



Australian Government

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Biological Diversity Advisory Committee

Land & Water Australia

Making economic valuation work for biodiversity conservation





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Contents

Workshop outcomes	2
Biodiversity and the economy	3
Why is biodiversity valuable?	4
What is biodiversity?.....	4
Why do we need to make the value of biodiversity measurable in monetary terms?	5
When markets fail.....	6
Biodiversity valuation: the state of play today	7
Delivering biodiversity values on private land.....	7
Methods for integrating biodiversity valuation into economics.....	7
Market-based techniques.....	7
Revealed preference techniques.....	7
Stated preference techniques.....	9
Contingent valuation	10
Choice modelling or contingent choice method	11
Fulfilling the potential of biodiversity valuation	13
Benefit transfer method.....	13
Lack of information for biodiversity valuation.....	13
Ethical concerns.....	14
Technical concerns: the accuracy of stated preference techniques.....	14
The way forward	15
Policy integration.....	15
Science.....	15
Communication.....	15
References and further reading	16
Additional Australian case studies	17

Figure 1. The different categories of value of different elements and functions of biodiversity	5
Table 1. Revealed preference techniques for biodiversity valuation	8
Case study 1. Assessing the recreational values of national parks and state forests in Victoria	9
Case study 2 . The worth of a possum	11
Case study 3 . Vegetation clearance in Queensland	12



Workshop outcomes

Jointly sponsored by the Biological Diversity Advisory Committee, the Australian Government Department of the Environment and Heritage, and Land & Water Australia, this booklet explores what economic valuation techniques can contribute to biodiversity conservation. It draws on a national workshop on the Economic Value of Biodiversity held in 2003 by the Department of the Environment and Heritage, and Land & Water Australia. It asks why biodiversity valuation techniques aren't more widely used in the decision-making process, explores how they can be made more accessible for decision-makers and provides some practical recommendations for economists, ecologists and decision-makers.

This booklet reviews the use of economic techniques for valuing biodiversity, and is illustrated by Australian case studies. These show that despite some shortcomings there remains untapped potential, especially for the use of revealed preference techniques like production function and hedonic pricing, to aid decision making.

The main obstacles to the wider application of biodiversity valuation in Australia are explored in this booklet as are recommendations for overcoming these obstacles as suggested by workshop participants. In summary, the main obstacles are:

- 1. Lack of biophysical information to support biodiversity valuation**
- 2. Ethical concerns about valuing environmental impacts in monetary terms**
- 3. Technical concerns, especially surrounding the accuracy of stated preference techniques.**

Participants at the Economic Value of Biodiversity workshop suggested three key strategies for making valuation studies more relevant and timely for decision makers. These are discussed in more detail later in the booklet but briefly relate to:

- 1. Greater policy application: Decision-makers can increase their understanding of the range of values that biodiversity offers and the techniques used to estimate them through greater exposure to the use of valuation techniques**
- 2. Better science: We need to improve our scientific understanding of the impacts of human activities on biodiversity**
- 3. Better communication: Improved general awareness of what biodiversity and biodiversity valuation can offer society.**



Biodiversity and the economy

Australia is one of the most biologically diverse countries in the world. We depend on this biodiversity for our survival and quality of life. But many of our actions deplete the natural resource base on which we depend. Since European settlement Australian ecosystems have been extensively modified resulting in dramatic declines in the distribution and abundance of many species.¹ Twenty-two Australian mammal species have become extinct in the last 200 years (a third of the world's recent extinctions) and a further eight species can now only be found on small islands. Of the 85 identified bioregions across the nation, 94% include at least one threatened ecosystem.²

Maintaining biodiversity requires more than just protecting wildlife and their habitats in nature conservation reserves. It is also about the sustainable use and management of all natural resources and safeguarding the life-support systems on earth. Society needs a mechanism for determining the appropriate trade-off between biodiversity protection and the human activities that create value for people but result in biodiversity loss.³ Economics offers some techniques to help in this decision-making process. However, the full potential of these techniques is yet to be realised.

The main aim of this booklet is to clarify what economics can contribute to the wise management of biodiversity to ensure its conservation in perpetuity. The goal is not to advocate or promote any particular type of analysis. Instead, it aims to provide a background on what economics has to offer, and highlights both the strengths and weaknesses of the economic valuation approach. It asks why biodiversity valuation techniques aren't more widely used in the decision-making process, explores how they can be made more accessible for decision-makers and provides some practical recommendations for economists, ecologists and decision-makers.

