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Valuation of Tourism's Natural Resources

Abstract

Discusses the implications of the economic valuation of natural resources used for tourism and relates this valuation to the concept of total economic valuation. It demonstrates how applications of the concept of total economic valuation can be supportive of the conservation of natural resources used for tourism. Techniques for valuing tourism's natural resources are then outlined and critically evaluated. Consideration is given to travel cost methods, contingent valuation methods, and hedonic pricing approaches before concentrating on current developments of valuation techniques, such as choice modelling. The general limitations of existing methods are considered and it is argued that more attention should be given to developing guidelines that will identify 'optimally imperfect methods'. An overall assessment concludes this article.

Valuation of Tourism's Natural Resources

1. Introduction and Importance

Much tourism depends on the environment(s) at the destination(s) of tourists. Such environments may be natural, cultural, or partly man-made and partly natural. In fact, few tourist destinations involve completely natural environments. For example, the environments of most national parks are to some extent human modified, for instance by access roads, walking tracks, built facilities such as toilets, picnic tables and camping areas (often near entry points) and so on.

Because access to many environmental goods, such as beaches, national parks, and other open-air recreational facilities are either not priced or are only partially priced, there is a danger of their not being valued (when they are economically valuable) or of their being under valued from an economic point of view. Consequently, this can distort economic resource allocation. Land areas which would be best left in a relatively natural state for tourism and other purposes may for example, be developed for uses such as agriculture or housing. From an economics perspective, rational decisions about resource use or allocation requires appropriate economic valuations to be made about their alternative uses.

Pigou (1938) in developing the subject of welfare economics suggested that economic valuation might be best based, from an operational viewpoint, on monetary values. Money enables economic values to be expressed in a single unit of measurement and facilitates the comparison of economic values. It is the basis of social cost-benefit analysis. According to this approach, the aim of economic valuation of a natural resource or an area of land is to determine its social economic value for all of its alternative uses in monetary terms. The use with the highest net monetary value (determined by social cost-benefit analysis) constitutes the best economic use of the natural resource. This may involve its preservation in a relatively natural state, with tourism being one of its uses.

Much economic discussion about this matter has centred on the theory of economic valuation and on techniques that might be applied to assign monetary values to alternative uses or environmental states for natural resources. After discussing generally some background theory on economic valuation, including the theory of total economic valuation, this chapter reviews various techniques, such as the travel cost method and contingent valuation method in relation to tourism's natural resources, and then considers the relevance of a more recent development, such as choice modelling to this subject, and refinements of the contingent valuation method. This is followed by a critical assessment of the current state of the subject, suggestions for future research and concluding observations.

2. An Overview of the Main Theories and Techniques involved in Valuing Tourism's Natural Resources

Measures of consumers' surplus have typically been the basis for assigning monetary economic values to possible alternative states for environmental resources. Willingness to pay by stakeholders for a particular state of a natural resource has been most frequently used as the indicator of the economic value of the resource in that particular state. This involves the independent estimation of the willingness to pay of each individual stakeholder for this particular environmental state and the addition of all these amounts to determine an aggregate economic valuation. Thus, in accordance with standard micro-economic theory, it assumes that the valuations by individuals are independent. Such independence does not necessarily occur in practice (cf. Leibenstein, 1950). Secondly, this type of valuation is used as a basis for social cost-benefit analysis which relies on the Kaldor-Hicks principle; namely, the assumption that if aggregate net value determined in this way rises, social welfare increases because gainers could in principle compensate losers for any losses involved. However, if compensation is not paid, issues involving income distribution become relevant.

An alternative approach is to consider the aggregate monetary sum that individuals would have to be paid to compensate them for the loss of an environmental asset. Empirically it has been found that the willingness to accept compensation for the loss of an environmental resource usually exceeds the willingness to pay for its retention (Knetsch, 1990; Perman et al., 2003, pp. 429-430). The difference is often considerable. That raises the awkward question of which of the two approaches is to be preferred. The first alternative allocates property rights or entitlements in favour of those who want to retain the environmental or natural resource. The second alternative assigns property rights or entitlements in favour of those who may want to exploit the natural resources. The choice of the technique, therefore, involves a question of distributional justice. According to "new welfare economics", the choice cannot be resolved without a value judgement.

