



Department of the Environment and Heritage

**ENVIRONMENT AUSTRALIA SUBMISSION TO
THE HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON
ENVIRONMENT AND HERITAGE
INQUIRY INTO
PUBLIC GOOD CONSERVATION**

July 2000



EXECUTIVE SUMMARY

This submission sets out Environment Australia's suggested approach to public good conservation. It highlights several key points which should be considered when determining the most appropriate way in which the costs of public good conservation might be shared between governments, private landholders, and other stakeholders.

The policy implications of the submission can be summarised into seven main messages. These are outlined below.

1. Conservation activities are an essential part of ecologically sustainable development, maintaining the natural resources that support current and future human activity and quality of life.
2. The case for government contributions to public good conservation activities is strongest when:
 - the agent best placed to undertake conservation activities is not ethically or legally required to undertake the conservation activity;
 - the activity can be shown to provide a net benefit to society;
 - the general community is willing to contribute to the cost of conservation activities on equity grounds or to secure greater conservation benefits; and when
 - private implementation costs of a conservation activity are greater than expected private benefits.
3. As a general rule, parties should be expected to meet the costs of achieving socially acceptable environmental standards, and assistance should be limited to circumstances where parties are moving beyond these standards. To ensure that the most affected groups are treated reasonably and equitably this should take account of the evolution of perceived responsibilities and standards – particularly in relation to landholder's duty of care.
4. In some instances it may be appropriate to provide assistance to conservation activities that are required to meet current standards or to address social costs. These may include situations where:
 - diffuse sources of degradation cannot be identified;
 - there is a desire to support a transition to sustainable use of resources;
 - remediation is beyond the financial resources of some landholders; and
 - current degradation was caused by historical unsustainable resource use, which was considered appropriate at the time, or supported by government policy.
5. In the absence of funding constraints, the costs of undertaking public good conservation activities should be shared between various parties – including governments – in proportion

to the distribution of benefits. This might involve applying different cost-sharing ratios to different categories of environmental projects according to the extent of 'public good' involved.

6. In practice, however, public funds are limited and can be used to greatest advantage where governments are able to contribute funding based on the gap between the implementation costs of the conservation activity and the private benefits to landholders. This supports the use of existing cost-sharing rules (such as those used in the NHT), complemented by more flexible approaches to cost-sharing where existing arrangements may be impeding activities with substantial public benefits.
7. Greater conservation outcomes can be achieved with public funds if attention is given to identifying situations where:
 - assistance for public good conservation will reduce other budget outlays - such as the New York approach to improving water quality through assisting land use changes rather than construction of a filtration plant.
 - others (including business and philanthropists) may be willing to contribute; or
 - conservation goals may be promoted through the creation of markets for natural resources.

INTRODUCTION

Based on the inquiry's terms of reference (Attachment A) this submission sets out Environment Australia's suggested approach to public good conservation. It focuses on the major principles and requirements that should be taken into account in considering different policy approaches to achieving conservation outcomes, and in determining the most appropriate way in which the costs of public good conservation might be shared between governments, private landholders, and other stakeholders. This approach may further evolve following decisions by the Commonwealth on natural resource management (NRM) policies now under development.

The submission is divided into five main sections. It begins by discussing the characteristics of conservation activities in Australia, and the nature of public good conservation. The second section suggests that public good conservation policy should be effective, efficient, and equitable, and identifies a number of more detailed principles to guide policy development to these ends. This discussion provides the basis for the third section, dealing with the principles to guide cost-sharing arrangements between private landholders, governments, and other stakeholders, and with issues in estimating the costs and benefits of public good conservation in different situations. The fourth section provides a brief overview of the role of the Commonwealth in public good conservation.

1. THE CHARACTERISTICS OF CONSERVATION IN AUSTRALIA

Conservation refers to the management of natural resources to protect biological diversity and the ability to provide flows of various values and services. These include the capacity of natural resources to provide:

- a range of marketable goods (such as water, food, fibre, available energy, and genetic resources);
- non-marketed or non-commercial use benefits (such as cultural and recreational use);
- ecosystem services supporting both production and the natural environment (including global water and carbon cycles, pollination services, insect control, water purification, groundwater recharge, and fishery spawning grounds); and
- other indirect-use and non-use values (including existence and bequest values, and ethical and spiritual considerations).

Conservation activities are an essential part of ecologically sustainable development. They maintain the natural resources that support human activity and quality of life, and allow it to continue on an ongoing basis. Most natural resource managers and users already undertake conservation in one form or other. In many cases, however, conservation activities are not easily separated from other activities, as conservation outcomes relate to the way in which particular activities are undertaken (as well as to specific conservation actions), and may not form the primary motivation for a particular action.

Public Good Conservation

Public good conservation refers to conservation activities where all the benefits, or a significant portion of the benefits, are not able to be captured by the individual undertaking the activity. While some of these conservation activities may be undertaken by individuals (as private benefits may outweigh private conservation costs), there will often be cases where the conservation activity will not be undertaken unless the broader community share the costs.

Most conservation activities, including those occurring on private land, provide public benefits to some degree. However, the character of conservation activities, and the balance between public and private costs and benefits, varies significantly between different resources and environmental functions (as illustrated in Box 1).

In addition, determining the public element of the conservation activity is often difficult as there is very rarely a simple division between public and private conservation costs and benefits. For example, while the costs of re-vegetating a property (or conversely, the benefits of land clearing) may occur entirely on-site, the benefits (or costs, in the case of land clearing) will be distributed among a number of parties.

Table 1 illustrates a potential distribution of benefits from the partial re-vegetation of a private property. These range from being on-site and largely private (shade for livestock) through to off-site and largely public (reduced greenhouse gas emissions).

Table 1 Distribution of benefits from re-vegetation of private land

<i>Location</i>	<i>Benefits (non-exhaustive)</i>
Conservation site	<ul style="list-style-type: none"> ▪ Reduced erosion ▪ Shade for livestock
Neighbours	<ul style="list-style-type: none"> ▪ Reduced nutrient run-off from conservation site ▪ Wind break
Region	<ul style="list-style-type: none"> ▪ Reduced salinity ▪ Increased tourist amenity
State	<ul style="list-style-type: none"> ▪ Impact on groundwater levels in other regions ▪ Biodiversity
Australia	<ul style="list-style-type: none"> ▪ Carbon sequestration ▪ Biodiversity
Global	<ul style="list-style-type: none"> ▪ Reduced greenhouse gas emissions

The variety in the characteristics of natural resource conservation (as illustrated in Box 1) and the potentially wide distribution of costs and benefits from a conservation activity suggests that, while it is possible to identify a number of valuable guiding principles, the process of translating these to practical approaches to conservation and cost-sharing will need be carefully tailored to specific resources and ecosystem functions or services.