The booklet draws mainly on presentations made at a national workshop on the *Economic Value of Biodiversity*⁴ held in 2003 which were jointly sponsored by the Biological Diversity Advisory Committee, the Australian Government Department of the Environment and Heritage and Land & Water Australia. This event was attended by 50 leading economists, biologists, ecosystem managers and others with experience in the economic valuation of biodiversity.





What is 'biodiversity'?

Biodiversity is the variety of all life forms: the different plants, animals and micro-organisms, their genes and the ecosystems of which they are a part. It is not static, but constantly changing. The concept emphasises the interrelatedness of the biological world. It covers the terrestrial, marine and other aquatic environments. Biodiversity can be classified at four levels as follows:

- Genetic diversity: the variation in the information represented by the genes of individual plants and animals
- Species diversity: the variety within and between species, subspecies, populations
- Ecosystem diversity: the variety of communities of plants and animals within particular habitats at scales ranging from individual habitats to landscapes and bioregions
- Functional diversity: the range of functions generated by ecosystems, including ecosystem life support functions, such as regulating water and carbon cycles and photosynthesis

A high percentage of Australian species occur nowhere else in the world due to millions of years of evolutionary isolation. About 82 per cent of our mammals, 45 per cent of our land birds, 85 per cent of our flowering plants, 89 per cent of our reptiles, and 93 per cent of our frogs are found only in Australia. Thus Australia contains a significant proportion of the world's biodiversity.

Sources: DEST, 1996; Nunes, 2001; Turner et al., 1999

Why is biodiversity valuable?

Our quality of life depends not only on a strong economy, but also on a healthy natural environment. Biodiversity is a major contributor to the economy through the provision of many ecosystem goods and services. Fresh air, clean water, nutrients for plant growth and crop pollination are just some of the 'ecosystem services' that nature provides. As just one example, the value of crop pollination to agriculture in Australia has been calculated at \$1.2 billion per annum.⁵

Biodiversity is intrinsic to the values of beauty and tranquillity. Many Australians place a high value on

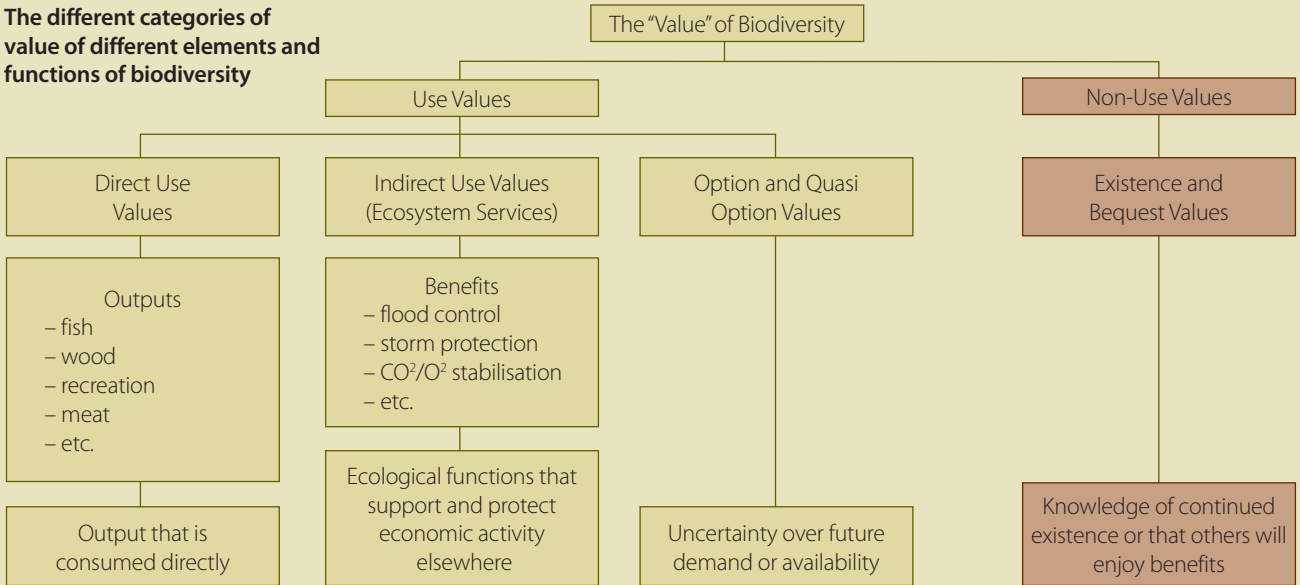
native plants and animals, which contribute to a sense of cultural identity, spiritual enrichment and recreation. Biodiversity is central to the cultures of Aboriginal and Torres Strait Islander peoples.⁶

Clearly the ways in which biodiversity enriches our lives are complex and interrelated. Traditionally, economists break these functions into several distinct categories as a first step in attempting to value their role. These categories of values are illustrated in Figure 1.



