THE ROLE OF NON-MARKET VALUATION IN FOREST MANAGEMENT AND RECREATION POLICY

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Forests, and particularly those where native and mixed species are grown, provide a variety of non-wood values, important among which are recreation and environmental services. Substantial progress has been made in recent years in estimating economic values on these services. A considerable amount of research on forest values has been carried out recently in tropical and sub-tropical eastern Australia, some of which is reported in the following papers. The need for estimates of non-wood forest benefits is apparent, and it is clear that further development of techniques and a greater understanding of the way these values can be integrated into public-sector decision making is required.

1. INTRODUCTION

Over the last about 15 years, much research has been conducted into community benefits or values of forestry and in particular non-timber values. Forests, both native and plantation, are recognized to provide a number of benefits to society, in addition to the value timber they produce. Critical amongst these are environmental services such as protection of land (including streambanks) in watersheds, protection of water quality, provision of wildlife habitat, recreation opportunities, landscape amenity and farm beautification, windbreaks and crop protection, and carbon sequestration. A knowledge of these environmental (including recreation) values is important for forest policy, and economists have responded to the challenge of making these estimates.

In Australia, one of the areas where this research has been focussed concerns native forests and reforestation with native species in the humid tropics and subtropics of Queensland and Northern New South Wales. This special issue of
Economic Analysis and Policy contains a collection of research papers on estimation of recreation and environmental values in forestry in this region. This opening paper introduces the objectives, methods and difficulties of environmental valuation in forestry, provides a brief commentary on the following papers, and reviews future prospects for environmental valuation in forestry. The collection of papers arise from a number of mainly unrelated research projects, but with a common focus on non-wood forest values in tropical and sub-tropical eastern Australia.

2. THE NEED FOR NON-MARKET VALUE ESTIMATES

Growing levels of affluence and education in Australia and other developed countries have resulted in growing demands for environmental goods and services. Simultaneously, the supply of these assets has been eroded through extractive uses of natural resources. This situation is reflected in a growing scarcity of environmental goods and services. This scarcity has not been reflected in markets because of the public good characteristics of environmental goods and services. Forest recreation and environmental benefits are not, in general, bought and sold in markets, that is, these benefits form a category of non-market values. However, these forest services can provide major benefits to society, and this is recognized for example in the gazettal of national parks and forest-based world heritage areas. Because forests generate multiple benefits, a variety of stakeholders can be affected by decisions about forest, plantation and revegetation management.

Because of lack of market signals to direct the management and conservation of environmental assets, the public has looked to governments to protect the supply of what assets remain. The dilemma this poses for government is the determination of environmental policy in a setting where information about peoples' preferences for the environment is not readily available in markets. Hence, the very reason for governments being involved in the provision of environmental goods and services is the reason why policy making in the field is so difficult. Yet resources are finite and governments must seek to allocate their available resources across the multitude of demands placed on them – including the environment – as efficiently as possible. For this to happen, preference information – in the form of value estimates – are of critical importance.

Various government agencies in Australia and overseas have recently developed – or are in the process of developing – policies on use of non-market values, examples being the US EPA (Callan and Thomas, 1996) and the South Australian government (South Australian Department of Environment, Heritage and Aboriginal Affairs, 1999). It has been suggested that some of the specific uses of these values are to set overall levels of supply being provided by the state (say in the form of national parks or forest reserves), to develop management strategies for environmental assets (for instance to determine the appropriate trade-off between extractive and protective uses of natural resources) and to establish cost-sharing arrangements where those enjoying the benefits of environmental protection are called upon to pay for their provision.
3. NON-MARKET VALUATION TECHNIQUES

Since environmental values are not traded, there is no direct evidence of preferences revealed in markets, and it becomes necessary to resort to the various methods of non-market valuation. Two basic types of techniques have been developed to estimate non-market values: revealed preference techniques and stated preference techniques.

Revealed preference techniques involve making reference to preferences that are revealed in markets that are in some specific and quantifiable way related to the good under investigation. Examples of revealed preference techniques are the travel cost method (Ward and Beal, 2000), and the hedonic pricing method (Haab and McConnell, 2002). The travel cost method relies on the relationship between demand for visits to a site of environmental significance and the markets for inputs into the production of a visit – notably transport, accommodation, and time. The hedonic pricing method is useful where a non-marketed good is an attribute of a marketed good. The demand relationship for the marketed good can be used to infer a value for the non-marketed attribute.

