

THE VALUATION OF NATIONAL PARKS - Analysis, Methodology and Application

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Australia is acknowledged throughout the world for its diverse landscape and the large number of unique plant and animal species. Fortunately these flora and fauna have been protected in large reserves dedicated as national parks, ranging from snow-covered mountains to rainforests located in all Australian States and Territories. However due to external factors, such as additional leisure time and increasing overseas visitor numbers, mounting pressure is being placed on this resource. The need for maintenance and upkeep of national parks has risen, and at times some costs are passed onto the visitor using a 'user pays' basis. As a result national parks are arguably to be increasingly more commercial in nature. This paper analyses and valuation methodologies adopted for valuing this unique resource and the valuation of national parks is considered in the context of market based and non-market based methods. With many government agencies adopting accrual accounting procedures, the regular valuation of all assets including national parks is essential. Although national parks are a public good, this paper suggests that there may be merit in considering the relevance of market valuation based techniques to the valuation of national parks.

Australia is known world-wide as the largest island and also as the smallest continent. Even though the proportion of land devoted to national parks may be of similar proportion to a number of other countries, it is the relatively large area which presents Australia with a unique set of circumstances, further complicated in recent years with various claims for the development and preservation of scarce natural resources (Carson, Wilks & Imber, 1994). Recently a number of government authorities have adopted accrual accounting practices, therefore requiring the value to be assessed for all assets, including national parks. The value of national parks in the context of a monetary market value has not been considered previously as its economic value has always been linked to the fact that by nature it is a public good. As such non market monetary valuation methods, generally described as contingent valuation methods, have been utilised. However it has been proposed that large scale natural landscapes can be valued using contemporary market valuation methods (Robbins, 1987).

In this respect it can be argued that monetary methods of valuation, other than non market, may have relevance to the valuation. As a result this paper reviews previous research into the valuation of public goods such as national parks and considers the relevance of market and non-market valuation approaches.

Alternative Approaches to valuing National Parks

The flowchart in Figure 1 outlines the structure for this paper. It commences with the breakdown into the two classifications of 'market' and 'non-market' based approaches to the valuation of national parks. Further consideration is then given to the specific valuation approaches and their applications. Whilst the emphasis is placed on the valuation methods relevant to national parks, a brief overview of the other methods is also included.

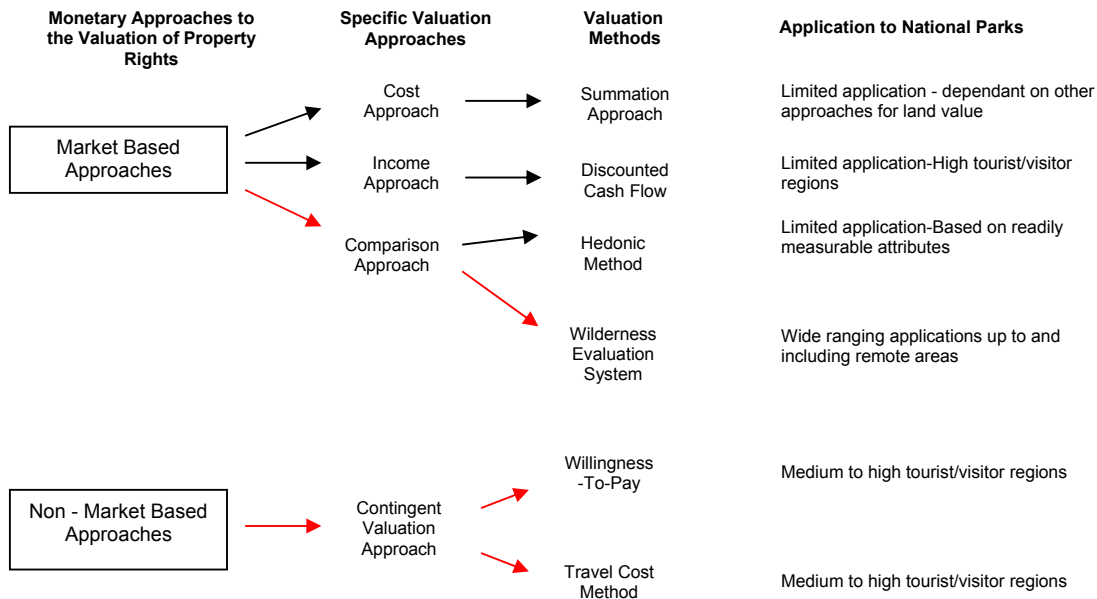


Figure 1 – Decision Support System for Monetary Valuation of National Parks (Authors)