Figure 1.

The different categories of value of different elements and functions of biodiversity



Reproduced from Organisation of Economic Cooperation and Development (1999)

Why do we need to make the value of biodiversity measurable in monetary terms?

Many of the goods and services provided by biodiversity and ecosystems are crucial, but not always quantifiable in monetary terms. Many of these goods and services are not traded in the market place and so do not have an obvious price or commercial value. The danger is

that if these unpriced values are not included in the decision-making process, the final decision may favour outcomes which do have a commercial value. Hence decision makers may not have full awareness of the consequences for biodiversity conservation.





When markets fail

Decisions about biodiversity management are complicated by the fact that various types of market failure are associated with natural resources and the environment. Market failures occur when markets do not reflect the full social costs or benefits of a good. Factors that cause market failures related to biodiversity protection include:

- (i) many ecosystems provide services that are public goods; they may be enjoyed by any number of people without affecting other peoples' enjoyment. For example, an aesthetic view is a pure public good. No matter how many people enjoy the view, others can also enjoy it.
- (ii) many ecosystem services are affected by externalities (the side effects of human actions; for example, if a stream is polluted by runoff from agricultural land, the people downstream experience a negative externality. Externalities can also be positive, eg the crop pollination services performed by wild bees).
- (iii) property rights related to ecosystems and their services are often not clearly defined.

An example of an externality is the cost of salinity arising from vegetation clearance. The repair bill for salinity and water logging due to removal of the vegetation that regulated groundwater flow (another ecosystem service) is one of the most expensive facing Australia at the moment. Estimates of the size of the repair bill vary from \$20 - \$65 billion over 10 years, depending on what aspects of salinity are included.⁷ If these externalities had been factored into the original decisions to clear vegetation, a costly repair bill may have been avoided.

Ecosystem valuation can help resource managers deal with the effects of market failures by measuring their costs to society in terms of lost benefits. The costs to society can then be imposed, in various ways, on those who are responsible, or can be used to determine the viability of actions to reduce or eliminate environmental impacts.

Source: adapted from www.ecosystemvaluation.org



People make a variety of claims on biodiversity and environmental resources. Deciding who should use environmental resources and how, where and when is complex. Decisions must weigh the values, variously perceived, of the range of potential uses of the resources.⁸

Economics has a well-established method for assessing the relative merits, from a society wide perspective, of alternative resource uses. For example; building a dam, clearing native vegetation for housing development or agricultural production. This is known as *Benefit Cost Analysis* (BCA) and is widely used by policy makers. In some jurisdictions, and for some resource use decisions, government

agencies are required by legislation to conduct benefit cost analyses. When resource use change is proposed, the benefits of the change are compared with the costs to see whether overall, the benefits to society will outweigh the costs. If they do, the change is advisable. Importantly, the BCA process needs costs and benefits to be estimated in monetary terms so that they can be compared⁹. But this is difficult when some of the costs or benefits involve biodiversity, which does not usually have a monetary value. In particular, it is difficult to put a dollar figure on the benefits of conserving biodiversity or the costs of losing biodiversity. We therefore need techniques that can account for the full range of values generated by changes to the stock of biodiversity.

Finally, valuing biodiversity using economic techniques and incorporating those values into the decision-making process can be a powerful way to demonstrate the importance of biodiversity protection to the broader public.

Delivering biodiversity values on private land

Biodiversity is not restricted to the network of national parks and other protected areas on state-owned land. Biodiversity also needs to be protected and managed on privately-owned land. This can be achieved by developing a suite of market-based instruments such as financial incentives to promote biodiversity protection. These include funding landholders to protect biodiversity, taxing destructive practices and introducing trading and banking schemes for property's supporting biodiversity conservation. The advantage of such instruments is that they allow biodiversity to be protected at minimum cost. However, what they cannot ensure is that the level of biodiversity protected is optimal from a society-wide perspective.