In contrast, stated preference techniques require respondents to a questionnaire to state their preferences in a hypothetical market context involving trade-offs between money and provision of the non-marketed good in question. Perhaps the best known stated preference technique is the contingent valuation method (Mitchell and Carson, 1989). An open-ended contingent valuation question involves respondents being asked the amount of money they would be willing to pay to secure a specific environmental improvement or to avoid a specific environmental loss. The dichotomous choice or referendum version of the technique rephrases the question to ask if respondents are willing to pay a pre-assigned sum of money. A more recently developed stated preference technique is choice modeling (Bennett and Blamey 2001). This is effectively an extension of the contingent valuation method in that it requires survey respondents to choose between different future environmental alternatives that are described in terms of a sequence of attributes. Choice modelling allows overall outcomes and unit changes in the individual attributes to be valued.

Ideally, a reference set of environmental values would be available from past studies, to provide ballpark estimates in new situations. These value estimates would then be available for extrapolation to situations other than the one in which they were developed. This is the process known as benefit transfer – values estimated in a “source” study are transferred to a “target” case for the development of specific policy advice. To be effective, the past values need to be converted to a uniform standard (e.g. current dollar values per person), with circumstances of their estimation clearly indicated. Also, there needs to be a sufficient number of estimates for any particular resource situation to provide evidence of the range of values that may pertain for any particular target site. The utility of databases of environmental values is increasing (e.g. see Morrison, 2001).

The variety of methods that have been developed to estimate the non-market environmental values of forests has evolved over a period of almost 50 years. The development process has been controversial. The revealed preference techniques,
being well-rooted (if somewhat indirectly) in the market behaviour of consumers, have always been better accepted in the mainstream of economics than the stated preference techniques with their reliance on responses to hypothetical questions. However, both revealed and stated preference valuation techniques have been subject to criticism and even aggressive controversy. It has been this negative reaction to the use of non-market valuation techniques that has brought about the continual refinement of all the methods.

An example of this evolutionary process can be seen in the development of the stated preference techniques. The revealed preference techniques are inherently limited in the scope of their application because not all non-market values have specific relationships with other marketed goods. Stated preference techniques were therefore developed to fill this gap. Early versions of the contingent valuation method were heavily criticised because of the prospect of respondents providing biased assessments of their willingness to pay. These criticisms stimulated the development of the dichotomous choice version of the method which was shown to be incentive compatible. However, elements of the profession remained unconvinced and further development was triggered. Now choice modelling and other conjoint-based stated preference methods are being trialled with growing success.

As experimentation continues it is also apparent that some non-market values are particularly intractable to valuation (e.g. see Harrison, 1999). Some situations arise where environmental valuation is particularly difficult. These include cases where the degree of respondent familiarity with the environmental good involved is low and where payment of money for goods that have traditionally been free is particularly objectionable to the public. Research continues on how to handle such cases but as with most analytical techniques, non-market valuation methods have their limitations.

4. DECISION PROBLEMS AND RESEARCH FINDINGS IN THE FOLLOWING PAPERS

The following collection of invited but peer reviewed papers reports experience in a variety of research projects in north-eastern Australia concerned with recreation and environmental values in forestry. Some of the studies have been undertaken as dissertations for university higher degrees. Several of the studies have been supported by the Rainforest Cooperative Research Centre based in Cairns. The papers set out the major issues involved in each particular study, and present estimates of values. As well, authors were encouraged to provide information about how the particular valuation approach was chosen, the steps involved in the implementation of the method, and reflections on appropriateness of the approach.

Driml provides an example of the application of the travel cost method to the estimation of recreational values enjoyed by visitors to the Wet Tropics World Heritage Area (WTWHA) in north Queensland. This valuation was challenging because of the large and dispersed nature of the WTWHA and variety of visitor sites. In testing propositions by Randall (1994), Driml demonstrates that estimated recreation values can vary greatly depending on the decisions which must be made.
at various points in applying the travel cost method. The study demonstrates the high level of visitation values and is of particular practical significance for those engaged in the management of the region.

Tisdell and Wilson explore the impact of World Heritage listing on economic value of the Australian listed properties, and in particular how this might be assessed and the difficulties involved in such assessment. Because of data limitations, the study focuses on foreign visitors only (c.f. Driml considers domestic visitors only). They concentrate mostly on use-values for tourism but also give some consideration to consequences for non-use values. An important finding is that the processing of listing, which signals values of these areas to potential tourists, does not have the impact on visitation rate that is often asserted. Growth in visitation of non-listed attractive natural areas is demonstrated to outstrip that of listed areas. Various explanations are advanced for this phenomenon. Another interesting finding, from a methodological viewpoint, is that travel cost method has severe limitations when attempting to estimate recreation values for large dispersed natural areas.

Rolfe and Bennett demonstrate the use of choice modelling to estimate the relative importance of alternative rainforest protection sites to the people of Brisbane. This innovative study showcases the capacity of the method to tease apart the contributions made by the various attributes of rainforest protection to the overall values ascribed by the community. It is shown that the proximity of protection sites to Brisbane is a key determinant of preferences.

