

## Using economics to inform national park management decisions: a case study on the Blue Ridge Parkway

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### Introduction

National parks frequently face difficult budget decisions. Economics can facilitate making these decisions by suggesting that benefits and costs should be weighed in order to make efficient budget allocations. However, this is often difficult in national parks since many park resources and amenities, such as scenic beauty and species preservation, are not priced in markets. At the same time, it is costly to maintain these resources. In effect, park managers face these costs in dollar terms, but not the benefits. Nonmarket valuation is a tool of economics that can help alleviate this problem by estimating the value of resources and amenities that are not exchanged in markets. This paper introduces the tools of nonmarket valuation and demonstrates how they can be used to inform park decisions. In addition, a case study on the Blue Ridge Parkway is presented which demonstrates how nonmarket valuation data can be used to inform decisions in that park.

### Background

National park budgets, like most budgets, are limited. This implies a need for budget scrutiny. Economic efficiency criteria requires that benefits and costs of alternative budget decisions be weighed. For national park managers, this may take many forms:

- Do the benefits of a specific park initiative or program exceed the costs? (Benefit–cost analysis.)
- For a given set of priorities or directives, what is the cheapest method of achieving them? (Cost effectiveness analysis.)
- Given a park mission, what is the best use of the budget?

Weighing the costs and benefits of alternative policies provides information about the efficiency of those decisions so that scarce dollars can provide maximum benefits to park users. Turner (2000) provides a model showing efficiency criteria that can be used by park officials in determining entrance fee levels and resource allocation levels for multi-attribute park experiences. However, he notes that the valuation information needed by park officials is not readily available to implement these decision criteria. Nonmarket valuation can be used to fill this information gap.

While it is relatively easy to calculate the costs of decisions, it is unfortunately more difficult to estimate the benefits of many decisions that park managers need to make. This is because public goods such as scenic beauty, habitat preservation, and ecosystem services are not frequently exchanged in markets so observable prices and demand curves for these goods and services do not exist in many cases. This does not mean, however, that people do not have preferences for these goods and services. The economic tools of nonmarket valuation are designed to estimate the values of the goods and services that are not readily exchanged in a market.

### **Types of nonmarket valuation**

Clawson (1958) reported that an early national park study indicated concern about methods for placing a monetary value on recreation since those methodologies appeared to be somewhat arbitrary (Prewitt 1949, cited in Clawson 1958). In the last half-century, however, the methodologies for estimating nonmarket values have been significantly advanced and are now quite commonly used.

One type of method used to uncover these underlying preferences for environmental resources associates consumption of a related market good in order to estimate the value of the nonmarket good or service. For example, one might incur travel costs in order to enjoy scenic beauty. This technique is categorized as a revealed preference method since consumer preferences are “revealed” through their consumption of a complementary good or service. A common revealed preference approach used to estimate values for recreational sites is the travel cost method. This method assumes that expenses incurred to make a visit to a recreational site express one’s value of the site. However, complementary market goods or services that adequately reveal consumer behavior are not always available; thus the contingent valuation approach was developed.

The contingent valuation method is sometimes referred to as a “direct” approach to estimating willingness to pay since it involves directly asking individuals to state their preferences for some characteristic of the environment or natural resource in question, i.e., state their willingness to pay. For example, what is the most you would be willing to pay in order to recreate in Yosemite National Park? It is “contingent” valuation because it asks people how they would act if they were placed in certain possible situations. In contrast with revealed preference methods, the stated preference method of contingent valuation does not use actual observed market behavior as the basis of benefit measurement. Contingent valuation has been used extensively in measuring the benefits of a variety of public goods, especially environmental quality. This is likely due in great part to the flexibility and applicability of the methodology, since contingent valuation can be tailored to study “virtually anything that can be made comprehensible to respondents” (Field 1994, 151). This includes goods and services such as the existence value for endangered species (Boyle and Bishop 1987; Bowker and Stoll 1988). Variations on the contingent valuation method include contingent ranking and contingent choice surveys, where respondents rank and select their preferred outcomes, respectively.

Choice modeling is another stated preference method that can be used to estimate values for goods such as scenic beauty and recreation services (Adamowicz et. al. 1997). A choice modeling study presents respondents with a series of choices about a respondent’s preferred alternative with regard to the amenity. For example, each choice can represent a different park management option. Each management option will represent different levels of park attributes, including the entrance fee, number and condition of hiking trails, level of scenic quality, number of campsites, miles of paved roads, and the like; one of the options will describe the current state of the park. Respondents then “state” their preferences by choosing the alternative they most prefer. By analyzing the results of a series of these choices made by many individuals, it is possible to estimate an implicit price for each attribute (e.g., number of campsites).

In addition to the travel cost, contingent valuation, and choice modeling methodologies, the hedonic price method can be used to estimate the value of living near an amenity such as a park. This approach has limited applications to the national parks due to the narrow focus of values estimated from residential property values associated with living near a park.

In sum, there are several nonmarket valuation methods available to aid decision-makers; each has its strengths and limitations (Freeman 1993; Hausman 1993; Smith 1996). Since the choice of appropriate method will depend inherently on the specific situation at hand, the following section will discuss how nonmarket valuation can generally be applied to park management decisions.

### **Using nonmarket valuation to inform park management decisions**

As Turner (2000) noted, important valuation information is needed for park decisions, especially when parks provide many alternative activities for visitors. There are several questions that must be considered before undertaking a nonmarket valuation study in a national park.