Source: Bennett, 2003

Biodiversity valuation: the state of play today

Techniques to value biodiversity have come a long way over recent decades. In this section we briefly describe the various techniques available and summarise what they can offer to decision-makers, illustrated by Australian case studies. We then discuss some areas of untapped potential for valuation techniques to play a role in biodiversity decision-making.

Methods for integrating biodiversity valuation into economics

Economists have developed a variety of techniques for valuing biodiversity. In this booklet we divide the techniques into three categories that range from pure market to non-market based techniques:

1. Market-based techniques

2. Revealed preference techniques

3. Stated preference techniques

We then give examples of how some of these techniques work and how they have been used in Australia. We also assess how well they perform in accurately reflecting the range of values that biodiversity represents.

Market-based techniques

Where a benefit generated by biodiversity is bought and sold directly in markets we can use standard economic techniques to estimate values for both buyers and sellers. The market price method uses standard economic techniques for measuring the economic benefits from marketed goods, based on the quantity people purchase at different prices, and the quantity supplied at different prices.¹⁰

For example, imagine water pollution has caused the closure of a commercial fishing area, and agency staff want to evaluate the benefits of a cleanup. The market price method can measure total economic surplus

for the increased fish harvest that would occur if the pollution is cleaned up.

However, market-based techniques are rarely used to value biodiversity because many of the benefits of biodiversity cannot be exchanged in markets. Also, where market forces operate successfully to secure biodiversity protection, biodiversity values are not really needed to aid public policy.¹¹ One exception to this is biodiversity prospecting (the search among genes of living organisms for chemical compounds of commercial value in pharmaceutical, agricultural and industrial applications¹²). Here, although market forces ensure a supply, there is a role for policy in ensuring equitable sharing of and access to benefits from these resources.

Revealed preference techniques

When market data are available for goods and services that are in some specific way related to the biodiversity value in question, such as the relationship between the costs of travel and the number of people visiting a national park (see case study 1), these data can be used to infer values. This approach is called 'revealed preference' and a number of different techniques have been developed (see Table 1).

However, other than the travel cost technique, these methods have not seen much use for biodiversity valuation in Australia. For example, two of the most promising techniques for valuing biodiversity – the hedonic pricing technique and the production function method – have seen very little application.¹³ The usefulness of these techniques could be improved by better biophysical knowledge (for the production function method) and better market data collection and analysis (the hedonic pricing technique).



Table 1. Revealed preference techniques for biodiversity valuation

Technique	Summary	Biodiversity example	Usefulness for biodiversity valuation
Mitigatory or preventative expenditure approaches	Values are inferred from the amount of money people are willing to spend to prevent biodiversity from being lost or to mitigate the consequences of biodiversity loss.	<p>Cost of a captive breeding program for a threatened species may be used to estimate the benefit being provided by its continued survival.</p> <p>To measure the cost of land degradation to shire councils, monetary values can be estimated for the benefits of conservation and flood protection and the costs of land degradation, such as the cost of damaged roads.¹⁴</p>	<p>Neither of these approaches strictly estimates the value of biodiversity benefits. They are surrogate approaches, because they estimate costs associated with providing substitutes or avoiding loss. They are therefore not ideal for fully valuing biodiversity, but can be useful for providing an initial estimate.</p>
Replacement cost	Estimates how much it would cost to replace an environmental resource.	<p>A diverse soil biota will lead to higher crop yields. Thus, the economic benefits of improved soil quality can be measured by the increased profit from greater agricultural productivity.</p>	<p>More useful because it observes people's actions in markets that are specifically related to biodiversity values. It is relatively straightforward and the relevant data may be readily available, so it can be inexpensive to apply. However, the application of this approach is currently limited by our lack of understanding of system inputs and outputs; for example, the link between vegetation cover and the health of the ecosystem. If the changes in the natural resource affect the market price of the final good, or the prices of any other production inputs, the method becomes much more complicated and difficult to apply.¹⁵</p>
Production function technique or change-in-productivity technique	Estimates the economic value of ecosystem products or services that contribute to the production of commercially marketed goods.	 <p>See case study 1</p>	<p>The travel cost method has been used in many studies in Australia and has provided plausible estimates of monetary values for recreation in natural environments because it uses actual behaviour of visitors as they adjust to changes in the real costs they incur; and actual data on the costs of the visit. Limitations include its assumption that people are travelling solely to visit the site in question.</p>
Travel cost method	Investigates how much people are willing to pay to get to a site of biodiversity value (eg a national park). It is based on the assumption that people will spend more to travel to a site they value more highly.	<p>Most commonly applied to variations in housing prices that reflect the value of local environmental attributes such as amount of open space, views to forested hills etc.</p>	<p>Can be used to estimate values based on actual choices eg property markets. It is versatile, and can be adapted to consider several possible interactions between market goods and environmental quality. However, outside influences, like taxes, interest rates, or other factors can affect the market.</p>
Hedonic pricing	Used to estimate economic values for ecosystem or environmental services that directly affect market prices.		