2. FRAMEWORK AND GUIDING PRINCIPLES

There are several overarching principles, or desirable features, of public good conservation which should inform the choice of policy instruments and approaches to cost-sharing. In summary, these are that the conservation of Australia's natural resources should be achieved:

- *effectively*, involving flexible and sustainable delivery of programs and outcomes;
- *efficiently*, including targeting priority areas and least cost mechanisms; and
- *equitably*, underpinning stakeholder and wider community support.

These features are described in more detail below following Box 1:

Box 1. Examples of conservation activities and associated costs and benefits

Resource	Conservation activity or goal	Costs of conservation for landholders and other stakeholders	Benefits of conservation
Water	<ul style="list-style-type: none"> ▪ ensure appropriate environmental flows ▪ improve water quality 	<ul style="list-style-type: none"> ▪ reduced water use may reduce yields and agricultural production ▪ cost of adopting water efficient technology ▪ cost of water to the user may increase, resulting in higher food prices 	<ul style="list-style-type: none"> ▪ water used and allocated more efficiently ▪ improved environmental (water) quality ▪ improved fresh water, estuarine, and marine biodiversity habitat ▪ reduced environmental problems (eg salinity, pollution levels, and algal blooms)
Soil	<ul style="list-style-type: none"> ▪ maintain the productive capacity of soil (often involving improved management) ▪ control and reduce salinity and erosion 	<ul style="list-style-type: none"> ▪ may involve higher cost of maintaining soil productivity (through changing input applications or management techniques) ▪ area available for agricultural production may be reduced (due to regeneration and revegetation of degraded areas) 	<ul style="list-style-type: none"> ▪ rural and resource based industries become ecologically sustainable ▪ long term yields and income may increase ▪ increased value of land ▪ reduced negative externalities and the associated impacts on other farms.
Native vegetation and plantations	<ul style="list-style-type: none"> ▪ prevent further clearing of endangered and 'of concern' ecosystems ▪ appropriate management of remnant vegetation ▪ re-vegetation of previously cleared land 	<ul style="list-style-type: none"> ▪ area available for agricultural production may be reduced ▪ remnant vegetation management costs ▪ cost of revegetation 	<ul style="list-style-type: none"> ▪ biodiversity maintained and enhanced ▪ agricultural production benefits (such as reduced salinity, improved soil, and pollination) ▪ timber and other forest products ▪ carbon sequestration and avoided emissions

Effective conservation

Commonwealth and State policies and programs set out a wide range of environmental goals. Effective conservation refers to the extent and certainty with which these environmental goals are, or can be, achieved. The effectiveness of conservation measures will generally be enhanced by:

- accessibility, allowing all significant groups or types of agent to participate in conservation programs;
- integration of policies and programs with other industry, community and government activities;
- conservation methods which are consistent with legislation (or are based on feasible changes to legislation);

- conservation activities which are understood and accepted by stakeholders;
- decision making processes being transparent, accessible, and understood by all parties;
- attention to incentives and compliance structures, including through the development of self-enforcing systems;
- cost effective enforcement; and
- low administration, monitoring and information costs.

This suggests that effective conservation in part relies on the adoption of efficient and equitable policies, as this encourages the stakeholder and community acceptance that underpins the operation of conservation activities.

Efficient conservation

Programs for delivering public good conservation should be designed to achieve their environmental goals in a cost effective and timely fashion. This will usually involve:

- integrating conservation into production systems and other decision frameworks where ever possible;
- ensuring that any unavoidable trade-offs between conservation and production activities are achieved at least cost;
- targeting priority areas, and activities, to take account of economies of scale or scope in conservation activities;
- providing incentives and other support mechanisms to encourage conservation; and
- removing perverse incentives for resource use and degradation.

These features are discussed in greater detail below.

Integration of conservation objectives into other decision frameworks

Wherever possible, conservation considerations should be integrated into production decisions to achieve a broad balance of objectives within a sustainable development framework. This approach yields both environmental and material net benefits for all of society, but not necessarily for individual landholders in some cases.

Integration involves both synergies and trade-offs. The incorporation of conservation practices within production systems enables them to be sustained on an ongoing basis, and helps conservation become an integral part of business operations and decision-making. Specific examples of programs and decision systems involving integrative approaches include state based 'Land for Wildlife' schemes (which provide extension to interested landholders) and property management planning (PMP) activities, and environmental management systems (EMS) that include conservation objectives. The first two of these are increasingly being adopted in agriculture and resource based industries. While EMS is being applied in some intensive agricultural industries, there continue to be significant unrealised opportunities for the use of EMS in other agricultural sectors. (For more information on EMS see Attachment B)

Integration is also important for significant non-commercial activities, such as recreational fishing, hunting, intensive tourism, 4WD touring, and visits to areas with high conservation values.

Least cost trade-offs

Many conservation practices involve trade-offs between private and public costs and benefits. Dryland salinity, for example, involves a trade-off between reduced degradation impacts (a

public benefit) and the resources required for mitigation actions, such as reduced clearing and production or planting trees (private costs). Trade-offs also exist between environmental quality and the production of goods and services, such as, between maintaining areas of native vegetation or clearing them for agricultural, mining, tourism or urban development.

The overarching objective is to achieve the greatest feasible net benefit to society, within an ecologically sustainable system. This involves achieving individual objectives at least cost to society and may involve restricting some activities and promoting others. Cost effective conservation will result in wider community acceptance of conservation measures while reducing the financial burden on participating parties.

Targeting priority areas

Conservation should be targeted at those areas where the greatest environmental benefits can be achieved at a given cost. As available public funds for conservation are limited, effort should be made to identify the conservation value of the resource and the likely net costs of conserving it. These 'costs' must be broadly defined, taking account of the economic benefits of the conservation activities, as well as any government outlays (or fiscal costs).

In some cases, this will imply concentrating public effort in a few areas to achieve economies of scope and scale, and to maximise the public return on the resources allocated. This would involve a departure from the tendency of existing programs to fund numerous small projects in an ad hoc way. The rationale and expected benefits of the targeted activities would also need to be well communicated.

