impacters

The 'impacter pays' principle requires costs to be identified, measured and apportioned across impacters. Costs incurred in meeting legal requirements, for example, would be the responsibility of individuals under the 'impacter pays' principle. Measuring the costs of degradation may not be straightforward, making it difficult to design or set the correct cost share under an 'impacter pays' approach. However, while it may not be possible to identify the share accurately, requiring impacters to meet at least some of the costs of addressing degradation may give them important signals about the true costs of resource use.

While the 'impacter pays' principle can be used to internalise the costs of biodiversity loss, governments may choose not to apply it in all cases because:

- it may not be technically possible or cost effective to identify and charge impacters, for example, where biodiversity loss result from past practices or where the cause of biodiversity loss is 'non-point source' degradation; and/or
- adoption of the 'impacter pays' principle is considered to impose excessive burdens on resource users.

Degradation resulting from past activities

At times, the loss of biodiversity may be attributed to decisions made by resource users long ago, or to decisions that were encouraged by previous government policies. In these cases, it may not be possible to apply the 'impacter pays' principle because the impacters responsible may no longer exist or may not be found (AACM 1995). From an economic perspective, there is little rationale to charge retrospectively for biodiversity loss because it is not possible to change past behaviour and correct past inefficiencies. As a result, the efficiency gains from applying the 'impacter pays' principle may not apply for the case of degradation caused by past activities. Further, it may be considered inequitable to penalise

impacters retrospectively for complying with the accepted legal frameworks and policies of the past (Tilton 1995).

For these reasons, Tilton (1995, p. 139) argues that financing the repair of past degradation should be based on the 'beneficiary pays' principle, which is likely to imply some funding from taxpayers:

> Efficiency and equity are better served if government pays for cleaning up past pollution.

Non-point source or diffuse degradation

For some causes of environmental degradation — such as non-point source — it may not be possible to determine what activities by whom and in what proportion are responsible for biodiversity loss. This difficulty is complicated further by the fact that environmental impacts from resource use depend not only on a particular activity, but also on how, where and possibly when it is conducted (Tobey and Smets 1996). It may not always be possible therefore to determine the appropriate charge to impose on impacters. In other cases, while it may be possible to identify impacters and the value of the charges, it may not be possible or cost effective to charge individuals or hold them responsible for their impacts.

According to Marshall (1998), the difficulty of applying the 'impacter pays' principle to non-point source degradation has often been used as a justification for not applying it at all. Similarly, Tobey and Smets (1996) consider that the difficulties partly explain the limited amount of cost internalisation in agriculture. However, while apportioning responsibility and the costs of biodiversity conservation across specific individuals may be difficult, the 'impacter pays' principle could be applied on an approximate basis by making groups of individuals collectively responsible for conservation outcomes in a sub-region. This would encourage individual members of the group to monitor others' behaviour (Bromley 1996). While this less precise approach is not ideal, application of the 'beneficiary pays' principle as an alternative an also result in similar imprecision (see below) if specific beneficiaries, and the magnitude of their benefits, are not identified and the general community bears a portion of their costs.

Marshall (1998) notes that apportioning costs to groups under the 'impacter pays' principle appears to meet greater resistance than apportioning costs to the general community under the 'beneficiary pays' principle, even though both approaches may be imprecise. It is not clear why inaccurate allocation of costs to the community is any more acceptable than inaccurately allocating costs among impacters. Such tensions highlight the need to develop better tools for measuring

and charging for non-point impacts to enable more accurate adoption of the 'impacter pays' principle.

Equity considerations

Adoption of the 'impacter pays' principle may have social consequences as it may add significantly to the costs faced by resource users (although some costs may be passed on to consumers through higher prices). This may be important especially if the commercial viability of resource users is uncertain. For example, Martin, Lubulwa, Riley and Helali (2000) observe that the majority of average farm businesses in Australia currently earn a rate of return of less than 3 per cent. Biodiversity conservation could therefore be a commercially unattainable investment for many individuals.

Some commentators consider that the financial viability, or otherwise, of resource users should not be used as a reason to excuse them from the 'impacter pays' principle. For instance, the Sustainable Land and Water Resource Committee (1999, p. 3) considers that:

> … poor enterprise viability or management is not a justification for governments to substitute public funds for landholder funding of remedial works.