Market Based Approaches

Market based valuation principles are designed to ascertain the overall value or worth of a property (including improvements) through a hypothetical sale scenario. Usually consideration is given to recent sales or lettings of similar properties, with an appropriate valuation technique is applied to estimate the worth or 'value' of the subject properties. In this type of situation there is a heavy reliance on recent sales or market evidence. The International Standards Valuation Committee (ISVC) has clearly emphasised the definition of market value as follows:

"The estimated amount an asset should exchange for on the date of sale between a willing buyer and a willing seller after proper marketing, where both parties acted knowledgeably, prudently and without compulsion." (ISVC, 2001).

To successfully determine market value, information is normally collected and based on the five categories listed below:

- Physical attributes such as size, shape, soils, geology, slope, water, flora and fauna, etc;
 - Legal or political attributes which influence the use and degree of decision-making and land use;
 - Linkage attributes which tie the property to infrastructure;
 - Dynamic attributes related to perception of a site; and
 - Environmental attributes related to the off-site influence of a property.
- (Graaskamp, 1977 as cited by Robbins, 1987).

Market-based approaches such as Discounted Cash Flow (DCF) have been proposed as appropriate for the valuation of wilderness areas in some circumstances (Bereck & Bentley, 1997). It would therefore be appropriate at this stage to review the relevance of the traditional market based valuation approaches and methods.

(a) Cost Approach

This method of valuation relies on the principle that the value of the property will be reflected in the sum of all the costs or value of the components that make up that property. It is based on the principle of ‘substitution’.

The method of application is reasonably straight forward. The value of the land is estimated by considering it as vacant land and using the market approach to establish its value. To this is then added the cost of all the improvements which should also include the costs associated with financing the project. An allowance has to be made for depreciation of the improvements. In certain circumstances it is used as a primary method of valuation, particularly where there are only few sales and the property is not an income generating investment. This could include ‘one-off’ properties e.g. a teaching block at a university, or a church. In Australia, it is the primary method used in the valuation of rural properties where it is difficult to find good comparable evidence.

The *cost approach* appears to have very limited relevance in determining a market value for National Parks. Clearly the improvement component of a National Park is of limited significance, with the land component assessed using a *comparison approach* regardless.

(b) Income Approach

Both the 'Capitalisation' and 'Discounted Cash Flow' are income-based methods of valuing national parks. Centred on assessing the present worth of the future benefits forthcoming from the property, priority is placed on the monetary charges paid by users of the national park. This is based on the premise that investors will buy an investment property based on the quantity and quality of the income stream the property will produce.

Although certain National Parks may produce cash flows of some substance, there is no evidence to suggest the net cash flows produced would be sufficient to reflect their true monetary value in the market context. An exception would be for a hypothetical cash flow scenario produced by the development and extraction of their natural resources. As such, the income approach would appear to have limited application in establishing a monetary value with respect to the existing use value of national parks.

(c) Comparison Approach

This method of valuation relies bases its effectiveness on the principle that land is non-homogeneous, i.e. that no two blocks of land are the same. This allows a comparison to be made between property rights. In simple terms, the property being valued is compared with other similar properties that have sold in the open market. After allowances for inherent differences between the sales and subject have been made, it is possible to allocate a perceived value to the subject property

In respect to the 'comparison approach' in the valuation of national parks, two primary methods have been proposed as presented below.