Incentives for conservation

Incentives are a means of driving behaviour to encourage landholders to go beyond minimum compliance with regulations in their conservation activities. Also, grants and other forms of incentives support conservation in a practical sense by contributing to costs.

A rationale for using incentives comes from the fact that there are both private and public aspects of conservation. That is, while the costs of conservation are incurred on site, the benefits may not be. So a contribution from off-site beneficiaries can help match the incidence of costs with benefits.

The Commonwealth has been active in identifying appropriate incentives for landholders and in supporting their adoption through grants under the Natural Heritage Trust (see Box 2). Incentives are also a key component of the Commonwealth's consideration of support for natural resource management (NRM) under its current NRM policy development agenda.

To maintain long term delivery, conservation measures should be flexible and create a dynamic and continuing incentive for conservation. They should encourage institutional capacity and responsibility for conserving biodiversity, establish mechanisms for monitoring and evaluation, and take account of long term funding issues. Conservation measures should also be adaptable to changes in markets and prices, technology, social attitudes, and government policy.

Reducing perverse incentives for environmental degradation should also be a priority. Perverse incentives unintentionally induce behaviour that results in environmental degradation. Past government policies, such as the administration of resource prices at below marginal cost (particularly water and timber), and provision of subsidies to agricultural producers, mining, and heavy industry have inadvertently encouraged the economic and biophysical over-use of natural resources and resulted in the excessive pollution and loss of biodiversity.

Actions that address these distortions often improve overall economic efficiency and performance whilst having positive environmental outcomes. Efficiency gains come from

better production decisions that take account of social costs, more productive use of scarce resources, fiscal savings and the opportunity for lower taxes.

Box 2 The Natural Heritage Trust

The Natural Heritage Trust was created by the Commonwealth Government in 1996, with the overarching objective to conserve, repair and replenish Australia's environment and natural resources. It contains a number of broadly focussed programs and provides excellent examples of conservation programs which achieve conservation and production benefits through cooperation, with the costs and benefits of conservation measures shared between several parties.

A key element of most of the Natural Heritage Trust programs is the emphasis on cooperative arrangements and sharing the costs of on-ground works. Project proponents are required to provide a contribution to the project of at least equal value to match the Commonwealth grant which they receive.

Actual proponent contributions is far higher, however. A recent review found that for every \$1 000 approved by the Commonwealth in 1999-2000 for one-stop-shop Natural Heritage Trust projects, other resources and in-kind contributions to the project amounted to around \$7 000.

The high level of interest and support for Natural Heritage Trust conservation programs, such as Bushcare, indicates the degree of support in the community for practical conservation works, even where such works involve a substantial contribution from landholders and others in the local community including landholders.

The experience of the Natural Heritage Trust shows not only that conservation measures need not be a burden on landholders, but also that there is a great willingness by many landholders to contribute voluntarily to conservation measures on their own land, even when this requires land to be removed from direct production.

On latest figures, the Natural Heritage Trust has approved funding of over \$860 million to 8 950 projects since 1996-97. It is estimated that over 300 000 Australians have participated in such projects.

Equitable conservation

Equity considerations include both fair processes and fair outcomes. Equity is important both for its own sake, and because programs and policies that are perceived to be equitable enjoy greater support, and require less external compliance efforts. Equitable cost-sharing also helps to generate necessary financial resources.

Equity will generally be enhanced where:

- processes are transparent;
- change is soundly based, clearly explained and signalled well in advance;
- people in like circumstances are treated in similar ways (horizontal equity); and
- particular effort is made to reduce adverse impacts on, or provide transitional assistance to, people most affected, including those in disadvantaged or vulnerable groups (vertical equity). That is, compliance costs have been taken into account and are low.

In practice, society makes equity judgements about the impacts of government policies through the political process. Political and administrative decisions about policy design and the funding of particular conservation measures may be usefully informed, however, by cost-sharing rules such as the polluter pays principle and beneficiary pays principle. Perceptions of equity are also strongly influenced by perceived responsibilities for achieving certain conservation outcomes, an issue closely associated with the notion of a landholder duty of care. Cost-sharing mechanisms should be designed to reflect these perceived responsibilities and to be able to adapt to changes in these perceptions. These issues are discussed in more detail in the next section.

3. COST-SHARING ARRANGEMENTS

Recent approaches to determining cost-sharing for conservation programs have sought to distribute costs on the basis of the net public and private benefits associated with on-ground works. In particular, governments have generally not been willing to contribute to the cost of conservation activities where the private returns to conservation investments are judged to outweigh the private costs. Public funds have thus been targeted to activities for which the public benefits outweigh the public costs, and the public nature of these benefits mean that landholders do not have sufficient incentive or capacity to undertake them without assistance. This approach is sound, and supported by a number of accepted policy principles.

In general, cost-sharing arrangements for public good conservation are most relevant where:

- landholders (or the agents best placed to undertake conservation activities) are not legally required to undertake the conservation activity;
- the private benefits from the conservation activity are relatively small, and so landholders have little incentive to undertake these actions;
- beneficiaries of the activity, or the general community, are willing to contribute to the cost of conservation activities on equity grounds or to secure greater conservation benefits; and
- the costs, or benefits, of the activity are considered sufficiently well defined for the specification of a public contribution or the application of other cost-sharing arrangements.

Cost-sharing principles vary widely and will result in different cost-sharing outcomes, recognising underlying responsibilities for management and conservation outcomes, and evolving community expectations. In practice, however, cost-sharing arrangements for public good conservation measures have usually been based on relatively arbitrary formula or lengthy negotiations. This suggests that there may be benefits from the development of more sophisticated rules of thumb, based on some general categorisation of public good activities.

Landholder responsibilities and community expectations

The classification of any particular conservation activity as providing a public benefit will depend on judgements about underlying responsibilities for the maintenance of natural resources. It is these perceived responsibilities, not the biophysical impacts of an action (or lack of action), that determine whether a conservation activity is considered to give rise to a social benefit (positive externality), which might be legitimately supported by a public contribution, or avoids imposing a social cost (negative externality).

Avoiding the imposition of adverse impacts on others is often regarded as part of an individual's 'duty of care', and so is expected to be performed without reward or public contribution (see Box 3).

Indeed it may be desirable to discourage negative impacts on the responsible parties through the imposition of some penalty. This general ethical position is often reinforced by pragmatic concerns about 'opening the floodgates' if payments are offered to prevent the imposition of costs on others.