Similarly, Marshall (1998) considers that such problems should be addressed through access to temporary credit rather than through release from responsibility for the costs that resource users' activities may impose on others.

Nevertheless, financial hardship and political acceptability could be expected to affect compliance levels among resource users. The more difficult the circumstances for individuals reliant on practices that degrade biodiversity, the greater the level of monitoring and enforcement that is likely to be required to ensure conservation under an 'impacter pays' approach. Since monitoring and enforcement can result in considerable implementation costs, this can reduce the benefits of applying the 'impacter pays' principle and may compromise the achievement of conservation outcomes.

For these reasons, governments may choose not to adopt the 'impacter pays' principle. Alternatively, governments may choose to apply the 'impacter pays' principle but offer assistance to resources users in the short term to help them adjust to its adoption (box 4.1).

Issues surrounding the social consequences of cost sharing arrangements, and the possible need for adjustment assistance, are complex and require further

examination on a case by case basis. This should involve consideration of the implications of any precedents that may be established.

Box 4.1 **Adjusting cost shares to provide assistance**

For social reasons, governments may consider phasing in additional responsibilities for individuals to ensure biodiversity conservation. One way to do this might be to adjust cost shares in favour of individuals. This could involve, for example, adopting the 'beneficiary pays' principle in the short term to ease the transition to eventual adoption of the 'impacter pays' principle or it could involve governments meeting costs that would otherwise be the responsibility of individual beneficiary groups under the 'beneficiary pays' principle.

Binning and Young, for example, consider that short term adoption of the 'beneficiary pays' principle may be justified to gain acceptance of more stringent environmental responsibilities and on equity grounds since more stringent requirements effectively re-define existing property rights. However, they argue that adjustment assistance should only occur when it is associated with a permanent change in property rights attached to land title, so that a permanent change in land use practices is guaranteed.

An alternative approach to help resource users adjust is to introduce cost sharing arrangements gradually or with advance warning. For example, the Victorian State Groundwater Council introduced the restructure of the water sector gradually by freezing groundwater charges for two years, while it developed a framework for ongoing management of groundwater resources and examined cost sharing arrangements between groundwater users and the government. However, this approach may pose risks to the environment if it encourages or enables resource users to remove or destroy biodiversity assets on their land to avoid incurring costs for retaining or managing them in future (chapter 3).

Sources: Binning and Young (1997); Victorian State Groundwater Council (1997).

4.3 Applying the 'beneficiary pays' principle

The 'beneficiary pays' principle allocates costs on the basis of who benefits from conservation. It requires policy makers to identify beneficiaries and to assess and apportion benefits across them.

Identifying benefits and beneficiaries

As outlined below, adoption of the 'beneficiary pays' principle may not represent a trouble-free alternative to adoption of the 'impacter pays' principle. However, it appears to be more widely used as a basis for environmental policy in agriculture, partly because it has more support from resource owners (Tobey and Smets 1996).

A distinction needs to be made between the private and public benefits of conservation activities to apply the 'user pays' and 'beneficiary compensates' components of this principle. Private benefits of conservation accrue to resource users (such as landholders) and other individuals. Examples include the commercial value in hay and seed production from planting perennial plant species such as lucerne, and benefits such as stock shelter, prevention of erosion, provision of drought feeding opportunities and aesthetic improvements from native vegetation management (Coorong and Districts Local Action Plan Steering Committee 2000; Crosthwaite 1998). Public benefits accrue to the broader community.

AACM (1995) argues that it can be easier to identify beneficiaries and thus apply the 'beneficiary pays' principle than to identify impacters and apply the 'impacter pays' principle. However, identifying specific beneficiaries (other than the individual directly undertaking a conservation action) under the 'user pays' component may be no less difficult, especially where the precise value of biodiversity enhancement is difficult to assess or where intangible benefits are involved. Despite the difficulties, it is important to identify the specific beneficiaries of conservation as far as possible (given the costs of doing so) to avoid excessive calls on government budgets. For instance, 'non-consumptive' beneficiaries, such as tourists, should not avoid the 'user pays net' (Madden 1996) as excluding such users can reinforce perceptions that some uses of natural resources are, and should be, free.