(i) Hedonic Method

The advantages of hedonic modelling has been widely acknowledged in the valuation of real estate (Adair, Berry & McGreal, 1996). Under the correct circumstances hedonic modelling is able to accurately predict the value of a property using a regression analysis based on the

particular characteristics of the asset. For example, in regards to real estate this approach has successfully determined the value contributions of factors such as building size and materials, availability of public transport, access to schools and parks, views and the quality of a neighbourhood (Harrison, Mandeville & Stillman, 2000). In this respect the method has the potential to estimate the value of visual amenity and other qualities of natural landscape that might be present in National Parks. The use of dummy variables has the ability to increase the usefulness of this approach, however it is market based with the original regression coefficients derived from sales of similar properties in the marketplace. This method relies on highly developed property markets in the vicinity of the national park.

(ii) Wilderness Evaluation System

The Wilderness Evaluation System (WES) was modelled by Robbins (1987) on the Wilderness Attribute Rating System (WARS), which itself was developed by the U.S. Forest Service, United States Department of Agriculture. WES was developed to address the problems associated with identifying the specific physical characteristics of a subject property and comparables, and importantly provide an inventory of facts that were important (Robins, 1987). The exact weighting nominated for each attribute can vary between regions and is based on the subjective judgement of the valuer. This approach is undertaken in a number of steps as listed below.

Step 1. Convert the national park into a spatial database using 10 acre (approx. 4 hectare) sections as the basic unit for evaluation.

Step 2. Score and evaluate each 10 acre (4 hectare) cell against a list of 10 different attributes as presented in Table 1.

Step 3. Score and evaluate the cells within a comparable property the manner using the criteria listed in Table 1.

Step 4. The final step is to compare the spatial cells of both the subject property and also the comparable properties. Judgement and allowances could then be made with a higher degree of certainty regarding similarities and differences between the two properties (Robbins, 1987).

In a similar manner to a discounted cash flow commonly used for the valuation of multi-tenanted buildings, WES remains open to subjective decisions and has been limited in its overall use as a primary valuation approach.

Table 1 - Attribute Weights for Wilderness Evaluation System (Robbins, 1987)

Main Components of Wilderness	Attribute	Weighting
Wilderness	Apparent naturalness	0.25
Solitude	Distance to perimeter	0.0625
	View from - reverse	0.0625
	View to - reverse	0.0625
	Vegetation screening	0.0625
Primitive recreational experience	Challenge	0.08334
	Diversity - % slope	0.08333
	Diversity - terrain	0.08333
View Quality	Scenic quality estimate	0.20
	View from	0.05
TOTAL SCORE		1.00

Since it makes spatially disaggregated predictions, WES is an example of a spatial decision support system and is best undertaken using a geographic information system (GIS). A GIS is a computer information system for the capture, retrieval, analysis and display of spatial data (Clarke, 1999; DeMers, 2000). GISs comprise the geographic database, the software used to organize the attribute and locational data, and the hardware required to capture and view the data, and create hard and soft-copy output from the analysis. GIS has tools for deriving many of the input variables, especially those related to terrain, such as viewshed, slope, and terrain diversity (Wilson & Gallant, 2000). WES is related to land suitability analysis, one of the earliest uses of GIS (McHarg, 1969).

Furthermore, WES is a type of multi-criteria evaluation technique, commonly used in land use planning, and more recently applied to conservation evaluation (for example, Anselin, Meire & Anselin, 1989; Bedward, Pressy & Nicholls, 1991), and implemented using GIS (Periera & Duckstein, 1993). Linear programming and other optimization techniques have

been applied to the problem of selecting land, based on its conservation value and acquisition cost, to include in a conservation network (Margules, Nicholls & Pressey, 1988; Cocks & Baird 1989; *see also* Church, Murray, Figueroa & Barber, 2000; Murray & Snyder, 2000).

Non-Market Based Approaches

Non-Market based approaches to the monetary valuation of environmental amenities such as national parks are generally referred to as contingent valuation techniques or methods. This approach employs surveys to create a hypothetical market for the benefits people derive from the environment (Wilks, 1990). The contingent valuation method is examined in more detail below.