The rights and responsibilities of landholders and other stakeholders are shaped by custom and shared expectations. These expectations are often defined by legislation and common law. Yet the characterisation of different activities, and the degree to which they are considered to involve public good conservation, will also depend upon established practices and general community perceptions, particularly where perceptions are changing over time. Significant

changes in landholders' previously understood legal property rights may lead to situations where transitional assistance could be considered.

Box 3 Responsibilities underpinning cost-sharing principles

Practical experience demonstrates that if responsibilities are clear (through well defined property rights) and transaction costs are low, then unpriced social costs (externalities) can be eliminated so that natural resources are used in an economically efficient fashion. The reality, however, is that effective property rights for natural resources are only partly defined, and that market failure and environmental damage are common place.

The first requirement for an effective and fair cost-sharing framework is for those involved to agree where responsibilities for natural resource management lie. This is important as changes in perceived and real property rights, responsibilities, and obligations facing landholders may impact on farm viability, rural sector investment decision making and the landholders attitude towards conservation. Achieving agreement is far from straight forward, however, as responsibilities for natural resource management and conservation are derived from a number of sources.

The responsibility for some management and conservation activities is clear, such as where legislation requires specific management actions. These might include weed and pest control, soil conservation measures, and retention of certain categories or amounts of native vegetation on private land.

In other instances legal responsibility may be uncertain. One approach to addressing this uncertainty would be for governments to legislate a 'general environmental duty' that establishes a broad-based obligation of stewardship of land and natural resources on freehold and leasehold private land, and to crown land. For example, the *Queensland Environment Protection Act 1994*, imposes a 'duty of care' on everyone to take all reasonable and practical measures to prevent or minimise environmental harm (the 'general environmental duty'). In effect, the legislation integrates the 'general environmental duty' with the whole regulatory scheme, while encouraging industry self-regulation through codes of practice as a way of meeting the duty.

The ANZECC *National framework for the management and monitoring of Australia's native vegetation* provides guidance on the expectations of Australian governments regarding duty of care responsibilities (Attachment C).

In cases where legislation and common law are ambiguous or inconsistent with community expectations, management responsibilities may be based on other social norms. These include:

- accepted practice (including the farmers' ethic of caring for their land);
- voluntary industry codes of practice such as environmental management systems;
- negotiation among the parties involved in particular projects or catchment management plans; and
- cost-sharing rules in particular programs like those of the *Natural Heritage Trust*.

These responsibilities are not static, and are influenced by the state of scientific knowledge regarding farming practices and environmental processes, and on how environmental problems impact on different groups. The changing perception of the role of planted trees and native vegetation in agricultural systems is a good case in point.

Clearly, many management and conservation activities exceed landholders' responsibilities, however defined, and warrant appropriate contributions by other beneficiaries. Community expectations are also changing in relation to the responsibilities of these beneficiaries to contribute. This is reflected in growing markets for 'green' products, the improving environmental performance of many industries, the growth in environmental philanthropy, and new government environment policies and programs

Principles for determining cost-sharing

A number of principles can help inform consideration of how the costs of public good conservation might be shared between those undertaking the conservation (usually landholders), direct and indirect beneficiaries, and the general public. These are:

- the polluter pays principle;
- the beneficiary pays/compensates principle; and
- the user pays principle.

These principles and their application are briefly discussed below.

The polluter pays and beneficiary pays/compensates principles

Responsibilities for conservation may be understood in terms of the polluter pays principle and the countervailing beneficiary pays/compensates principle.

The polluter pays principle was originally formulated by the OECD in the context of the introduction of more stringent pollution controls, and states that polluters should bear the cost of meeting socially acceptable pollution standards. This requires those who cause environmental damage to bear the costs of avoiding or mitigating this damage, up to the point required by law. In simple terms this means that if a landholder is legally responsible for a conservation activity, such as weed control, then he or she should pay for it.

The ‘extended polluter pays principle’ suggests that polluters should be required to bear the full costs of their decisions and actions to avoid imposing uncompensated costs on others and associated net social losses. The application of the extended polluter pays principle encourages resource users to reduce damaging activities, promotes efficient resource use, and reduces the pressure on government budgets.

The ‘beneficiary compensates principle’ is relevant where conservation is considered to provide a social benefit (or ‘positive externality’). This principle suggests that overall efficiency can be improved by requiring those who receive an unpriced environmental benefit (beyond legal requirements) to pay for the incremental cost of providing that benefit. This provides an incentive to potential suppliers of the benefit, who may otherwise not be able to recover their costs.

The same essential principle arises in taxation theory, described as the beneficiary pays principle. This principle argues that, depending on transaction costs, there may be efficiency advantages to imposing higher taxes on beneficiaries of particular government activities. In practice this involves the identification of a specific subset of people who receive disproportionate benefits from an activity, identifying an appropriate tax base, and introducing or adjusting taxes so that this group pays in proportion to their benefit. Examples of taxes reflecting this principle are the Higher Education Contribution Scheme and various producer levies (such as the wool levy).

Hereafter, the term ‘beneficiary pays’ is used to refer to the general principle that the beneficiaries of conservation activities that a resource user is not obliged to undertake, should contribute to any additional costs of providing that benefit. In the context of public good conservation, however, benefits are provided by private individuals – who do not enjoy tax powers – and contributions will need to be arranged in other ways, most of which will involve the backing of some level of government involvement to prevent ‘free riding’.

User pays principle

The user pays principle is relevant where conservation or natural resource management provides a good or service sold in a market and requires those who receive such a good or service to pay for the full cost of providing it.

The user pays principle is particularly relevant to the financing of resource or infrastructure development where it is more equitable for users to pay rather than taxpayers (such as for irrigation water). While this principle is central to natural resource management, and associated

reforms, it relates primarily to costs that give rise to private benefits, and so is of limited relevance to public good conservation.

While some landholders stand to benefit from greater application of the user pays principle to ecosystem services, others could pay more for public goods they now use for free, or at less than full cost. This would result in more efficient use of scarce resources. Examples of such resources are irrigation water, regeneration processes by natural areas (such as water filtration and pollination) and insect pest control from predators in natural areas.

Application of principles

Application of the beneficiary pays principle means that a landholder is justified in seeking contributions to the costs from other beneficiaries where the landholder is not legally obliged to undertake the conservation activity.