The share of costs attributable to a government under the 'beneficiary compensates' component will depend on the level of public benefits generated. Governments should contribute funding only where activities generate net public benefits. Further, the 'beneficiary compensates' principle should generally be used to allocate only the costs of conservation that resource users are not already legally required to undertake under existing property rights (see, for example, Hajkowicz and Young 2000). This is because it is not the purpose of government to meet individuals production costs, including the costs of complying with legal requirements.

When government funding is provided, it does not necessarily need to reflect fully the public benefits generated by an activity, and it need be up to only a level that triggers the necessary investment from the private sector (SLWRMC 1999, chapter 3). Thus, payments from governments should reflect only the net cost to resource users of undertaking additional conservation, as limited by the following criteria:

- Payments to individuals should be net of any benefits — financial or otherwise — that they or other specific beneficiaries derive from the activity. That is, the 'user pays' component should also be applied.

- Payments to individuals to cover the costs of inputs should be net of other payments or subsidies from governments that reduce the cost of inputs to avoid 'double payment'.
- Payments should only return resource users to their pre-conservation level of wealth; individuals should not be better off as a result of payments provided by governments for biodiversity conservation.

Since adoption of the 'beneficiary pays' principle may require beneficiaries to pay for conservation services that they have not paid for previously, application of this principle can have social implications. To help individuals adjust to new arrangements, governments may consider providing assistance or introducing new arrangements gradually (box 4.1).

Funding the costs of conservation under the 'beneficiary pays' principle is likely to be an expensive exercise for governments, particularly compared with approaches reflecting the 'impacter pays' principle.

Valuing benefits and attributing cost shares

Cost sharing arrangements under the 'beneficiary pays' principle can be determined using various approaches to estimate benefits and thus attribute costs:

- careful identification of beneficiaries and the proportion of benefits they receive — this focuses on quantifying in detail the expected benefits accruing to beneficiaries from an activity and is the approach suggested by the Murray-Darling Basin Commission (MDBC 1996);
- a 'rule of thumb' to approximate who benefits and thus who should be responsible for meeting the costs; or
- auctioning of payments for the provision of biodiversity conservation services.

As a general rule, the more detailed the method for valuing and attributing benefits, the more expensive and time consuming that method will be. The most appropriate method will reflect a trade-off between the cost of using the method and the scale of the net benefits expected to accrue.

Detailed impact assessments

Detailed impact analysis (on the basis of present values) can indicate where the benefits and costs of an activity accrue, their magnitude and whether the activity results in net benefits overall and thus whether it should proceed.

The intangible benefits of conservation can be difficult to estimate, but some methods do exist. At the simplest level, decision makers may estimate a minimum value of intangible benefits that an activity needs to generate to justify the costs of undertaking it (a 'threshold' analysis). (Information on methods to estimate intangible environmental benefits can be found in Bennett 1998; Freeman 1999; Hanley, Shogren and White 1997.)

The most detailed approaches for identifying and evaluating the impacts of a conservation activity are likely to involve cost benefit analysis using discount rates to account for benefits and costs that occur at different points in time. Such approaches may even go as far as identifying impacts at fine spatial levels. Thus, they can provide clear guidance in determining cost sharing arrangements and how payments should move between resource users, other individuals and governments. However, these approaches, particularly when conducted at a very fine spatial scale, can be time consuming and expensive and may be feasible only for large projects at a regional or catchment level. Further, they may not be necessary where expected benefits are mainly public (Crosthwaite 1998). Boxes 4.2 – 4.4 outline three cases involving detailed approaches for establishing cost sharing arrangements.

Box 4.2 **Determining cost sharing arrangements — Goulbourn Broken Catchment**

The Goulburn Broken Catchment in Victoria covers around 2.4 million hectares. The Catchment Management Authority recently completed a Native Vegetation Plan, which outlines activities needed to address biodiversity loss and increase native vegetation levels. Such activities include for example, fencing and de-stocking to protect remnant native vegetation and the establishment of vegetation corridors to connect habitats.

A cost sharing arrangement to fund the activities will be determined using information generated from a series of environmental and economic models. A study has been undertaken to compile an inventory of the key goods and services produced in the catchment and to identify how these are supported by natural processes (ecosystem services). A study will be conducted to assess the impacts on outputs of varying the levels of ecosystem services provided across the region. The benefits of these different levels of ecosystem services — both public and private — will be estimated across the region using data such as changes in the market value of production and the costs of substituting ecosystem services with technologically available replacements (for example, the cost of replacing natural predators with pesticides).