Contingent Valuation Method

The contingent valuation method (CVM) incorporates unique features allowing researchers to value goods which are not commonly traded on markets. At the same time the CVM can account for a number of preferences from respondents that generally do not materialise in market transactions (Getzner, 2000). So far the CVM has been consistently proven as the most widely adopted valuation approach for assessing the value of national parks. Accordingly further consideration is given to this approach in this paper.

Even though it is widely used, serious concerns have also been raised about the ability of the contingent valuation approach, as it is based *on stated estimates only* as opposed to preferences revealed through market exchanges (Richer, 1995). It has been the potential subjective nature of these interviews that has received most criticism, although to a large degree this bias can be controlled by careful questionnaire and survey design (Arrow, Solow, Portney, Leamer, Radner & Schuman, 1993 as cited by Bateman, Willis & Garrod, 1994).

Nevertheless, the contingent valuation approach appears firmly entrenched as the most reliable and effective means of valuing national parks and wildlife areas. It is important to address some of the shortfalls associated with this approach with the goal of increasing its overall effectiveness for future applications.

Length Biased Sampling

Using this approach a sample is viewed as length-biased if the probability of observing an individual at a particular site is proportional to the individual's stay at the site (Nowell et al., 1988). In other words, the longer a visitor remains in a national park there is a higher chance of being involved in a sampling survey of this nature. Questions are then raised concerning the relationship between the level of 'willingness to pay' and also the length of stay. In this example most respondent would be more than willing to pay as their stay was quite lengthy, in direct contrast to those residents with much shorter stays (Nowell et al., 1988).

A contingent valuation approach was used to assess the value of a fishing campground in Yellowstone National Park in the U.S.A. In this example there was an obvious instance of length biased sampling whereas long term visitors made better use of the facilities and appreciated them more, therefore *willing* to pay more for their availability (Nowell et al., 1988).

(a) Willingness to Pay

A common approach to valuing non-market goods such as national parks has been to use an indirect method of valuation such as the 'willingness to pay' (WTP) approach, commonly based on observable behaviour to estimate the benefit of such goods. It has been widely advocated as a reliable means of valuing environmental commodities and other non-traded goods (Nowell et al., 1988).

This approach has often been used to reflect the value of a public good and is based on the concept of individual usefulness (Sinden & Thampapillai, 1995). This can be related to the indirect individual's enjoyment of the non-market good provided as measured by the contingent valuation approach, commonly referred to as 'willingness to pay' or WTP (Bateman & Langford, 1997).

Motives behind Willingness to Pay

There can be a variety of reasons why the visitor actually displays a 'willingness to pay' and consideration should be given to these differences. One of the main issues behind measuring the level of 'willingness' is based on the hypothetical nature of the approach. It has been shown that ambiguous results concerning the hypothetical bias of surveys which measured

the respondent's level of WTP using their stated behaviour (Getzner, 2000). In other words, consideration should be given to the differences between hypothetical responses in a WTP survey in comparison to reality. It is quite possible for public opinion surveys to be adversely influenced by the surrounding circumstances, such as the effect of an oil spill on the environment (Kovski, 1993).

In many instances it is possible to calibrate between the hypothetical reply and the real answer to allow for any differences. However there is no common calibration function for WTP as the correlation between hypothetical and the real WTP depends on the goods to be valued and the overall context within which the valuation takes place (Getzner, 2000). The central issue of spatial differences and the unique geographical location could complicate the issue given the heterogeneous nature of real estate.

Remote and Desolate National Parks

The unique attributes of a national park require a unique approach to be undertaken for the valuation of each park using WTP. Many sections of Australia's national parks are extremely remote and rarely (if ever) visited on a regular basis. Complications then arise as to the validity of this approach when respondents to a WTP survey are negligible or nil.