Case study 1: Assessing the recreational values of national parks and state forests in Victoria

Parks outside urban areas are usually natural areas containing biodiversity that produce a wide range of direct, indirect and non-use values. This study was carried out to guide policies and strategic directions for park management, monitor changes in economic output over time through repeat studies, justify funding allocation and aid infrastructure and government investment decision making.

Method

The travel cost method was chosen and the analysis used existing survey data. Data were collated on point of origin postcode for each visitor, frequency of visits, group size, length of stay, means of travel, type of accommodation etc. Findings were extrapolated to parks for which no survey data existed, using 'benefit transfer' (see below).

Findings

The sample of 23 non-metropolitan parks (national parks, state parks etc.) revealed that the average visitor enjoyed a net benefit of over \$19 a day when visiting a park. The total recreational value for all 23 parks for the years 1997/98 was over \$173 million.

Policy relevance

The estimate for recreation value is part of the total economic benefit provided by the parks. This estimate alone exceeded the public expenditure on managing parks. Therefore these findings could be used to justify or increase existing expenditure on park management.

Source: Sturgess, N. 2003. Economic assessment of the recreational values of Victorian parks. Paper presented to the national workshop The Economic Value of Biodiversity, 22-23 October 2003.

Stated preference techniques

The methods discussed so far are limited in their ability to reflect all the values that biodiversity has to offer, in particular non-use, or passive use, environmental benefits. It is clear that people are willing to pay for such benefits. However, they are likely to be valued at zero in decision-making processes unless their monetary value is somehow estimated. So, how much are they worth? Since people do not reveal their willingness to pay for them through their purchases or by their behaviour, the only option for estimating a value is to ask people questions.

This has led to the development of another set of methods, known as stated preference techniques, in which people are asked how much they would be willing to pay for the service offered by a biodiversity resource.



Contingent valuation

The first stated preference technique to be developed was the contingent valuation method (CVM). It can be used to estimate both use and non-use values, and it is the most widely used method for estimating non-use values. It is also the most controversial of the non-market valuation methods. It is called “contingent” valuation, because people are asked to state their willingness to pay, *contingent* on a specific hypothetical scenario and description of the environmental service (see case study 2). This method generally involves a survey of a sample of people on the amount they would be willing to pay for some aspect of biodiversity to be improved or conserved.

Strengths

The Contingent Valuation Method (CVM) is an increasingly popular method for valuing biodiversity. It has more potential for capturing biodiversity's more abstract benefits than revealed preference techniques. It is flexible and works best when estimating values for goods and services that are easily identified and understood by users. The nature of CVM studies and the results of CVM studies are not difficult to analyse and describe.

Weaknesses

The following areas have made CVM a controversial approach. However, as the method continues to be applied these issues are being ironed out:

- **Asking people their willingness to pay (WTP) to maintain an element of biodiversity elicits very different responses to those found when Willingness to Accept (WTA) questions are asked. WTA significantly exceeds WTP. Critics have claimed that this invalidates the CVM approach, showing responses to be expressions of what individuals would like to have happen rather than true valuations. However, recent research in behavioural**
- **economics has shown that even in market contexts people are less willing to lose a certain dollar amount compared to gaining the same amount when structured scenarios are put to them.**
- **CVM is prone to a range of potential biases, such as when the respondent provides a biased answer in order to influence the policy outcome or when respondents are forced to value attributes with which they have little or no subject experience. However, these are not insurmountable problems and the use of experimental economics to review strategic behaviour incentives has untapped potential.**
- **The payment vehicle chosen eg, taxes or a donation, may impact on WTP and cause the valuation to be an inaccurate expression of the actual value of biodiversity.**
- **External validation of the method's results is difficult and hence the method's credibility suffers.**
- **Expensive and time-consuming because of the extensive pre-testing and survey work.**



Case study 2: The worth of a possum

The contingent valuation method was used to explore people's willingness to pay for two aspects of biodiversity: all endangered species of flora and fauna in Victoria (about 700 species); and one threatened species, Leadbeater's possum. The study was motivated by a legislative requirement to include social and economic valuation in species and biodiversity conservation policy decision making in Victoria.