It is intended that cost shares for environmental activities identified through this study will be determined by the resulting spread of benefits and costs.

Sources: Crosthwaite (1998); CSIRO (1999); Goulburn Broken Catchment Management Authority (1999); Goulburn Broken Catchment Management Authority (2000).

Box 4.3 **Cost sharing — the Coorong District Local Action Plan**

The Coorong is located in South Australia. The Coorong and Districts Local Action Plan (LAP) addresses various environmental issues facing the region, including dryland salinity, erosion, water quality decline and feral species invasion. Projects under the LAP are eligible for government funding if they improve the environment. The LAP specifies a number of priority activities and project proposals that address a priority activity are eligible for higher levels of government funding. Priority activities include:

- fencing off areas of native vegetation, where the funding level depends on the size of the area to be fenced and the 'boundary-to-area' ratio;
- protecting threatened or endangered species or communities; and
- protecting areas undisturbed by human activity.

Extra incentive payments are also available to landholders who adhere to specific guidelines in undertaking conservation activities. Bonus payments for revegetation, for example, are available if landholders meet any of the following criteria:

- planting only local indigenous species;
- planting species of the same habitat type as that of the original native vegetation;
- planting five understorey species for every tree species;
- having a minimum planted area of 5 hectares;
- having corridors at least 50 metres wide that link at both ends to existing natural vegetation of at least 10 hectares each; and
- planting priority vegetation types.

Bonus payments increase as a project proposal meets more criteria.

Detailed cost sharing arrangements under the LAP are based on the 'beneficiary pays' principle. The framework recommends cost shares for landholders, the local community and the wider community, based on each sector's share of present value market and nonmarket benefits accruing from particular activities.

Cost shares are established for activities such as native revegetation, farm forestry, saline land reclamation and remnant vegetation, and wetlands and habitat conservation. The cost shares for each of these activities differ according to the private and public benefits they generate; for example, landholders may pay up to 93 per cent of the cost of activities aimed at saline land reclamation, while the local community pays 3 per cent and the wider community pays the balance. The higher cost share of landholders implies that these activities generate significant private benefits. Conversely, landholders pay only 6 per cent of the costs of activities aimed at remnant vegetation, wetlands and habitat conservation, while the local community pays 17 per cent and the wider community pays 77 per cent. This arrangement implies that these activities generate mainly public benefits that accrue to the general community.

Sources: Coorong and Districts Local Action Plan Steering Committee (1997); Dames and Moore (2000).

Box 4.4 **Determining cost sharing arrangements — Liverpool Plains**

Liverpool Plains is a region in northern New South Wales experiencing various natural resource problems, including dryland salinity, flooding and soil erosion. To address these issues, a modelling approach to evaluate on-ground activities was undertaken to provide input to the Liverpool Plains Catchment Investment Strategy. The strategy outlines key activities that need to be undertaken in the catchment to address natural resource problems and approaches for sharing the costs of those activities.

The recommendations of the strategy are based on a series of biophysical and economic models developed for the region. These models divided the catchment into several biophysical regions or 'land management units' (LMUs) for which key physical problems (such as soil erosion) were assessed and mapped. Potential activities to mitigate these problems were identified ('recommended technical actions') along with the benefits to each LMU of undertaking them. The total estimated commercial benefits of undertaking the recommended technical actions for the whole catchment were around $100 million over 25 years, while the nonmarket benefits were estimated to be at least $70 million.

The incidence of these benefits (along with the costs of the recommended technical actions) across the LMUs within the region was also identified. The models indicated an uneven distribution of costs and benefits across the region; for example, eight of the fourteen LMUs were expected to experience a net loss from undertaking the recommended technical actions because many of the benefits of their activities would accrue downstream. The ratio of expected benefits to costs from undertaking activities in each LMU varied from over 9:1 for 'recipient' LMUs to 1:14 for 'donor' LMUs.

The Liverpool Plains Land Management Committee considered that the uneven distribution of benefits and costs across the catchment emphasised the need to develop intra-catchment cost sharing arrangements. In other words, the direct beneficiaries of some activities within the catchment should share the costs of activities undertaken in other LMUs. This is consistent with the 'user pays' component of the 'beneficiary pays' principle.

Source: Liverpool Plains Land Management Committee (2000).