Combined WTP-Comparison Valuation Approach

As discussed earlier, the underlying advantage of the WTP approach is its ability to indirectly measure the value or worth of the public good (e.g. national park) by surveying visitors. A traditional approach to valuing an asset is to draw comparisons between similar types of property. However these two approaches can be combined and therefore evaluate the value of a public good using multiple WTP surveys.

In the United Kingdom this approach was adopted to analyse the value of two national parks located at Yorkshire Dales and Norfolk Broads (Bateman, Willis & Garrod, 1994). This research identified a number of differences between the two national parks which complicated the use of this methodology:

1. Both national parks could be described as truly unique resources where comparisons were extremely difficult;
2. Only one of the surveys included a question relating to their 'annual countryside budget';
3. Considerably large difference between the two studies in regard to the relationship between 'annual countryside budget' and WTP (Bateman, Willis & Garrod, 1994).

These three differences highlighted some of the difficult issues which arose when comparing two unique resources. Complications were not restricted to the national parks, but also to vast differences between the types of visitor to each park which can adversely affect the level of WTP.

One of the important findings from the UK comparison of two national parks was the variations in the WTP. It was proposed that when there were no alternative national parks in the vicinity, the level of WTP was quite high. However when there were a number of options available for visitors, the WTP decreased quite dramatically (Bateman et. al., 1994). This aspect alone would severely restrict the ability to compare two national parks, as both the attributes of each parks *and* circumstances surrounding similar parks in the near vicinity must also be fully considered. Therefore the effectiveness of this approach is extremely limited.

Further Modifications to the Original Willingness To Pay approach

A number of additional modifications may be undertaken by researchers to allow for differences between national parks (Anon, 1990). For example, the respective level of appreciation from visitors may vary dramatically due to variations in their social status. Those visitors in the upper socio-economic class may have a higher affiliation with tangible assets such as houses and automobiles. In contrast those visitors in the lower socio-economic status may have a closer connection with the environment and therefore a higher overall appreciation. Thus, the difficulty arises when accounting in the WTP analysis for the differences between the visitors, let alone attributes of the national park itself.

In addition, there may be other considerations in the contingent valuation process. As well as the environmental values commonly measured by WTP, consideration may also be given to:

- social values;
- economic values; and
- cultural values (Hooper, 1990).

Thus, complications arise when applying the WTP approach to public goods areas which are potentially suitable for mining. From this perspective the use of environmental values in isolation would not be suitable, and often this has formed the cornerstone for conservation-versus-development debates (Hooper, 1990).

(ii) Travel Cost Method

This approach is designed to measure the level of demand when a defined market is non-existent. Simply explained, the Travel Cost Method (TCM) estimates the consumer surplus from recreation areas, which are valued in terms of how much people actually pay to visit these areas (Harrison et. al., 2000). This would normally involve a survey of all recreational visitors to determine:

- how much is paid for access to the area;
- assess the private and public vehicle costs;
- determine the entry fees; and
- possibly consider the value of time spent accessing the area.

Difficulties with this approach may arise when there are multiple entries by the same party or perhaps a visit to an area incidentally, following a business trip (Harrison et. al., 2000). Although effective in the right environment the use of TCM is limited to selective areas with medium to high recreational visitors.

Conclusion

Recent changes to accrual accounting practices require the assessment of value for all government-owned assets. However the valuation of a public good such as a national park presents a unique set of circumstances which requires a unique approach. Whilst the 'contingent valuation method' can overcome the complete absence of a trading market, it is accompanied by an additional set of rules and potential complications. The contingent valuation or willingness to pay approach relies heavily on the quality survey responses from visitors, which in itself can be adversely affected by survey design and visitor characteristics. Although allowances can be made for a number of these complications, this may render the overall method incapable of further analysis and comparison to other national parks.

It appears the unique circumstances surrounding each national park should also be carried into the valuation approach. Obviously the possibility of applying a market valuation methodology is problematic. However it would seem worthwhile investigating the application of WES within the market approach of direct comparison to the valuation of national parks in Australia so that an alternative monetary value related to market prices might be achieved. It can be concluded that the contingent valuation approach remains the most effective valuation approach at present despite its imperfections.

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