Method

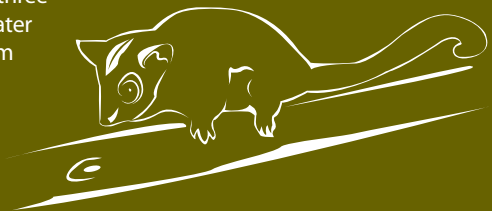
Two questionnaires were circulated amongst a random sample of 3,900 Victorians drawn from the electoral roll. One questionnaire asked how much people were prepared to pay for the conservation of 700 species and the other for the conservation of Leadbeater's possum. People were asked how much they would be willing to pay a year to conserve these two aspects. The payment vehicle was an increase in state taxes and/or a donation to a private conservation organisation.

Findings

The conservation value of Leadbeater's possum alone was estimated to be between \$40 million (\$29 per household) and \$84 million a year. The range of values for conserving all 700 endangered species was estimated to be \$160 (\$118 per household) to \$340 million a year.

Policy relevance

The estimated economic value for conserving Leadbeater's possum is two to three times the value of timber cut from its habitat and equivalent in value to both water conservation and recreation values. Therefore conservation of Leadbeater's possum habitat would be given priority as it provided a positive benefit to the community when compared to alternate uses. The estimated value for conserving all 700 endangered species was at least an order of magnitude larger than government expenditure on flora and fauna conservation at the time of the study (about \$10 million a year). These figures could be interpreted as strong support for increasing spending on conservation.



Source: Jakobsson K. & Dragun A. (2001) *The worth of a possum: valuing species with the contingent valuation method. Environmental and Resource Economics* 19, 211-227.

Choice modelling or contingent choice method

This is the most recently developed stated preference technique. It is similar to contingent valuation in that it can be used to estimate economic values for virtually any ecosystem or environmental service, and can be used to estimate non-use as well as use values. Like contingent valuation, it is a hypothetical method – it asks people to make choices based on a hypothetical scenario. However, it differs from contingent valuation in that it does not directly ask people to state their values in dollars. Instead, it asks people to state a preference between one group of environmental services or characteristics, at a given cost to the individual, and another group of environmental characteristics at a

different price or cost (see case study).

Because it focuses on trade offs among scenarios with different characteristics, choice modelling is especially suited to policy decisions where a set of possible actions might result in different impacts on natural resources or environmental services. For example, improved water quality in a lake will improve the quality of several services provided by the lake, such as drinking water supply, fishing, swimming, and biodiversity. In addition, while choice modelling can be used to estimate dollar values, the results may also be used to simply rank options, without focusing on dollar values.¹⁶



Case study 3: Vegetation clearance in Queensland

The Fitzroy River basin is the second largest in Australia (after the Murray Darling). A recent water reform process identified potential unallocated water surplus in parts of the Fitzroy basin, however, allocating water for irrigation and other natural resource developments entails economic and social benefits and costs. These include employment benefits, and costs such as, impacts on native vegetation, water quality, river estuary and Great Barrier Reef lagoon health and on Aboriginal cultural heritage sites. To undertake decision-making and consider trade-offs we need to know how people value the various costs and benefits.

Values for retaining native vegetation were assessed in four case studies for the Fitzroy River basin and two of its sub-catchments by academics at Central Queensland University in association with the Queensland Department of Natural Resources. Choice Modelling (CM) was used between 2000 and 2003 to assess values among people living in Brisbane, Rockhampton and Emerald. The Rockhampton indigenous community was sampled separately. Repeating the study over time allowed researchers to check the consistency of values estimated.

Estimates for the retention of native vegetation in the Fitzroy River basin were as follows. In 2000 Brisbane households would pay \$1.74 annually to reserve each 1% of remnant vegetation in the Fitzroy River basin. This figure increased to \$3.29 in Brisbane households in 2003. The results of this case study suggest that remnant vegetation values are large, important and appear to be increasing as remnant vegetation scarcity increases. Choice modelling captured the different values held by the indigenous community and non-indigenous people. All non-indigenous participants sampled in Emerald, Rockhampton and Brisbane held similar values.

These research findings support the introduction of the Vegetation Management Act 1999 in Queensland to regulate clearing on freehold land and the proposal to phase out future clearing of remnant vegetation by 2006.

Source: Dr Jill Windle. Remnant Vegetation in Central Queensland: Value Differences across Populations and Time. Paper presented to the national workshop The Economic Value of Biodiversity, 22-23 October 2003.