Rules of thumb

Rules of thumb, based on an approximation of the expected benefits and costs of a conservation activity, may be used to determine cost sharing arrangements. They may not be as accurate as approaches involving detailed evaluation, but may be useful where frequent cost sharing decisions are made for activities that are relatively low cost. In these cases, it may be cost effective to resort to less detailed but cheaper means to determine cost sharing arrangements.

An example of a rule of thumb is provided by the maximum 1:1 cost share ratio adopted by some programs of the Natural Heritage Trust. Under this approach, the Commonwealth Government provides funds for projects that contribute at least one dollar of proponent (which may include other levels of government) funding for every dollar of Commonwealth funding (box 4.5). The rationale for adoption of this rule is unclear.

Box 4.5 **Cost sharing — some programs of the Natural Heritage Trust**

The Natural Heritage Trust supports a variety of conservation programs, including Bushcare and Landcare. It offers funding assistance for community-based projects (projects run by one individual are considered only in exceptional cases) that benefit the environment and that offer high returns on government funds. Project proposals are assessed at both the regional and State levels, and any project deemed suitable for funding must also be approved at the Commonwealth level.

A regional assessment panel, comprising members of the catchment management authority, the community and a technical assessment panel, ranks projects according to their value for money (assessed against similar projects) and whether they are considered to have a high likelihood of achieving their stated objectives.

Most Natural Heritage Trust programs assign cost shares according to the maximum 1:1 rule. (Exceptions include land acquisition for the National Reserve Program, which allows up to two dollars of Commonwealth funding for each proponent dollar.) Only in rare cases does Commonwealth funding exceed 1:1 — usually only where very high biodiversity values are at stake and proponents are unable to meet half the cost of the project.

The Natural Heritage Trust also employs other rules of thumb in setting cost shares. Under Landcare and Bushcare, for example, government funding rates for fencing are fixed on a per metre basis. These rates are determined according to the average cost of fencing across Australia, but the rate may be increased if the terrain is particularly difficult (implying that the project is more costly), or if the landholder agrees to covenant the property (implying that environmental benefits are likely to be greater because they are secured for the long term).

Sources: ANAO (1998); NHT (1999); Department of Natural Resources and Environment (Vic.) (pers. comm., Bendigo, 25 October 2000).

Rules of thumb may be appropriate for small projects to reduce administration costs or to reduce the potential for strategic behaviour on the part of resource users, which may occur in individual negotiations for management agreements (Hanley et al. 1998). However, a drawback of this approach is that providing the same government cost share for various activities may not adequately account for the variation in costs and public and private benefits generated by a given activity across landholdings or regions. A set subsidy for tree retention may not take into account the varying benefits of tree retention, for example, in one region as opposed

to another, or the variation in benefits of retaining one species of tree over another. This may result in a higher (or lower) cost share from the government than would be appropriate through a more careful and individual determination of cost shares which has implications for efficiency. The tradeoff between less accuracy and the savings in implementation costs of this approach must be considered in the determination of cost sharing arrangements.

Auctions

Auctions can be used to determine and allocate cost shares under the 'beneficiary pays' principle, by-passing the need to calculate and attribute benefit shares to individuals specifically. Auctions allow market forces to dictate cost shares and to select individual projects for funding. Landholders bid for the amount of government funding or compensation required to undertake biodiversity conservation on their land.

The concept of auctioning payments for biodiversity conservation is relatively new in Australia. The Victorian Government is developing a potential auction system for the conservation of native vegetation in the first instance (Forster 2000) and the Liverpool Plains Land Management Committee (New South Wales) intends to trial auctions in connection with the World Wide Fund for Nature (Moss 2000). In contrast, the US Department of Agriculture has used auctions for conservation for some time. Its auction process incorporates an 'environmental benefits index' priority system (see below) to compensate landholders for diverting land from agricultural production to the provision of conservation services (box 4.6).

Auctions for determining cost sharing arrangements provide a means of dealing with incomplete information. Governments generally have incomplete information about the costs to landholders of undertaking conservation and about the private benefits that accrue from it (Stoneham et al. 2000). Fixed payments to landholders for undertaking particular activities can over-compensate those landholders with relatively high private net benefits, as well as those with low marginal damage abatement costs. (When fixed payments are used to encourage voluntary conservation, undercompensation is unlikely to occur because landholders will not volunteer to undertake conservation if the payment is insufficient.)