Eono and Harrison report a study designed to estimate the total economic value of the Community Rainforest Reforestation Program in north Queensland. This program involved the planting of mixtures of native tree species, some having outstanding timber values, in small plots on private land, which considerable financial support (but no equity sharing) by government. This study confronted the challenging tasks of identifying through interview surveys the benefits landholders and local government place on establishment of plantations of native species, and of attempting to derive values for the most important benefit categories, primarily by benefit transfer methods. It is found that timber and non-wood values for the program are of similar aggregate magnitude. This may be contrasted with protection of native forests, where evidence suggests environmental values can greatly outweigh timber values (e.g. see Pearce and Moran, 1994).

Duthy discusses an application of contingent valuation to examine whether the Whian Whian State Forest in north-east New South Wales (a remnant of the 'big scrub' area of high ecological values) should be converted to a national park. As well as deriving estimates of community willingness-to-pay for protection of the area, he explores the various components of this community value, hence shedding light on why people feel strongly about forest conservation in the area.

Cook and Harrison examine the economics of development of new long-distance walking tracks (with overnight camping opportunities) in the Wet Tropics of Queensland. They note that unlike in New Zealand, there are few overnight walking tracks in north Queensland, and this represents an overlooked opportunity for providing greater forest recreation experiences and generation of revenue from
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Ecotourism. A social cost-benefit evaluation of any proposed walking track presents particular difficulties. Since the track asset does not exist, it is necessary to estimate demand from other long-distance tracks, and then use benefit transfer methodology to infer values. Estimation of supply costs requires assumptions about the method by which construction and maintenance of the track will be funded. This paper and their earlier reports (e.g. Harrison, 1998; Harrison et al., 1998) have constituted something of a campaign for establishment of new long-distance walking tracks, and these are now advocated in the regional walking tracks strategy.

Kath Herbohn addresses the question of how workable is an environmental reporting system that incorporates financial estimates of unpriced environmental impacts for Queensland public-sector forestry organisations. A case study is carried out for an un-named agency, using essentially qualitative research methods. The study focuses on three research questions, viz. (1) 'How do forest managers from public sector forestry organisations react to proposals to incorporate financial estimates of unpriced environmental impacts into their reporting systems?', (2) 'How do stakeholder groups of public sector forestry organisations react to proposals to incorporate estimates of unpriced environmental impacts into the reporting systems of these public sector organisations?' and (3) 'What is the implementation experience of public sector forestry organisations with a reporting system incorporating financial estimates of unpriced environmental impacts?'. In general, a favourable attitude exists to financial estimates of environmental impacts, which would be of assistance in reporting sustainability of forest management, presenting cases for further funding, and negotiating settlements with powerful stakeholders. However, various barriers to pricing environmental impacts are found to exist.

The paper of Pearson, Tisdell and Lisle reports valuation issues for a National Park which has walking tracks in mature native forest including rainforest and eucalypt species, and is situated within a highly developed beach resort city. The hedonic price method is used to estimate the implicit land price function and hence value that Noosa residents place on the Noosa National Park (NNP) headland section. The relationship between property values and characteristics such as direct distance to the ocean and views of ocean are explored. Studies of this type can provide information for local governments, which typically are concerned about possible depression of rate revenue due to protected forest areas.

Harrison presents an example of applying non-market valuation in the circumstances of a short-term and limited-budget consultancy, concerned with the visual disamenity cost of intrusive infrastructure placed within or close to rainforest and mangrove forest. This paper examines in particular the practical approaches to generating decision-support information under severe resource constraints. It is found that simplified forms of travel cost and hedonic pricing analysis can provide usable estimates of disamenity costs, whereas stated preference surveys can give rise to public controversy which would impede the planning process.

These papers reveal that substantial progress is being made in the application of environmental valuation in forestry in north-eastern Australia. The studies collectively provide insights gained from considerable research experience on non-
market valuation, which hopefully will be of value to readers faced with similar valuation problems.

5. FUTURE PROSPECTS FOR ENVIRONMENTAL VALUATION IN FORESTRY

Clearly, a number of difficulties frequently arise in non-market valuation of environmental assets, and considerable imprecision can exist in any estimates derived. The widespread use of benefit transfer is to be noted. Here estimation is subject to both the reliability of source studies and the skill with which estimates are transferred to target sites. As well, databases of environmental values still tend to be thin in terms of the number of studies that can be identified which are relevant to specific locations and resource management problems. Despite the various methodological and data difficulties, it seems clear that valuation efforts do provide improved information for decision makers.

Framing effects remain as a significant issue in the development of stated preference techniques. It has been demonstrated frequently that the context or frame in which values are estimated has an impact on the estimate derived. Hence it is important to the accuracy of the estimate that the frame used in the questionnaire is consistent with the frame that is apparent in the policy arena. For instance, value estimates for a forest's non-market environmental attributes are likely to be greater when derived in isolation than if estimated as a component of a larger group of forests. Hence, if a policy is being formulated for a single forest, the frame of the questioning should be a single forest and not a group of forests across a region. This concern is particularly relevant when the benefit transfer process is being used. The frame of the source study must be consistent with the frame of the policy initiative proposed in the target area.