Despite this problem, there can be a large number of cases in which both approaches (willingness to pay and willingness to accept compensation) lead to the same conclusion about optimal resource use. This strengthens any economic policy prescription based on this type of social cost-benefit analysis, even though it does not render such analysis flawless.

Few, if any natural resources, are valued just for tourism. Natural resources used for tourism are typically mixed goods and possess economic values for multiple purposes. Consequently, there are few natural resources that are just tourism's resources and normally this ought to be taken into account when valuing natural resources used for tourism. Bearing this in mind, turn now to an overview of the main theories and techniques of valuation of tourism's natural resources, then consider some current developments of these valuation techniques, including those involving choice modelling. This will be followed by a critical assessment of the state of the subject and suggestions for future research and development.

3. Main Theories of Valuation of Tourism's Natural Resources

The theory of the demand for and optimal use of natural resources is complex because such resources are normally used for multiple purposes and on occasion, more intensive use for one purpose eg. tourism, can be in conflict with other uses, such as nature conservation. In addition, there can be conflicts between uses of such resources for different types of tourism and recreation, for example body surfing versus board surfing. Not all the complexities of multiple use can be examined here but the theory of total economic valuation provides a useful introduction to this subject.

According to the theory of total economic valuation, the economic value of a natural resource may be assessed by taking into account its total economic value consisting of its use value plus its non-use value. Developers of the concept include Albani and Romano (1998). Subject to some qualifications, most of the value of a natural site for tourism derives from its on-site use. Furthermore, in principle, exclusion from the site is possible. However, the commodity involved is not a pure private good because it involves shared or common facilities. Nature-based tourism is therefore, appropriately classified as a quasi-public good or in the absence of an entry fee to the site, it is common property. However, few tourism sites can be classified as open-access because usually some rules or regulations apply to their use. They are thus usually *res communis.*

Many natural tourist sites have non-use values. Non-use values of a site or natural resource are usually of an intangible nature and to a large extent, have the characteristics of pure public goods; they involve non-rivalry in their consumption and non-excludability from their benefits. Such values can include the existence value of nature (eg. wildlife species) associated with a site, its bequest value and arguably options for its future use. For some natural resources, non-use values constitute most of their value. For example, Bandara and Tisdell (2003) found from a study of the contingent value of the Asian elephant in Sri Lanka that its non-use value accounts for more than half of its total economic value.

In order to clarify the matter further, divide the total economic value obtained from a natural site into its economic value for use for tourism or outdoor recreation and its value in a natural state for other purposes. Its value for other purposes will include its non-use values (values assigned to its public goods attributes) plus other external values such as for example, its value in sustaining clean water flows in the catchment area to which it belongs. As in most expositions of total economic value, its components are assumed to be additive.