Auctions can help overcome these information problems and the potential for over-compensation by enabling governments to determine the minimum amount necessary to trigger additional voluntary conservation. Auctions reveal to governments the cost of conservation activities because each bid indicates the minimum amount of funding that a landholder requires (the landholder's opportunity cost net of any private benefits) (Stoneham et al. 2000). Through

competitive bidding, the participation of many bidders in a well designed auction allows the government to obtain conservation at least cost, promoting value for money (Moss 2000; Reichelderfer and Boggess 1988).

Box 4.6 Auctions for biodiversity conservation — the Conservation Reserve Program

The US Department of Agriculture (USDA) runs the Conservation Reserve Program, a voluntary program which offers compensation to landholders to divert land from production to reserves to promote biodiversity conservation. While originally established in 1985 to reduce soil erosion, the program has since expanded to include the objectives of improving water quality, providing wildlife habitat and addressing other environmental concerns. Each Conservation Reserve Program contract runs for ten years, after which time it expires. Landholders may renew contracts only by reapplying for funding through the auction process.

The costs to landholders of providing environmental services include the:

- opportunity cost of removing the land from agricultural production, including the net present value of earnings forgone;
- costs involved in establishing/converting and maintaining the land in a Conservation Reserve Program acceptable state; and
- possible associated decreases in land value.

The Conservation Reserve Program uses an auction system to obtain bids from landholders for the minimum annual rental payment the landholder will accept from the government to divert land from agricultural production to the establishment and maintenance of a protective cover of vegetation or to other approved conservation practices. Landholders may choose to place a bid that reflects the full cost of the service provision, or some portion of the total cost. Bids may be discounted by the landholders' expected private benefits such as personal satisfaction from participating in environmentally beneficial activities.

The cornerstone of the auction system is the environmental benefits index (EBI) which ecologists constructed to express the relative scarcity of different environmental goods and services. By establishing priority activities and areas for conservation, this index signals to landholders the relative value of various environmental services. It also assists the government in ranking the applications for funding, based on the cost effectiveness and priority value of the bids.

Apart from scoring relatively highly on the index, landholders may improve their chances of obtaining funding by electing to bear a higher cost share. Information is provided by the government to help landholders identify fair land rental values for various locations, which enables landholders to more easily identify a competitive cost share bid.

In 1999, 36 million acres of land were under contract to provide environmental services under the Conservation Reserve Program. Community acceptance in the United States is so high that Congress aims to expand the total area available by another 12 million acres in the next signup in 2002.

Sources: Amosson et al. (2000); Stoneham et al. (2000); Wiebe, Tegene and Kuhn (1996).

Another advantage of auctions for determining cost shares is that they may be designed to enable public funding to be directed at high priority conservation issues. Variations in environmental benefits produced by a given activity across individuals or regions are accommodated by an environmental benefits index which provides a common base for comparing different habitats and environmental outcomes. Different habitats may be allocated points in the index according to their scarcity and ecological importance, for example, (Stoneham et al. 2000). Thus, the index can reflect particular priorities, and government funds can be directed to those activities that perform well against the index.

A key limitation of the auction approach is that it may be relevant only for encouraging voluntary conservation and it is not relevant if all landholders need to be involved in undertaking the conservation activity. Further, the benefits of achieving voluntary conservation at minimum cost may not be realised if there are only a few bidders, because the possibility of collusion arises. Moreover, it is likely to take considerable time to develop an assessment system to evaluate conservation proposals or bids on a consistent basis. However, alternative approaches may also encounter similar hurdles; for example, it can be administratively costly to conduct one-to-one negotiations to establish conservation agreements, given the time required (Stoneham et al. 2000).

4.4 Ensuring compliance

To ensure that individuals or groups who receive funding from beneficiaries for biodiversity conservation meet their obligations, arrangements allowing for periodic monitoring, enforcement and review of outcomes need to be established. When government funding is provided, the establishment of these mechanisms should improve both the effectiveness and accountability of government involvement.

Monitoring and review systems

Government payments through cost sharing for biodiversity conservation should be conditional on the achievement of conservation outcomes. It is difficult to ensure this because biodiversity outcomes may take a long time to become apparent. However, it is possible to monitor short term and medium term indicators of progress that are linked to the achievement of longer term outcomes. Another condition that may be attached to the provision of government funding for conservation, is to provide funds only for activities that are specified as part of a regional or catchment management plan, so funds are more likely to be directed at priority conservation issues. Alternatively, or in addition, payments could be

provided only on satisfactory completion of the conservation activity (MDBC 1996).