However, the existence of a public benefit from such an activity does not necessarily mean that governments should pay the costs. There are many activities undertaken in society and in the economy that yield public benefits but are not paid for by government. Potential contributors could include downstream commercial enterprises such as irrigators, downstream urban water users, food and fibre consumers, greenhouse gas emitters, environment groups, philanthropic organisations and governments. The limited fiscal resources of governments should be targeted to priority activities. In particular, consideration of appropriate contribution levels should take account of the extent to which the activity generates on-site or private benefits, which may adequately compensate landholders for the cost of the activity – including through the ability of landholders to attract non-government support.

Governments may also judge it appropriate to apply the beneficiary pays principle, rather than the polluter pays principle, even where conservation activities are addressing social costs caused by landholders. Possible reasons for this include:

- diffuse sources of degradation cannot be identified;
- supporting a transition to sustainable use;
- the costs of remediation are beyond the financial resources of some landholders; and
- the current degradation was caused by historical unsustainable resource use, which was considered appropriate at the time, or was supported by government policy.

Such departures from the polluter pays principle should be explicitly acknowledged and justified to help achieve a consistent and robust policy framework, and avoid cost shifting.

In cases where application of the beneficiary pays principle is appropriate, governments should aim to contribute to the ‘incremental costs’ of public good conservation, that is, costs in excess of the value of private benefits the landholder will derive from the conservation activities. This minimises public expenditure and helps achieve efficient outcomes (where economic rents do not accrue to landholders). Cost-sharing should not be undertaken where the landholder would be likely to undertake the works anyway because of private benefits.

Mechanisms for achieving conservation

A range of mechanisms which draw upon the principles outlined above can be used by governments to address environmental problems and distribute costs between stakeholders. These include:

- public ownership and management of land and natural resources;
- direct regulation;
- market measures, such as tradeable permits, auctions, and performance based payments;

- grants/incentive payments; and
- legal instruments, such as covenants, property rights, and easements.

All of these, other than regulation, offer ways of providing resources or facilitating cost-sharing for public good conservation (see Attachment D for a more detailed discussion).

International examples of cost-sharing

Analysing how other countries have applied cost-sharing principles to conservation programs may be useful in designing cost-sharing frameworks in Australia. However, while international conservation programs often have a common aim, the differing political and legal structures of individual countries means that there will be significant differences in approaches in different jurisdictions.

As in Australia, most cost-sharing frameworks developed internationally have been based on voluntary participation, and government technical and financial assistance. A brief description of some of the approaches to cost-sharing that have been adopted internationally is provided in Attachment E.

4. ROLE OF THE COMMONWEALTH

The States and Territories have primary responsibility for natural resource management in light of their constitutional responsibility for land use decisions and ownership of large areas of land. The Commonwealth's direct responsibilities in natural resource management and conservation relate to:

- management of areas that lie within its own jurisdiction;
- Australia's obligations under international law including treaties; and
- exports, imports and quarantine.

In addition to these, the national interest in the conservation of Australia's natural resource assets and the seriousness of current and predicted levels of resource degradation point to an important leadership role for the Commonwealth. This role could include:

- ensuring policies and governance arrangements are applied by the States and at the regional level, and promoting consistency of approach across jurisdictional borders; and
- contributing financially to lever the State and private investments needed.

In this context, the Commonwealth overarching role is to promote policies which address the causes, rather than the symptoms, of degradation of natural resources.

It is also appropriate for the Commonwealth to work with rural industries to develop national standards and approaches relevant to integrating natural resource conservation into production. Such standards can be formally adopted through mechanisms such as environmental management systems.

The development of technical and knowledge support using Commonwealth resources (including research and development) complements market approaches and work by industry and related grants programs. For instance, as part of the recent reform of Australia's forests, the Commonwealth, in cooperation with State and Territory governments and industry, provided extensive scientific, environmental, and economic input. Another component of this role is the current development and promotion of the valuation of ecosystem services within natural resource management and policy development.

The extension of technical information and skills to landholders is also an important role of the Commonwealth, which it has performed through programs such as Landcare. An important

part of the extension message is the promotion of the production and private benefits of sustainable natural resource management and conservation.

Commonwealth contributions to conservation through these programs should continue to be based on the underlying responsibilities for management and follow established cost-sharing principles, as well as consider the public benefits.

With regard to establishing efficient cost-sharing mechanisms there also appears to be a considerable role for the Commonwealth in clarifying the responsibilities of landholders in conserving natural resources. In this case, the Commonwealth could investigate how the duty of care concept can be further operationalised and to ensure that consistent legislation and approaches to 'duty of care' between States and the Commonwealth are established.

Finally, in allocating public funds for conservation projects the Commonwealth has a role in identifying a number of situations which may result in a more efficient use of these funds. These could include situations:

- where assistance for public good conservation will reduce other budget outlays (such as the New York approach to improving water quality through assisting land use changes rather than construction of a filtration plant), as this may provide a case for increasing or reallocating funding for public good conservation; or
- where other beneficiaries may be willing to contribute; or
- where conservation goals may be promoted through the creation of markets for natural resources, including through the removal of legal impediments (such as inflexible property rights regimes), or the removal of perverse incentives.

LIST OF ATTACHMENTS

Attachment A	Inquiry terms of reference
Attachment B	Environmental Management Systems
Attachment C	ANZECC agreement on principles for 'duty of care' and cost-sharing
Attachment D	Mechanisms for Conservation
Attachment E	International examples of conservation cost-sharing programs

Inquiry terms of reference

The House of Representatives Standing Committee on Environment and Heritage will enquire into and report on:

- the impact on landholders and farmers in Australia of public-good conservation measures imposed by either State or Commonwealth Governments;
- policy measures adopted internationally to ensure the cost of public good conservation measures are ameliorated for private landholders;
- appropriate mechanisms to establish private and public-good components of Government environment conservation measures; and
- recommendations, including potential legislative and constitutional means to ensure that costs associated with public-good conservation measures are shared equitably by all members of the community.

Environmental Management Systems

Environmental management systems (EMS) are a means for private landholders and others to incorporate good environmental practices within their business systems to meet their responsibilities for environmental management. In this case, the costs are appropriately borne by the business.

EMS have been defined as ‘methodical approaches to organising the planning, implementation and review of an organisation’s or business’ attempts to manage its impacts on the environment. They aim to achieve “continuous improvement” using a “plan, act, monitor and review” cycle – adaptive environmental management within the commercial sphere.’ (Alexandra, 1999). EMS are addressed in the ANZECC *National framework for the management and monitoring of Australia’s native vegetation* under ‘regulatory’ approaches of industry.