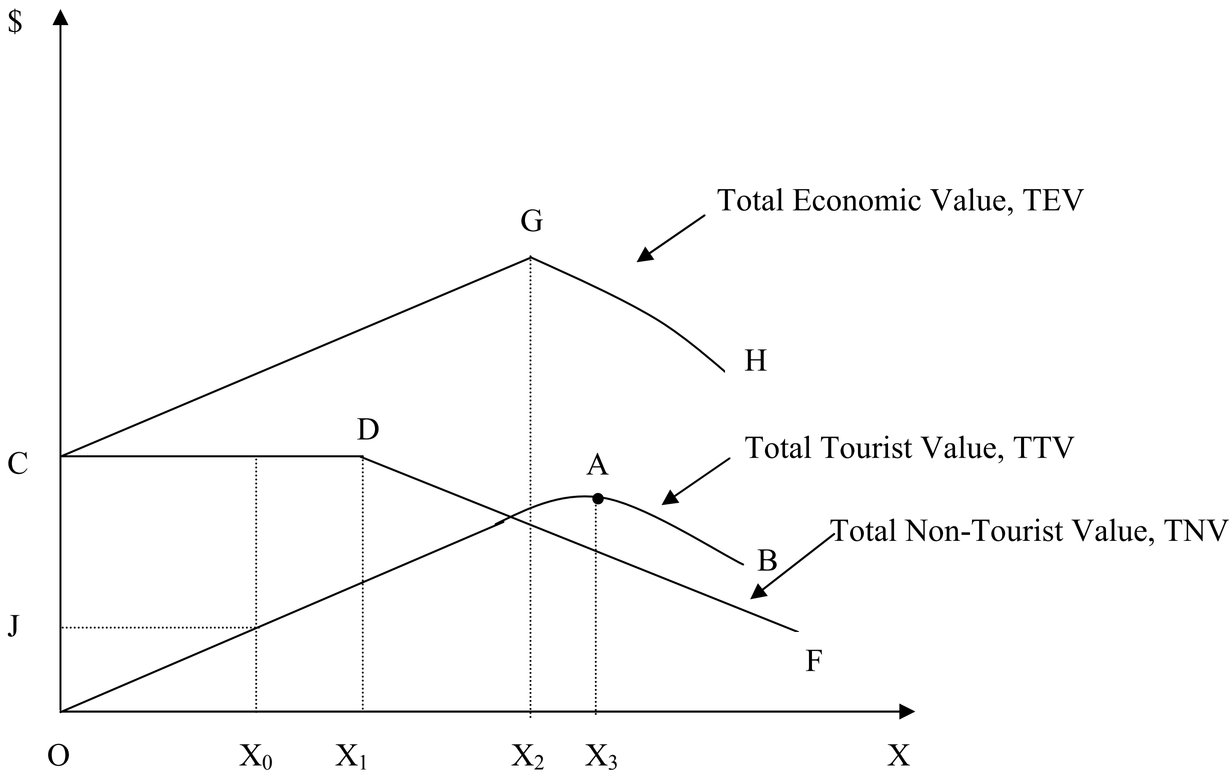
Let us, therefore, envisage the following relationship:

$$TEV = TTV + NTV \qquad (1)$$

where TEV represents total economic value of a natural site, TTV its total on-site value from tourism and outdoor recreation and NTV is its total non-tourism value in a natural state. While the additivity assumption maybe a limitations of this approach, it seems to be a minor problem compared to ignoring completely the totality of the economic valuation problem.

A stylised example of relationship (1) is shown in Figure 1 as a function of the number of visits of tourists or visitors to the natural site. This figure indicates that tourism visits have no impact on the non-tourism total values of the site until their numbers reach X_1 per period, and after that threshold is reached conflict arises. Then NTV begins to decline with an increasing number of visits but total economic benefits from use of the site by tourists continues to rise until X_3 visits per period occur. The curve OAB represents total economic benefit from tourist visits to the site as a function of the number of visitors per period. This is shown as peaking for X_3 visits per period. Reasons could include crowding effects (Wanhill, 1980; McConnell, 1985) or visitor-induced deterioration in the natural assets that attract tourists.

FIGURE 1



Possible impacts of tourist visits on the total economic value of a tourism site

The total economic value curve in this case takes the form indicated by curve OGH and peaks at X_2; a value between that maximising TTV from the site and that maximising TNV. If the number of visits does not exceed X_1, tourist visits are compatible with maximisation of the total economic value of the site. But a number of visits exceeding X_3 reduces both the total economic benefits received by visitors as well as other economic benefits obtained from the site.

If a natural site is quite popular with tourists, then the number of visits is likely to be of a magnitude that reduces its non-tourism values, such as those derived from the conservation of nature. Does this mean that the use of a natural site by tourists will commonly reduce the value of the site in conserving nature? This may be so. However, this raises the broader question of whether nature conservation suffers as a result of the utilisation of natural sites by tourists. The answer is no.

Even if tourism at a particular natural site is to some extent at the expense of nature conservation, in aggregate nature conservation may benefit from the use of natural sites for tourism (cf. Tisdell and Broadus, 1989). Tourist use of such sites adds to political pressure for the provision and conservation of natural sites by stakeholders with an interest in nature-based tourism, including tourists themselves. For example, the self-interest of railroad companies in the United States played an important role in the nineteenth century in the creation of national parks, such as Yellowstone, in the west of the USA. Railroad companies supported the creation of such parks in anticipation of carrying extra passengers to them for vacations. In addition, the contacts and experience of tourists with nature may strengthen their political and economic support for its conservation. Overall, it seems likely that if all protected areas were locked away and were not available for tourism, a much smaller land area would be allocated for nature conservation then now is the case, with even more serious consequences for nature conservation than currently. In such a case, reduced political pressure can be expected for the creation of protected areas for nature.