A minimum requirement for ensuring compliance in cost sharing arrangements is the establishment of monitoring and review arrangements. These should encompass regular ongoing monitoring of specific conservation activities as well as reviews of the cost sharing arrangements.

Management agreements

A management agreement is a voluntary contract between a landholder and another party, such as the government or a conservation group, regarding the use and management of land. Binding management agreements restrict the types of land uses that may be undertaken or they remove or amend entitlements (Binning and Young 1997). As such, they re-define property rights over land because individuals agree to surrender some of the entitlements they would have had under the original property rights structure, or agree to meet new obligations that would not otherwise necessarily apply (Wiebe, Tegene and Kuhn 1996). However, nonbinding agreements also exist which focus on formally recognising individuals' conservation efforts without necessarily prohibiting certain current or future land uses or entitlements (Binning and Young 1997).

Management agreements may be permanent in nature (termed 'covenants') or temporary. Both types may have roles to play in encouraging commitment to conservation and in ensuring the delivery of conservation outcomes by linking payment to the individual's involvement in an enforceable and lasting arrangement. Temporary agreements may secure the involvement of those who are interested in conservation but who are not prepared to enter into a permanent agreement. Covenants are attached to the title of land and can allow management agreements to survive changes in property ownership. This ensures that the conservation outcomes achieved by one owner are not 'undone' by future owners of the site.

As individuals volunteer to participate in these arrangements, they may deliver higher levels of compliance than can be delivered by some other conservation arrangements involving cost sharing. Crosthwaite (1998), for example, considers that management agreements may offer the best prospects for securing the future of Australia's native grasslands. On the other hand, management agreements can be costly to establish and enforce because they are site specific. Further, on re-negotiation of fixed term agreements, landholders may have an opportunity to 'hold a valued environmental asset to ransom', potentially adding to costs (although these problems may be overcome by requiring the return of funds previously paid if the agreement cannot be re-negotiated) (Binning and Young 1997). As a result of the

costs, Binning and Young (1997) recommend that management agreements be used to target unique areas, where it is a priority to secure a particular ongoing management approach or to secure a permanent change in management practices in exchange for a once-off incentive payment. However, they argue that ongoing management agreements are not suitable for meeting broad conservation objectives.

Due to the costs of establishing and enforcing management agreements, Colman et al. (1992) consider that conservation goals may be achieved at lower cost by outright land purchase by the government — in a sense, the acquisition of all property rights by the government. To this extent, the activities of agencies such as the Trust for Nature (Victoria) in land purchase and the establishment of covenants are significant. The Trust purchases land, establishes a covenant upon it and then sells it to private buyers sympathetic to its conservation goals (Trust for Nature 2000a; 2000b). The work of the Trust illustrates that funding for conservation on private land need not necessarily be reliant on government budgets. Funds may be forthcoming from other individuals, philanthropic groups or industry.

In Australia, management agreements commonly exist between landholders and either government agencies or non-profit environmental organisations, with the latter paying landholders for undertaking (or not undertaking) certain activities. Under the Bushcare program of the Natural Heritage Trust, cost shares on the part of the Commonwealth government may vary according to the level of the proponent's commitment to conservation. Government funding is often higher if landholders enter into a management agreement, and higher still for the greater degree of certainty and long term conservation delivered by a covenant (Bushcare, pers. comm., Canberra, 7 November 2000).

Management agreements may be considered contracts for the purchase of environmental services from landholders or rental payments for restricting the use of land (Hodge 1997). Management agreements to achieve environmental outcomes are also in place in the United Kingdom, the United States and New Zealand.

Accreditation schemes

Market approaches involving environmental labelling or accreditation can also promote compliance with conservation goals. Environmental labelling or accreditation schemes may occur where suppliers are able to differentiate their products to consumers on the grounds of environmental 'superiority' (for example, if they are produced using environmentally benign practices).

By allowing only those suppliers who invest in biodiversity conservation to carry an environmental label or to access a niche market, these mechanisms allow customers

to discriminate and express a preference between suppliers who do and do not invest in biodiversity conservation. These mechanisms can be effective for encouraging conservation provided it is possible to segregate the market for environmentally friendly products and provided the product can capture the benefits of doing so through higher prices and/or increased sales. If this occurs, these mechanisms can allow biodiversity values, such as existence values, to be expressed in the market place.