A national workshop on EMS and agriculture was held in May 1999 (see <http://www.rirdc.gov.au/> for workshop papers) and there has been much interest nationally — in industry, in government agencies and the research and development sector — in following up opportunities for use of EMS in agriculture. The national workshop encouraged the adoption of EMS which were systematic, and which sought to adopt good policy and practice through continuous improvement, and a process of certification and audit to ensure compliance. One aspect of EMS is the adoption of codes of practice.

While few examples of fully fledged EMS exist in Australian agriculture, codes of practice have been applied in several instances, including the development of a code of practice to control chemical residue from cotton farming contaminating beef on nearby properties.

There is emerging interest throughout the country in the potential of this as a market based approach complementing existing regulatory and voluntary approaches in moving towards sustainable agriculture. There is a growing awareness of the potential benefits of EMS including (Alexandra 1999):

- improvements in environmental performance;
- capacity to measure environmental performance and impacts, and target responses;
- reduced risk of environmental degradation and associated costs;
- enhanced market prospects e.g. improved market access;
- greater capacity to meet goals articulated in environmental policies and plans; and
- greater public confidence.

The Commonwealth has produced a discussion paper on the potential use of EMS in agriculture titled *Managing natural resources in rural Australia for a sustainable future: a discussion paper for developing a national policy* (1999). The paper encourages ‘extension of the quality assurance approach to accreditation schemes for production systems’ and notes that such voluntary systems would involve guidelines and would need to recognise the broader landscape. The discussion paper also notes that although EMS should be initiated by industries and regions there is a role for government in facilitating adoption of standards.

ANZECC agreement on principles for ‘duty of care’ and cost-sharing

The ANZECC *National framework for the management and monitoring of Australia’s native vegetation* was developed by State, Territory, and Commonwealth governments through the Standing Committee on Conservation of the Australian and New Zealand Environment and Conservation Council (ANZECC). The framework has been endorsed by all levels of government through the ANZECC process.

The ANZECC framework includes broad guidelines on ‘duty of care’ and cost-sharing principles and these are reproduced below (see <http://www.environment.gov.au/bg/publications/nvf.html> for more details).

Duty of care, cost-sharing arrangements and prioritisation of resource allocation

The clear definition of the property rights and associated entitlements and obligations tied to landownership are an essential starting point for addressing native vegetation management issues. A distinction can be drawn between:

- the Duty of Care for sustainable land management faced by a landholder; and
- the provision of a non-marketable Public Conservation Service by landholders managing vegetation to meet conservation objectives.

Determining where ‘duty of care’ stops and ‘public conservation service’ begins is a difficult issue. We suggest that the dividing line should be drawn between those management practices required to achieve landuse objectives at a landscape or regional scale and any additional practices required to sustain sites of unique conservation value. Hence, a public conservation service is provided when the community’s interest lies in securing active and ongoing management of a particular site.

In the long run, the higher the duty of care, the less expensive remnant vegetation conservation will be. In practice, duty of care is defined by existing property rights, that is the legal institutions, legislation and regulations that control landuse. Duty of care is not a static concept because scientific knowledge and community expectations will shift through time. For example, the provision of incentives for vegetation clearance, maintained into the 1970s, provides a pertinent case study of Australia’s evolving understanding of sustainable land management as public policy is now directed strongly at the conservation of vegetation. The challenge is to develop mechanisms that allow duty of care to be revised and adapted through time.

A ‘duty of care’ with regard to native vegetation management could reasonably be expected to include protection of endangered species and/or ecosystems, protection of vegetation on land at risk of land degradation, e.g. from salinity or erosion, protection of riparian vegetation, protection of vegetation on lands of low agricultural capability and protection of vegetation on acid sulphate soils. Depending on regional circumstances, duty of care may invoke other management actions or priorities.

Tension exists between providing clear guidance through State and Commonwealth legislative frameworks and maintaining flexibility to take account of regional differences and changing vegetation management objectives. Practical lessons can be learnt from other natural resource industries which have developed Codes of Practice to resolve these issues by institutionalising adaptive management. An adaptive approach to determining duty of care can also be pursued by agreeing and describing what comprises duty of care at the regional scale through regional

planning processes. Having determined duty of care, it is possible to consider cost-sharing arrangements on a more informed basis.

The following policy guidelines for cost-sharing arrangements are proposed.

- It is appropriate that native vegetation management involve both private and public investment, and that public investment include investment from all levels of government
- Public investment should be contributed by the three levels of government in proportion to their roles and responsibilities in given circumstances. In some cases a native vegetation management issue would be substantially a Commonwealth, State or Territory Government responsibility and it would be appropriate for these levels of government to make the bulk of the public investment. Conversely, in other cases a native vegetation management issue may largely be a Local Government responsibility and it would be appropriate for Local Government to contribute the bulk of public investment. In many circumstances however, the issue being addressed will appropriately involve investment from all levels of government. Cost-sharing arrangements then needs to be determined in a manner that reflects the relative responsibilities of each level of government.
- Where community expectations resulting in legislative or policy changes cause duty of care to be shifted significantly over a short period of time, financial assistance may be provided to speed the transition to the new arrangements and maintain community support. Such payments should be one off payments in recognition of the need to adjust to a new regime.
- There are cases where the community may seek landholders to manage areas of remnant vegetation at a higher standard than normally expected. In these cases ongoing payments from government can be justified on the grounds of equity because a conservation service is being provided by the landholder.
- Financial assistance should generally not be paid to landholders to meet their duty of care for sustainable land management.

Mechanisms for Conservation

Public ownership and management of land and natural resources

One of the ways in which governments have traditionally invested in public good conservation has been by proclaiming Crown lands and acquiring new lands to be managed as dedicated national parks and nature reserves. This approach has provided Australia with the core reserve system needed to conserve our biodiversity. However, while this approach will continue to form a critical and integral element of conservation strategies, it is increasingly being realised that to effectively conserve the nation's biodiversity we must sustainably manage the whole landscape, including those parts which are privately owned or managed.

Regulation

Traditionally, governments in Australia and overseas have relied heavily on regulatory approaches to conservation. These are aimed at directly influencing the decision making process of those causing environmental damage or to encourage others to conserve resources. The enforcement of performance standards is an example of a regulatory instrument.