While the economic value of natural resources for tourism can provide a strong case for their conservation, this case can often be bolstered if account is also taken of off-site non-tourism values of a natural site. For example, in the case illustrated in Figure 1, suppose that the number of visitors per period to a natural site is expected to be X_0. Its total economic value for tourism is then OJ. But the total economic value of the natural site for non-tourism purposes (for example, its existence and other values) is OC. This is much larger than OJ. Hence, those who want the site conserved for tourism purposes rather than developed would find it worthwhile not only to stress the tourism value of the natural site but also its other economic values as well. Conversely those who want the site preserved primarily for its ecological or off-site values would do well not to ignore its value for tourism purposes. In real political situations, all these sets of economic values can make a difference in influencing political decisions about whether a natural area is conserved.

4. Techniques for Valuing Tourism's Natural Resources

The longest established techniques for valuing tourism's natural assets are (1) travel cost methods; (2) contingent valuation methods; and (3) hedonic pricing approaches. More recently choice modelling techniques have been increasingly used for this purpose. The first three techniques will be considered here and choice modelling will be covered in the next section.

Travel cost methods and hedonic pricing methods are usually classified as revealed preference methods. Contingent valuation and choice modelling approaches are normally viewed as stated preference methods. While it is often believed that the revealed preference methods are more objective in their derived valuations than stated preference approaches, because the latter depend on subjective responses by respondents, it is wrong (as discussed later) to believe that the former are necessary scientifically more accurate than the latter and free from subjective influences. In any case, the different techniques often measure the values of different things, so they are rarely perfect substitutes. For example, the travel cost method usually values visits to a site whereas the contingent valuation method may measure the whole economic value that visitors place on the conservation of the site. In fact, what the contingent valuation method measures depends on the type of questions asked visitors; on what they are actually asked to value.

The travel cost method for valuing outdoor recreational assets was originally suggested by Harold Hotelling (1947). It was developed by Clawson (1959), Knetsch (1963) and was followed up in Clawson and Knetsch (1966). Basically it involves using the travel costs incurred by travellers to a natural area plus any entry fee paid as a proxy for their effective price for visiting the area. Those travelling greater distances to visit the natural area will usually incur greater travel cost. Therefore, the effective price or cost of a visit is higher than for those who live closer to the natural area. Other things equal, a lower relative frequency of visits would be expected from residents living more distant from the natural attraction than those closer by, given that the demand for visits is a normal economic good.

Usually, the areas that provide the source of visitors to the outdoor attraction are divided into zones to simplify the application of this technique. The researcher has to make a judgement about how many zones to use and how to determine their boundaries (Stymes, 1990). The coarseness of zoning will be influenced to some extent by the geographical availability of data; for example, the ‘fineness’ of the availability of population data for different areas.

The operational core of the zoned travel cost method is the trip generation function (see, for example, Perman et al. 2003, Ch. 12). This specifies the relative frequency of visits to the attraction from the different zones in relation to the travel cost involved in visiting the site. It is the basis for estimating the demand curve for visits to the natural site and subsequently for measuring the economic surplus derived by visitors or tourists from their visits to the site (Tisdell, 1992, Ch. 7). The Marshallian measure of consumers' surplus is used to derive the economic value that visitors obtain from their visit to the natural site. If entry to the site is free, this surplus is equivalent to the area under the demand curve for visits. It is the difference between the maximum amount that visitors pay to enter the natural site and the maximum amount they would be prepared to pay for entry. It is an economic value not explicitly taken into account by the economic system, but ought to be taken into account when assessing alternative uses for natural areas.

For example, suppose that the most profitable alternative use of the natural area is for beef production. Assume steady state situations for comparative purposes. Beef production yields an annual net income of $2 million per year, and because this production from this site is negligible in relation to the total market, it has no impact on beef prices. Consequently, consumers' surplus from beef is not altered by use of the natural area for beef. The use of the natural area for tourism is estimated (for instance, using the travel cost method) to generate a visitors' surplus of $5 million annually, but involves associated costs of $0.5 million per year, giving a net economic benefit of $4.5 million annually. From a social economic perspective, retention of the natural area and its use for tourism is the more attractive economic option of the two.