An environmental management system is a method for certifying that suppliers' products are environmentally sound. The product will be certified or labelled only if it is demonstrated that it is produced in a way that is consistent with environmentally sensitive practices.

Environmental management systems ensure that the proceeds from the sale of these goods are directed back to the environment partly because only those producers that invest in biodiversity conservation can sell the certified product. Thus, product accreditation can generate private sector funding needed to invest in biodiversity conservation. It also provides incentives for other suppliers to invest in conservation to join the scheme in the expectation of receiving higher returns.

By creating a market incentive to conserve biodiversity, these market based schemes may reduce calls on government budgets to fund conservation activities through cost sharing arrangements. As a result, government encouragement of these industry initiated schemes in the initial stages to help identify their potential may be worthwhile if the long term success of such schemes reduces the call on government support for conservation. The New Zealand Ministerial Advisory Committee (2000) recommends that governments should facilitate and encourage early adoption of biodiversity related criteria in accreditation schemes in the future.

An industry initiated accreditation scheme reflecting environmental criteria already in place is that between onion growers in Tasmania and Britain's largest supermarket chain, Tescos. Tescos' supplier, Field Fresh, offers a premium price to Tasmanian onion growers who meet the Nature's Choice Quality Assurance system, which includes a wildlife and landscape conservation component (ANZECC 2000). In Australia, the Liverpool Plains Land Management Committee (New South Wales) is considering linking its cost sharing arrangements to product accreditation under an environmental management system (box 4.7).

Box 4.7 **Linking cost sharing and accreditation — Liverpool Plains**

A salinity management strategy has recently been finalised for the Liverpool Plains catchment in New South Wales. Under the strategy, landholders are encouraged to participate in sustainable land management practices to reduce salinity and associated problems.

The sustainable land management options identified in the strategy vary in stringency. To increase incentives to adopt the more stringent practices, it is proposed that greater financial assistance will be provided to landholders adopting stricter practices and lower financial assistance will be provided to those adopting less strict practices.

The most stringent form of sustainable land management practices recommended under the salinity management strategy involves adoption of the ISO 14000 series of environmental management standards, which are designed to provide an internationally recognised framework for environmental management and evaluation.

To encourage adoption of these practices, it is proposed that a product accreditation scheme be developed for suppliers adopting the ISO 14000 standards. Products from these suppliers could be marketed as being environmentally sustainable in the hope that these suppliers could secure a niche market and/or higher product prices. If this is achieved, then the commercial benefits of producing product under the ISO 14000 standard may be sufficient to encourage other landholders to adopt environmentally sustainable practices.

Sources: Liverpool Plains Land Management Committee (2000); Liverpool Plains Land Management Committee (pers. comm., Tamworth, 8 November 2000).

4.5 Summary

- Clarifying property rights is a fundamental step for determining which cost sharing principle to apply.
- In principle, the 'impacter pays' principle should be adopted to internalise external costs and promote efficient outcomes.
- There may be cases where governments choose not to adopt the 'impacter pays' principle because it is not technically feasible or cost effective to do so or because it is considered to generate an excessive burden on resource user. In these cases, the 'beneficiary pays' principle may be preferred.
- Where the community asks resource users to meet a higher level of environmental amenity than required under existing property rights, the 'beneficiary pays' principle is relevant to encourage voluntary conservation in the short term.
- If community demands for a higher level of environmental amenity persist in the long term, governments may choose to either share costs under the 'beneficiary

pays' principle in the long term or may consider changing property rights to reflect new community expectations. The choice between these options will depend on the net benefits of each.

- Cost sharing arrangements can have social implications. Governments may therefore choose not to adopt a particular cost sharing principle on this basis or may choose to adjust cost shares in favour of individuals in the short term to help them adjust.
- When governments provide funding for conservation under the 'beneficiary pays' principle, they should only fund costs that are incurred in generating net public benefits. In principle, government funding need not reflect public benefits in full and need only be the minimum necessary to trigger additional conservation by the private sector.
- Auctions may be one way to determine the minimum amount required from governments to encourage additional conservation by the private sector and may also allow government funds to be directed to low cost providers of conservation.

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