Regulatory conservation measures are often inflexible, do not provide ongoing incentives for conservation, and often have high compliance, administration, and enforcement costs.

Despite these problems, regulation can still play a role in setting the bottom line expectations for the management of those natural resources for which markets do not exist or do not operate effectively (for example, in relation to biodiversity conservation).

Economic instruments

Economic instruments use prices to provide an incentive to resource users to integrate environmental concerns into their everyday decisions. Because economic incentives take advantage of market forces they will often be the least-cost means of achieving environmental objectives, while providing continuing incentives for innovation, and in some cases a source of government revenue. These advantages over direct regulation have resulted in economic instruments being increasingly used in recent years.

A wide range of economic instruments are suited to addressing natural resource degradation in Australia. A brief description of some of these is provided below.

Tradeable permits

An alternative approach to setting an incentive level outside the market through regulation is to allocate tradeable property rights and let the market reveal the value of the service created.

The underlying cause of most natural resource degradation can be attributed to market and information failures, and ill defined property rights. An economic value can be created for these scarce natural resources with public good characteristics by establishing a market for the conservation and management of the resource and tradeable property rights over its use.

Tradeable property rights have been created for water, fisheries, and salinity in Australia and for gas emissions, biodiversity and nutrient run-off internationally.

Ecoservice provision

Market valuation and the creation of property rights is useful only where factors are well understood and objective valuation is possible and methodology agreed. Unfortunately, most ecosystem services provided by natural resources on private land are not yet adequately

considered in resource use decision making because there is insufficient knowledge about them.

To overcome this problem, increasing attention is being paid to the cost of replacing ecosystem services, or the cost avoided by conserving these services, as a measure of their value.

Ecoservice provision describes the concept of the environment producing resources that are valued by humans, such as clean air, water, natural fertilisation and nutrient cycling in soil, pollination of plants, control of pests, and the production of goods.

Valuing ecosystem services is very difficult. Some ecoservices contribute directly to the production of goods or services that have a market value and can be valued by conventional techniques. Most ecoservices, however, do not pass directly through markets and require indirect pricing.

From a precautionary perspective at least, and certainly from a sustainable production perspective, the full range of ecosystem services as both public and private goods should be acknowledged in any environmental decision making and also in cost-sharing determinations. The challenge is to identify the full range of benefits (services) at appropriate scales. An example of paying for ecosystem services of natural resources on private land would be the transfer of funds from downstream communities (e.g. coastal cities) for the adequate supply of clean water from land further up catchments (rural communities) via charging for water.

Such payments should be agreed to by different parts of the community and once accepted should be secure into the long term and cost effective to administer.

Ecosystem service management has been used in New York City to improve drinking water quality. In this instance \$660 million was provided to compensate landholders for development restrictions in the Catskills Mountains (the city's water catchment) as an alternative to building a water filtration unit at an estimated cost of \$8 billion.

Performance based payments

Payments can be made to the private landholder on the basis of an assessment of their conservation management performance. Any performance assessment requires clear management objectives and well established performance criteria.

Performance payments are linked to the outcomes of management and as such are useful when adaptive management is sought from the private landholder. They can also provide a positive incentive to reporting conservation management problems and are useful for identifying high priority conservation areas.

Performance based payments are likely to be more complex and administratively costly than input based mechanisms for achieving cost-sharing.

Competitive bidding and auction based mechanisms

Rather than administratively estimating the costs and benefits of a conservation measure, cost-sharing could be based on competitive bidding. Competitive bidding encourages innovation and cost-sharing by effectively capturing private benefits of conservation. Conceptually, those who are most willing to conserve remnant vegetation will make lower bids than those less willing.

Tender bids can provide valuable information to assist in the allocation of scarce government funds, helping to identify the conservation values of different areas, and the costs of conserving these. As a result, scarce available funds can be used to deliver the best combination of conservation values at the lowest price.

Auction based mechanisms have been used in the United States through the Conservation Reserve Program (see Attachment E).

Grants / incentive payments

Grants are made to private landholders to undertake conservation activities, for example, the fencing and management of remnant native vegetation. As these grants typically cover only part of the costs, they can be seen as incentives to induce more private conservation expenditure. They provide one of the main existing opportunities to adjust cost-sharing arrangements for current conservation activities.

Legal instruments - Covenants/conservation easements

A covenant is a legal instrument which restricts what people may or may not do on their land. Covenants are often in perpetuity (binding all future landholders) but may also be enforced with a sunset clause.

Conservation covenants provide for conservation of the identified natural values of land and seek to ensure conservation land use through restricting certain uses and requiring an agreed management regime. They are entered into voluntarily by landholders, and are an expression of their level of commitment to manage for conservation. Such covenants are often required to be in place to qualify landholders for support for land management through incentives schemes.

Provisions for conservation covenants exist in most jurisdictions. Best practice conservation covenanting is still being developed nationally but is likely to include:

- a combination of perpetuity conservation through registration on title, and conservation covenants which have sunset clauses which allow title to be altered at a certain date if a set of pre-agreed conditions are met;
- provision of both positive and negative elements in the covenant;
- a requirement for a conservation management regime to be applied (eg, through a management plan); and
- ongoing support for conservation management by the covenanting organisation.

ATTACHMENT E**International examples of conservation cost-sharing programs**

As in Australia, the conservation effort in other countries remains centred on voluntary participation, and government technical and financial assistance. Several conservation programs which include some form of cost-sharing between governments and private landholders can be found in the United States, while programs for protecting natural resources through covenanting are well progressed in New Zealand.

A brief description of the largest of these programs, the Conservation Reserve Program, is provided below, while international examples of other conservation programs are covered in Table D1.

Conservation Reserve Program (CRP)

The CRP is the largest conservation program in the world. It is larger than all other United States environmental conservation programs combined with overall participation capped at more than 15 million hectares. The major conservation goals of the CRP include reducing erosion and sedimentation, improving water quality, and maintaining fish and wildlife habitat.

Under the CRP landholders offer agriculturally productive land to the conservation reserve auction process, retiring it from production for 10 years. In their auction bid the landholder is required to:

- state the annual rental payment per acre that they would be willing to accept for converting their eligible cropland to permanent vegetation cover; and
- submit a conservation plan for their land (agreed to by District Conservationist).

Offers are evaluated against each other based on achieving the greatest environmental outcomes at the lowest possible price. Thus, the higher the environmental benefits and the lower the rental rate that a producer will accept, the better their chance of acceptance into the program.