Nevertheless, it is important to realise that the travel cost method has several limitations. One of the most important of these is how to measure the cost of travel and in particular what allowance to include in total cost for the time involved in travel. Should this be some fraction of possible income forgone? This is in fact often used. But it is in some cases the travel itself is enjoyable and income is not always forgone when undertaking recreational travel. In most cases, it is alternative leisure possibilities that are forgone. In fact, Randall (1994) argues that often the allowances made for such travel costs reflect convention rather than reality. Randall (1994) argues that recreational decision-making depends on the subjective, and unobservable price of travel, whereas the travel cost method uses the observer's assumed cost of travel. Common et al. (1999) demonstrate by undertaking a travel cost study of visits to Tidbinbilla Nature Reserve that the problem raised by Randall is both of empirical and theoretical significance. Randall (1994) correctly emphasises that revealed preference methods of measuring the value of recreational or tourist resources are not necessarily more objective than stated preference methods.

Problems for this method also arise when there are substitute sites, if visitors visit several sites on the one trip, and if individuals have limited knowledge of the site to be visited or if the site covers a large area (Tisdell and Wilson, 2002).

The significance of these problems will vary with the particular case under consideration. In many circumstances, despite errors, approximations still result in appropriate policy choices. Perfect theoretical models are not always required nor optimal for refined decision-making about natural resource use.

As pointed out in the previous section, the economic value of a natural area just for tourism or recreation rarely measures its total economic value. Therefore, the economic value of retaining a natural area rather than developing it, as in the above example for beef production, may be much greater than the economic value of the natural area for tourism. Contingent valuation methods can be used to help account for a broader range of economic values provided by the natural area.

The contingent valuation of a natural area (by stakeholders with interests in it) usually measures its economic value *contingent* on its preservation. Contingent valuation is valuation contingent upon some event or circumstance, and often (but not always) it involves willingness to pay to retain the status quo of a natural resource. If it is a natural area, the complete contingent valuation of it would include its total tourist value plus its total non-tourist value. In such a case, it is not the stated preference analogue of the travel cost approach. If the natural area has non-use values, CVM should ascribe a higher economic value to the natural area than the travel cost method.

But there is a stated preference analogue to the travel cost method. It involves eliciting from visitors the maximum fee that they would be prepared to pay to visit the natural area, everything held constant, and deducting the actual fee charged to determine their consumers' surplus. Such an estimate would include the existence and bequest value of the area as well as other non-tourist values.

The contingent valuation method can be used, to elicit from visitors to a natural area the total economic value that they place on the tourism asset. But their economic valuation will not only include their economic surplus from visits but existence, bequest and other values of the site. Nevertheless, the total valuation placed on the natural resources by visitors may fall far short of its aggregate economic value because those who do not visit the natural area may also value the area highly for its existence, bequest and option values, for example.

Consider now the contingent valuation technique of eliciting from visitors their maximum willingness to pay for a recreational asset.

The contingent valuation method was originally developed by Davis (1963, 1964). He used a bidding game approach, a method that is still widely used, to determine willingness to pay. It involves asking the respondent whether he or she is prepared to pay a designated amount to retain a particular resource. This amount is called the starting point. If the respondent says ‘yes’ then the same question is asked with a higher amount. If the respondent says ‘no’, a lower amount is tried, asking the same question. This procedure is repeated until the highest amount is found that the respondent is willing to pay. This represents the individual’s contingent valuation of the resource.

An alternative simpler approach is to employ an *open-ended question* to elicit the maximum amount that respondents are willing to pay to retain an asset. For example, visitors to a natural site may be told that there is a proposal to withdraw a natural site from outdoor recreational use and develop if for housing. They may then be asked what is the maximum amount they would be prepared to pay to retain the current situation, everything else unaltered.

A third approach involves the use of a *payment card*. This card lists a series of alternative payments that could be made by the respondent and the respondent after considering the question posed and the payment card is asked to circle (or otherwise mark) the maximum amount he or she would be willing to pay. The card may be ‘anchored’, for example, by indicating amounts on average that individuals provide to finance various other goods supplied collectively. This, however, can introduce ‘anchor bias’.