Strengths

Choice modelling is achieving greater acceptance and with time has become less controversial. It is a clear demonstration of how the valuation methodology has progressed with increasing use. Advantages include its ability to involve the community in the planning process, and that different attributes of an environmental good can be valued and transferred to other situations (benefit transfer – next page). Bias is less likely in choice modelling compared with other stated preference techniques.

Weaknesses

Many of the problems with this technique are similar to those for contingent valuation, such as the potential for respondents to overvalue a resource to influence the outcome of a study (strategic bias) and the type of payment vehicle used. Another problem more specific to choice modelling is the challenge of providing respondents with complex information in a manageable format. Adequate information needs to be presented so realistic choices can be made, but too much information deters respondents.¹⁷





Benefit transfer method

The benefit transfer method is not a specific valuation approach. Rather, it involves estimated values for biodiversity or ecosystem services being 'transferred' from studies carried out elsewhere. For example, values for recreational fishing in one state can be estimated by applying estimates of recreational fishing values calculated for another state. Benefit transfer is a convenient method to use when it is too expensive or time-consuming to conduct a new valuation study. While there are limitations in using benefit transfer to derive a precise dollar value for impacts, it can provide an indication of the likely magnitude of environmental values.

However, benefit transfers are only as accurate as the initial study and if conditions are similar at both sites.¹⁸ In addition, care should be taken when extrapolating value estimates from one site or population to another. The NSW Environmental Protection Agency maintains ENVALUE, a database of published environmental valuation studies. One of its uses is as a resource for benefit transfer, but as noted above it is only valid if the conditions and environmental change being proposed are similar.

Fulfilling the potential of biodiversity valuation

A review of how biodiversity valuation techniques have been used in Australia¹⁹ shows that most studies of biodiversity value estimation have used stated preference techniques, mainly contingent valuation. There have been very few revealed preference studies (apart from travel cost approaches that do not fully reflect biodiversity values) or market based studies.

The applications of methods have mostly concentrated on species and habitat protection. While most studies claim to yield values for biodiversity, there is little recognition of the complex relationship between biodiversity and the scale of the biological resource. Hence, the values reported are not estimates of biodiversity per se, but rather of the species/ecosystem being studied. Very few studies have targeted the value of ecosystem resilience as the specific result of biodiversity protection activities.

How have these approaches influenced or been used by policy makers in Australia? The same review finds that compared to the US and Europe, few biodiversity studies have been specifically commissioned for policy purposes in Australia. While some major policy decisions – Coronation Hill²⁰, Fraser Island and NSW rivers environmental flows - have included stated preference study valuations as part of a suite of information provided to decision-makers, the topic remains highly controversial in Australia. So in this section we ask why there have been so few studies and why these approaches have lacked policy significance in Australia.

There are three main obstacles to the wider application of biodiversity valuation in Australia:

1. **Lack of biophysical information to support biodiversity valuation.**
2. **Ethical concerns about valuing environmental impacts in monetary terms.**
3. **Technical concerns, especially surrounding the accuracy of stated preference techniques.**

Lack of information for biodiversity valuation

Unless the ecological system is understood, the role of economics is very limited. For instance, to use the production function approach to assess the value of soil biota we need to understand the links between farm management practices, soil biota and the productivity of the soil. To use a stated choice method, we need to be able to explain clearly to questionnaire respondents how a proposed change will affect an ecosystem. These relationships are extremely complex, and science still does not provide a full understanding of how many ecosystems operate. In these circumstances it is hard for scientists to predict how proposed changes might affect an ecosystem.



Ethical concerns:

A key criticism of biodiversity valuation approaches is how can one place a dollar figure on something as 'priceless' as an old-growth forest or a pristine river? This is a valid question. Decisions are made constantly about developments that may affect biodiversity and so trade-offs are being made, either explicitly or implicitly. For instance, if it is decided to log a forest and so reduce the habitat availability for a species or suite of species, the value of the timber harvested (and the jobs created etc.) is seen as greater than the value of the potential loss of biodiversity. The trade-off between the monetary value of the timber harvest and the non-monetary value of the biodiversity has been made. It is important that when such decisions are made, valuations are made explicit and done in as accurate and inclusive a way as possible²¹. Put simply, decisions involving trade-offs between biodiversity protection and the value people gain from activities that utilise natural resources are difficult but a fact of life. Improved economic analysis including valuation studies of biodiversity can contribute to sound decision making that considers the environmental, economic and social attributes of outcomes.