Each parcel of land deemed eligible for the CRP is subject to a maximum annual rental rate cap based on average cash rental rates and productive characteristics. Landowners may submit offers up to this cap.

Successful bidders can receive annual rental payments up to \$50 000 per person per year and payments cannot be higher than local rental rates for comparable land. Landholders are also eligible for 50 per cent cost share allowance for establishing vegetation.

Table D1. International examples of conservation programs

PROGRAM	COUNTRY	AIM	METHOD	GOVERNMENT ASSISTANCE
Conservation reserve program	United States	<ul style="list-style-type: none"> ▪ Reduce erosion and sedimentation. ▪ Improve water quality. ▪ Maintain fish and wildlife habitat. 	<ul style="list-style-type: none"> ▪ Auction process, where landholders offer to retire land from production for 10 years in return for annual rental payment. ▪ Use of environmental benefits index to compare auction bids. ▪ Cost-sharing 	<ul style="list-style-type: none"> ▪ Annual payments up to \$50 000 per person per year (payments cannot be higher than local rental rates for comparable land). ▪ Cost-sharing assistance up to 50 per cent for establishing vegetation.
Environmental quality improvement program	United States	Assist agricultural producers in implementing conservation programs on the farm for 5-10 year periods.	<ul style="list-style-type: none"> ▪ Contracted cost-share assistance. 	<ul style="list-style-type: none"> ▪ Up to 75 per cent of total project cost. ▪ Limited to \$10 000 annually and \$50 000 over the life of a contract (5 to 10 years).
Challenge cost share program	United States	Conserve fish and wildlife resources and natural habitats.	<ul style="list-style-type: none"> ▪ Cost-share assistance. 	<ul style="list-style-type: none"> ▪ Up to 50 per cent of total project cost.
Partners for wildlife program	United States	Restoration of wildlife habitat	<ul style="list-style-type: none"> ▪ Contracted cost-share assistance. 	<ul style="list-style-type: none"> ▪ Up to 100 per cent of total project cost if arrangements are for more than 10 years. ▪ Up to 50 per cent, of total project cost, and less than \$5 000, if arrangements are for less than 10 years.
Stewardship incentive program	United States	Enhancement of resources associated with private forests.	<ul style="list-style-type: none"> ▪ Cost-share assistance. 	<ul style="list-style-type: none"> ▪ Up to 75 per cent of project costs (must not exceed \$10 000 per landholder per year).
Water quality incentives program	United States	Protect water sources.	<ul style="list-style-type: none"> ▪ Cost-shared assistance. 	<ul style="list-style-type: none"> ▪ Up to \$3 500 per property.
Wetlands reserve program	United States	Restore converted and cropped wetlands.	<ul style="list-style-type: none"> ▪ Conservation easements (either permanent or 30 years in length) with cash compensation for landholders. ▪ Cost-share assistance. 	<ul style="list-style-type: none"> ▪ 100 per cent cost-sharing for project design and implementation. ▪ Cash compensation of up to US\$550 per acre (cannot exceed average market price of comparable land in the region).
Stewardship incentives program	United States	Maintain productivity of land.	<ul style="list-style-type: none"> ▪ Technical and financial assistance. 	<ul style="list-style-type: none"> ▪ Up to 75 per cent of total project cost
QE II national trust	New Zealand	Protect endangered ecosystems.	<ul style="list-style-type: none"> ▪ Covenants 	<ul style="list-style-type: none"> ▪ Details not available.
Natural heritage fund	New Zealand	Protect indigenous ecosystems.	<ul style="list-style-type: none"> ▪ Direct purchase and covenanting. 	<ul style="list-style-type: none"> ▪ Details not available.

BIBLIOGRAPHY

- Alexandra, J (1999), 'Environmental management systems for Australian agriculture – issues and opportunities' in *Environmental management systems in agriculture, proceedings of a national workshop May 26-28, 1999: a report for the Rural Industries Research and Development Corporation*, RIRDC Publication No 99/94.
- Amosson, S., Smith, J., Outlaw, J., and Smith, E., (1999), *The CRP decision process*, <http://agecotext.tamu.edu/commodity/crp/three/crpsteva.htm>
- ANZECC Working Group on nature Conservation on Private Land (1996), *Nature Conservation on Private Land: Commonwealth, State and Territory Legislation and Programs*, Australian Nature Conservation Agency, Canberra.
- ANZECC 2000, *National framework for the management and monitoring of Australia's native vegetation*, <http://www.environment.gov.au/bg/publications/nvf.html>.
- Bowers, J (1999), 'Policy instruments for the conservation of remnant vegetation on private land', *Journal of Biological Conservation* 87.
- Carruthers, G. and Tinning, G. (eds.) 1999, *Environmental management systems in agriculture: proceedings of a national workshop, May 26-28, 1999*, Rural Industries Research and Development Corporation Publication No 99/94.
- Cork, S.J. and Shelton, D. (2000), *The nature and value of Australia's ecosystem services: a framework for sustainable environmental solutions*, CSIRO, draft manuscript submitted to the 3rd Queensland Environmental Conference, May 2000.
- Hale, P. and Lamb, D. (eds) (1997), *Conservation outside nature reserves*, Centre for Conservation Biology, the University of Queensland.
- Latacz-Lohmann, U. and Van der Hamsvoort (1997), 'Auctioning conservation contracts: A theoretical analysis and an application', *American Journal of Agricultural Economics* (May).
- Lockwood, M. and De Lacy, T (eds) (1992), *Valuing Natural Areas – applications and problems of the contingent valuation method*, Johnstone Centre of parks, Recreation, and Heritage, Charles Sturt University.
- National Council for Science and the Environment (2000), *CRS Issue Brief for Congress*, www.cnie.org/nle/ag-18.htm
- Price, R (ed) (1996), *Sustainable management of natural resources: Who benefits and who should pay?*, Occasional paper 01/96.
- Texas Parks and Wildlife (1998), *Conservation*, <http://.bb35.tpwd.state.tx.us/conserva/wetlands/noregf1.htm>
- United States Department of Agriculture (1997), *USDA Conservation programs*, www.nrcs.usda.gov/NRCSPPProg.htm
- Walker, B. (2000), *Incorporating ecosystem services into the Australian economy: investing in a new and sustainable future*, CSIRO, paper to symposium on ecosystem services in April 2000.