Bidding games are believed to be subject to some extent to a starting point bias. This means that the estimated value may be influenced by the level of the payment initially presented to respondents. The open-ended question approach on the other hand is often believed not to stimulate respondents to think carefully about their alternative levels of payment. Typically, it places a lower value on tourism assets than the bidding game approach (Bishop and Heberlein, 1990, p.85) and most likely a lower value than the payment card approach. However, the open-ended question approach is simple and can be a cost-effective basis for many social decisions about alternative method resource use. It can be (in a world of bounded rationally) a suitable basis for optimally imperfect decision-making (Baumol and Quandt, 1964; Tisdell, 1996).

A more recent method for determining contingent valuation is the *dichotomous-choice technique.*(Bishop and Heberlein, 1990). One variant of this method involves presenting each respondent with a single bid that the respondent may either accept or reject. The bids offered to the sample of those surveyed are drawn randomly from a range of potentially relevant values. The relative frequencies of respondents are then used to estimate the mean willingness to pay of respondents in the sample and this is extrapolated to the relevant population to estimate the contingent value of the resource to be valued. This method (also called referendum CVM) is designed to overcome the problem of starting-point bias, and simulates the type of choice that is made in markets about whether or not to purchase a private good.

Starting point bias is sometimes found to be present when the bidding game approach is used. This means that the respondents can be influenced by the magnitude of the starting value tested in the bidding game.

According to Bishop and Heberlein (1990, p.87) disagreement continues about the most desirable contingent valuation method and new methods continue to be developed. Furthermore, they point out that in many cases the various methods give similar results and that ‘the choice of questioning technique is still largely a matter of individual judgement’.

Naturally CVM has a number of additional limitations to those already mentioned. For example, strategic bias may occur. In such a case, respondents do not give their real values but vary those in an attempt to influence policy outcomes. Hypothetical bias may also arise. In such cases, individual's find it hard to imagine accurately the alternatives they are to ask to value so their answers may not reflect their values in a real situation. Instrument bias can also occur. Answers may be influenced by the way in which respondents are hypothetically asked to pay for their choices. Furthermore, one should be aware that most CVM studies are based on a partial approach.[1] While this approach has a range of valid applications, errors can be made in generalising from partial studies to aggregate circumstances. Suppose for example that several natural sites are substitutes. The evaluation of each independently may result in the conclusion that each has low economic value for recreation and other purposes. However, it cannot be concluded that all have low economic value because withdrawal of the availability of some will increase the economic value of the remainder if they are substitutes (cf. Samples and Mollyer, 1990). As usual, caution and judgement are required when drawing policy conclusions from the application of economic techniques.

Usually contingent valuation methods are not used to value the attributes of the natural resources attracting tourists. Hedonic pricing techniques can potentially be used for this purpose. These are revealed preference type of techniques. From observed behaviour, inferences are drawn about attributes or characteristics of goods that give pleasure to those that consume them. The marginal utility of those attributes may for instance be estimated using such studies.

The hedonic method relies on the existence of complementarity between the demand for private goods and environmental attributes associated with those. For example, housing land values may be higher for blocks giving an ocean view or view of a national park, than comparable blocks without such a view (cf. Pearson, et al., 2002). By making various assumptions, it is often possible to estimate the economic value placed on the environmental amenity. A comparable case in relation to tourism may be differences in hotel or accommodation tariffs for facilities located so as to provide tourists with superior environmental attributes compared to those with less salubrious environs.

5. Some Current Developments of Relevant Valuation Techniques

Techniques used to value tourism's natural resources continue to develop, and change in the degree of their popularity. Furthermore, hybrids of different methods have also evolved (see for example, Cameron, 1992).[2]

It is widely accepted that standard environmental valuation techniques have not given enough attention to valuing the attributes of sites. This is so for standard travel cost analysis and for most applications of contingent valuation. As Pendleton (1999, p.168) observes, 'A single value for the recreation benefits of a given site is rarely of interest for management purposes unless the manager is considering the loss of an entire site. Instead managers usually are concerned about the economic impacts of changes in the quality of a site or the quality of all sites. Effective management requires valuation techniques that can determine the economic impact of quality changes in recreation sites'.