Technical concerns: the accuracy of stated preference techniques

Economists themselves have questions about the ability of some of the valuation techniques, especially stated preference techniques, to value accurately biodiversity. These concerns relate to:

- **The complexity of the biodiversity issue and the capacity of the general public to understand these complexities and provide accurate responses to a questionnaire; and**
- **The possibility for strategic behaviour by questionnaire respondents with vested interests; and**
- **Other biases that arise because of the nature of the hypothetical questions.**

The valuation technique debate amongst economists does not give comfort to policy-makers. Without agreement the techniques continue to be underused. However, the debate has been critical in the continuing evolution of the techniques. It has ensured the continued refinement and improvement of the techniques and hence should be regarded as a positive feature of developing this decision making tool.

The final section in this booklet suggests some practical ways forward for meeting the challenges facing environmental valuation and fulfilling the potential offered by the suite of techniques outlined above.



The way forward

The following recommendations are distilled from the Economic Value of Biodiversity Workshop and provide a number of avenues to be pursued in achieving the goal of making valuation studies more relevant and timely to decision makers.

Policy integration

Decision makers need to be supported in increasing their understanding of the range of values that biodiversity offers and the array of valuation techniques available to estimate these values. Increased use in policy settings will improve their acceptance and help smooth out remaining flaws. Decision makers also need support in recognising that valuation techniques are but one tool in the overall decision-making process and are not some 'black box' that generates absolute answers to resource use questions.

Some strategies include: demonstration of how current policy making processes implicitly include a value for biodiversity and highlight the importance of processes that make these values explicit through valuation studies; analyse the effectiveness of investments in environmental protection measures to assess if existing investment is effective and efficient; and develop funding mechanisms to support new research and build an Australian skills base.

Science

For estimates of biodiversity values to be widely respected and applied we need to improve our scientific expertise on two fronts: improving the performance of economic valuation techniques and our understanding of the impacts on biodiversity of human activities.

This could be supported through the adaptation of existing case study material to make it more accessible to potential users (policy makers); and strengthen the ecological-economics interface by bringing together teams of researchers.

Communication

Biodiversity valuation has a lot to offer society. Improved communication of valuation techniques used in policy making would be a good place to start. It is difficult to convey complex techniques in meaningful ways without over simplifying the issues.

Practitioners of valuation techniques could work together to promote the merits of estimating the values of biodiversity to improve decision making; to develop simple messages for the media using measurements that are specific and meaningful; and to develop a series of demonstration projects that will build grassroots credibility for valuation studies and form the focus of a communications exercise.





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End Notes

- ¹ Dest, 1996
- ² Nlwra, 2002
- ³ Bennett, 2003
- ⁴ In Particular, It Draws Extensively On A Scoping Paper Written By Professor Bennett For That Workshop: *The Economic Value Of Biodiversity: A Scoping Paper*.
- ⁵ Pmseic, 2002
- ⁶ www.deh.gov.au/biodiversity/index.html
- ⁷ Pmseic, 2002
- ⁸ Dest, 1995
- ⁹ Bennett, 2003
- ¹⁰ Information from www.ecosystemvaluation.org
- ¹¹ Bennett, 2003
- ¹² Nunes, Et Al. 2001
- ¹³ Bennett, 2003
- ¹⁴ Example From Dest, 1995
- ¹⁵ www.ecosystemvaluation.org
- ¹⁶ www.ecosystemvaluation.org
- ¹⁷ Windle, 2003
- ¹⁸ Epa, 2003
- ¹⁹ Bennett, 2003
- ²⁰ Imber Et Al. 1991
- ²¹ Bennett, 2003

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- P.5 Daryl Walters and Scott Taylor - Native plantings on Scott Taylor's property, Yelta New South Wales 2001
Credit: John Baker
- P.6 Barr Creek Project Victoria 2001 Credit: John Baker
- P.10 Spinifex and mallee country New South Wales 2000
Credit: Andrew Tatnell, Department of the Environment and Heritage
- P.14 Timber Harvesting Wingham New South Wales 1993
Credit: Brendan Edgar LWA
- P.14 Tjilpi Ropbin (Kankan kapantja) patch burning at Walalkara Indigenous Protected Area
Credit: Bruce Rose, Department of the Environment and Heritage
- P.15 Coastal Dunes South Coast New South Wales 1998
Credit: Tony Karacsonyi Marine & Wildlife Photographer
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