Strategic behaviour on the part of stated preference technique respondents remains a concern. Developments in choice modelling show further signs of advantage in this respect but studies are still being performed which use the open-ended contingent valuation method that is well known for its problems with strategic bias. There is often a trade-off between the costs of a non-market valuation exercise and the quality of the estimates obtained. The analyst must be well aware of this trade-off and recognise the potential for biased results that can come from using less sophisticated but less-expensive-to-apply methods.

In this light, it is most important that the quality of studies performed be kept at a high standard. Poor quality studies are potentially dangerous in the context of the policy decisions that are immediately based on them but they are even more dangerous if they become a part of an accepted database of studies that can be used for benefit transfer. It is beholding on those undertaking applications, the agencies funding the work, the editors of journals and the examiners of theses to uphold stringent quality standards. This will assist in policy making and also help prevent the use of non-market valuation techniques from being perceived generally as erroneous exercises.

Nevertheless, economic valuation of non-market environmental commodities is here to stay although the degree of respect for economic environmental valuation
techniques, and therefore the extent of their use, will depend on the type of factors mentioned above, as well as those listed below. Society is now more aware than ever that a large and significant range of non-market environmental commodities (including non-timber benefits from forested areas) are highly valued economic commodities and should be taken specifically into account in decisions about natural resource allocation and use.

The demand for applying economic valuation techniques to measure the value of non-market environmental commodities can be expected to grow. There are two reasons for predicting this. First, the demand for environmental commodities increases with income and education levels, and these are likely to display a continuing upward trend. Second, as economic growth proceeds, the scarcity of natural environmental commodities will probably increase. The net overall effect of such developments is that the value of natural environmental commodities tends to rise relative to man-made ones.

Given that the societal demand for application of economic valuation techniques is likely to grow, it is important, as specified above, that they be applied in a professionally competent manner. In addition, our knowledge about these techniques needs to be further extended.

The following is a short list of areas where future advances may occur and fill current needs of practitioners and clients:

(1) Clearer delineation of circumstances in which applications of these techniques are likely to yield relatively accurate results and identification of other circumstances where their application is misleading. Measures of the degree of error to be expected in different conditions could be useful.

(2) Further experimental testing to determine how important identified limitations of these techniques are and how the degree of the error introduced varies with circumstances. For example, experimental results indicate that strategic bias is not always strongly present and that methods can be adopted to reduce the likely impact of strategic bias, for instance, on contingent valuation estimates.

(3) More information is needed about how economic environmental evaluation techniques can best be used in conjunction with other social valuation techniques, and vice versa.

(4) The role and limitations of these techniques in social, including political, conflict resolution requires further study.

(5) Techniques might be further extended by developing 'mixed' techniques of valuation involving combinations of revealed preference and stated preference approaches.

(6) More attention to underlying psychological models may help to advance the theory and application of valuation in this area. For example, the relative importance of cognitive and affective psychological factors in valuation and decision-making (c.f. Tisdell and Wilson, 2001, 2002) could lead to useful advances (see, for example, van Raij et al., 1988).
(7) Development of appropriate rules of thumb, given the importance of bounded rationality (Tisdell, 1996), could widen the application of these techniques. At the same time, there is also a need to identify and warn against the use of misleading rules of thumb and procedural shortcuts (cf. Harrison, 1999).

(8) Teachers of environmental economics should take more time to make their students aware of the strengths and weaknesses of these techniques so that they are likely to apply these techniques in the future in an appropriate way. Students also should be informed that knowledge in this area is still evolving and that in future practice, they will probably need to update their knowledge. Furthermore, it should be made clear that the teacher’s coverage of the subject is by necessity partial and that their instruction is just a vehicle for the student to obtain further knowledge.

6. CONCLUDING COMMENTS

Community preferences for environmental assets have strengthened in recent years, leading to increased demand for environmental values, and non-market valuation has become a major research area in economics. The concept of multiple-use forests is well established, and substantial progress has been made in placing economic values on the various non-wood forest benefits. At the same time, an improved understanding is being gained on the role and limitations of environmental valuation and reporting within government agencies.

The choice of estimation method will depend on both the particular application area and the resources available to the researcher. At a research level, progress continues to be made in understanding the limits of evaluation techniques, and exciting research is being carried out on development of new and refined valuation methods. At the same time, databases of environmental values are being compiled and extended, which will assist in low-cost applications of benefit transfer methodology. Careful quality control is needed in non-market valuation research if these techniques are to be accepted by the various stakeholder groups and accorded standing in the policy arena.

REFERENCES