The hedonic travel cost method and random utility models were developed in an attempt to address this issue (Pendleton, 1999). As explained by Brown and Mendelsohn (1984, p.427), the process involved in the application of the hedonic travel cost method is as follows: "The prices of recreational attributes are estimated by regressing travel costs on bundles of characteristics associated with each of several potential destination sites. The demand for site characteristics … is then revealed by comparing the site selection of users facing different attribute prices".

Brown and Mendelsohn (1984) helped develop the hedonic travel cost method and applied the technique to determine the demand for recreational inland fishing, taking into account the characteristics of scenery, lack of congestion, and fish density. In principle, the method is a revealed preference one. But only some attributes of a site may be objectively measurable. For example, in this case, although fish density can be approximated objectively, scenic value is more subjective.

This method has been subject to considerable criticism, as for example referenced in Font (2000). Font (2000) in fact uses a two-stage travel model to assess the economic value of natural areas in Mallorca for travel there. Using that method, he finds such resources to be of considerable economic value in attracting international tourists to Mallorca.

The hedonic travel cost method faces all of the limitations of the ordinary travel cost method plus others. It requires the researcher to decide by what attributes are important and some of those may not be objectively measurable. Also the sites visited may not have sufficient diversity of attributes or all may not have enough visitors to measure empirically the value of the full possible range of attributes, or to do so significantly.

In such cases, choice modelling can be superior. Choice modelling approaches are becoming increasingly popular for environmental valuation. Like contingent valuation, choice modelling is a stated preference method. Choice modelling differs from contingent valuation methods because it considers the choices that individuals make when offered hypothetically or 'experimentally' environmental goods with different attributes or characteristics. In the case of CVM, usually only two alternative states of the environmental good are compared, and these usually are its availability compared to its non-availability.

Choice modelling (involving choice experiments) has a similar theoretical basis to the characteristics approach to demand theory developed by Lancaster (1996 a, b). It is also related to dichotomous-choice contingent valuation based on the Random Utility Model (Luce, 1959; McFadden, 1973) or also to referendum CVM (described earlier in this chapter as dichotomous choice CVM).

Hanley et al. (2001) provide a useful overview of choice modelling, and Boxall et al. (1996) present a readable introduction to the choice experiment approach to choice modelling and compare it with a referendum contingent valuation approach. Boxall et al. (1996) illustrate their article with a case study involving the demand for recreational moose hunting and Hanley et al. (2001) illustrate their review with examples involving the demand for rock climbing in Scotland.[3]

Both referendum or dichotomous-choices CVM present respondents with the possibility of make one choice from a set of alternatives. Typically, however, choice modelling presents respondents with many more scenarios about which they must choose than does CVM. For example, the moose hunting case study of Boxall et al. (1996) involved 32 scenarios requiring 32 choices. However, they varied the scenarios presented to respondents so that each respondent only had to consider 16 scenarios and make 16 choices.

The stages involved in choice modelling are clearly set out in Hanley et al. (2001, p.437). They also point out that there are four main types of choice modelling: (1) choice experiments developed initially by Louviere and Henscher (1982) and Louviere and Woodworth (1983); (2) contingent ranking; (3) contingent rating; and (4) paired comparisons. The choice experiment approach, applied, for example, by Boxall et al. (1996), requires respondents to choose between two or more alternatives in each of a range of scenarios. One of the alternatives included is maintaining the status quo. Contingent ranking involves respondents' ranking the alternative scenarios presented, contingent rating requires the respondents to assign a value on a Likert scale, usually of 1-10, to each of the alternative scenarios presented; and paired comparisons requires a similar assignment but alternative scenarios are only presented to respondents in pairs.

The approach involving choice experiments is usually favoured by economists because of its grounding in economic welfare theory. The other methods are more problematic in terms of their economic basis. However, it is possible that their application could on occasions be justified if they provide economical rules of thumb for decision-making (Baumol and Quandt, 1964; Tisdell, 1996).

In their case studies, both Boxall et al. (1996) and Hanley et al. (2001) use travel costs as the proxy for the price of taking advantage of alternative scenarios involving different attributes. However, as pointed out by Randall (1994), actual travel costs are difficult to measure because many of the cost elements involved are subjective. In such cases, economic inferences drawn from choice experiments can be subject to some of the limitations of travel cost methods.

6. General Limitations and Future Research Needs

Most attempts by economists to measure the value of outdoor natural assets used by tourists or visitors concentrate on their value for recreation. In doing so, their focus is on a particular aspect of use value. For some resources, this may be their complete or prime source of economic value. But for other resources used for tourism and recreation, their source of economic value is mixed and only partially accounted for by their tourism or recreational value. The passive or non-use value of many natural areas is considerable and measurement solely of their tourism and recreational value is liable to understate significantly the economic value of conserving such areas. On the other hand, some sites (such as recreational parks surrounding some man-made reservoirs) may have little or no passive use value.

Travel cost methods do not measure non-use values, and applied choice models to date have not done so either. In that respect, Boxall et al. (1996, p. 252) speculate that "The real test if the choice experiment method, however, may lie in its ability to address non-use economic values such as preservation and existence. While these issues are presently under examination, the authors believe that this SP [stated preference] should become more widely used in the valuation of environmental amenities". It is possible for applications of CVM to measure total economic value. But that depends on the questions asked and the population surveyed.

The various evaluation techniques suggested all involve application costs and the accuracy of most varies with sample sizes. More attention needs to be given to assessing the net operational benefits of using the different available techniques, desirable sample size and in relation and so on. This would be a useful step towards optimally imperfect decision-making in this area.[4] This is a related but somewhat different issue for the extrapolation of results from one site to others and the extrapolation of historical or existing estimates of economic value to the future.

There is also the possibility that developments in economic valuation by economists have been restricted by the existing theory of economic welfare. This focus is too narrow for many policy applications. Hanley et al. (2201, p. 453) observe "There is increasing interest among policymakers to be able to somehow combine environmental CBA with multi-criteria analysis and with participatory approaches, such as citizen juries (Kenyon and Hanley, 2000). Whether and how this can be done is an important area for future research".
While there is a need to examine this approach, it changes the focus to the exploration of methods of social conflict resolution. It involves an interdisciplinary search for 'socially optimal methods' of conflict resolution subject to political and institutional constraints. The definitions of socially optimality in such cases could therefore, be different to those used traditionally in welfare economics. It may, however, be appropriate to consider such approaches as complements rather than substitutes for existing economic approaches to optimal resource use.

It is extremely desirable to consider the attributes of different natural resources used by tourists or recreationists in assessing the value of those resources and the possible economic impacts of a variation in these attributes. Choice experiments provide useful insights in this regard. But they are subject to the limitation that the utility function in relation to the characteristics taken into account is usually assumed to be linear, no multiplicative effects on utility of the attributes is allowed. While linear relationships can be used to approximate non-linear ones as a rule over a range, linearity remains a restriction. The appropriateness of this assumption will however, depend operationally on whether it promotes optimally imperfect decision-making in this subject area.

7. Concluding Comments

Considerable progress has been made since the early 1960s in developing and applying techniques for the economic valuation of environmental/natural resources. However, as far as tourism and recreation are concerned, these developments have concentrated on estimating the use value of natural sites or resources for this purpose. While this emphasis has its relevance, this chapter emphasises the risk of neglecting non-use economic values. Taking these values into account can often strengthen the economic case for conserving a natural area used by tourists and recreationists.

Choice modelling is a positive development despite several limitations. However, it needs to be supplemented by other approaches that pay more attention to issues involved in social conflict resolution.

Finally, this chapter emphasised that in many policy applications, variations in results obtained by applying different (but related) techniques for natural resource valuation do not alter the selected policy choice. In such cases, the least cost technique is economically advantageous. More attention should be given to identifying circumstances in which this is so.[5]

Notes

1. A short list of limitations of CVM mentioning further limitations can be found in Bennett and Blamey (2001, pp. 4-5).

2. Some of these hybrids are reviewed in Bateman et al. (2002, Ch. 11).

3. For further overviews of choice modelling, see Bennett and Adamowicz (2001) and Bateman et al. (2002, Chs. 6 & 7). Bateman et al. (2002) provides an excellent coverage of most stated preference methods of economic valuation.

4. There are encouraging signs of increasing attention to the decision-making costs and benefits of alternative economic valuation techniques. See for example, Bateman et al. (2002, pp. 69-70, 79-80, 139). For instance, on page 139 Bateman et al. points out that the use of single bounded dichotomous choice or referendum methods tends to be expensive relative to the information generated and is also quite sensitive to the indirect assumptions used.

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