- Are nonmarket goods or services involved that should be included in the decision process?
- Is it desirable to have the value of these goods and services monetized so that they can be compared with other alternatives?
- Is the park willing and able to take time and money to analyze these goods and services?
- Does the good or service provided by the park encompass multiple dimensions (e.g. scenic viewing, hiking, boating, fishing, wildlife habitat, etc.)?
- What type of value is needed: whole (visitor value of entire range of experiences) or partial (hiking experience, or wildlife habitat)?

Park managers may want to include in their decision process values of park resources that are not available from typical sources such as entrance fee collections and satisfaction surveys. For example, in many parks a significant component of a visitor's experience may include resources whose value is typically not captured in normal operations, such as scenic beauty, ecosystem services, and wildlife habitat. Costs have to be incurred in order to preserve these aspects of the park experience. Examples include costs associated with habitat preservation or restoration, the purchase of conservation easements, and the like. Nonmarket valuation can be used to measure the benefits from this aspect of the park experience: for example, a contingent valuation study can estimate the benefits of preserving the habitat to compare with costs of preservation.

Alternatively, a nonmarket valuation study may be useful if a park is considering implementing an entrance fee, or raising an existing entrance fee. Data from a contingent valuation study can help determine visitors' willingness to pay the new fee, whether or not visitation will be affected, and the like.

Finally, if individuals wish to preserve the option of visiting a park—even if they haven't yet made a visit, or may not ever actually make the visit—then option values could be incorporated with the benefits accruing to visitors of the park (Walsh and McKean 1999). These option values may be significant for those parks with particularly unique resources and amenities.

In the above cases, nonmarket goods and services exist that may be valued for the decision process. Park officials must then decide that they want to place monetary values on these goods and services and are willing to allocate funds to estimate these values. The method used depends upon the characteristics of the goods and services valued and the decisions facing park officials. It is important to remember that each park's challenges are unique and the application of nonmarket valuation to improve

decision-making is not uniform. The Blue Ridge Parkway example below illustrates how these methods are being applied in a particular park.

### **Case study on the Blue Ridge Parkway**

The Blue Ridge Parkway, a unit of the National Park System, is a scenic motor road connecting Shenandoah National Park in Virginia with Great Smoky Mountains National Park in Tennessee. Addressing the concern for the decline in scenic quality along the Blue Ridge Parkway requires that the park allocate scarce resources for view preservation, such as paying for increased vegetation management, or purchasing conservation easements, leases, or land. Blue Ridge Parkway staff currently use a descriptive ranking system of sites to identify critical sites for preservation (Johnson, Orr, and Rotegard 1997). This determines which sites are threatened and which sites visitors consider to be of highest, medium, or low quality. It does not tell the park which sites visitors are willing to lose, or if visitors are willing to give up trails and campsite quality to maintain or improve scenic quality. Parkway officials know what it costs to preserve views; they do not know the benefits. Nonmarket valuation provides critical information to the decision process for park staff when making resource allocation decisions. Introducing consumer preferences into the decision process by using benefits estimation provides estimates that are comparable to mitigation costs.

Given the needs of park staff, we used choice modeling and a variant of a contingent valuation survey, a contingent choice survey, to analyze visitor preferences towards the attributes of their recreation experience and the impact of changing scenic quality on visitor trips to the Blue Ridge Parkway.

The choice modeling survey elicits information about whether visitors prefer more hiking trails, overlook areas, roadside landscape management, or some combination of these services. In addition, by using a monetary attribute in the survey we can estimate the benefit for each attribute and of maintaining the current quality of scenic views along the Blue Ridge Parkway by estimating visitors' willingness to pay. The contingent choice survey used view quality to elicit expected changes in visitation behavior if alternative quality levels occurred. Several scenarios representing both increases and decreases in quality were presented to each respondent, and respondents were asked to state their level of visits in response to the alternative. This data will be used in combination with expenditure data (Brothers and Chen 1997) in order to estimate the economic impact of these changed visit levels.

Three formats of the survey were implemented on the southwest Virginia section of the parkway. Implementation occurred at Mabry Mill, the most visited site on the parkway. Computers were used to administer the survey; paper copies were available for those who preferred that medium. During summer and fall 2000, 860 observations were collected over several weekend and weekday periods.

### **Preliminary results**

Statistical analysis of survey responses is not yet complete; results will be available by January 2002. However, an examination of some preliminary results can shed light on how these may be used in park management decisions.

Some respondents (n=245) were asked if they were willing to pay a randomly assigned amount ranging from \$5 to \$200 in order to ensure their Blue Ridge Parkway experience. For values between \$5 to \$125, at least 60% of all respondents indicated a yes response (37% of those offered \$200 answered yes). A follow-up question asked respondents to identify the most they would be willing to pay this year in order to ensure their experience on the Blue Ridge Parkway next year. On average, these respondents indicated a maximum willingness to pay of \$121. This suggests that many visitors to the Blue Ridge Parkway—who do not pay an entrance fee—would be willing to do so in order to ensure their experiences on the parkway were maintained. This is the type of information that may be useful to managers in parks considering access or user fees.

Preliminary analysis also indicates a majority of respondents would be willing to pay in order to enhance their scenic experiences on the Blue Ridge Parkway. Specifically, if given a choice between the status quo experience, with no fee, or one that included an improvement in roadside and overlook scenic quality with a supplemental \$50 annual fee, 69% of the time people would choose to pay the fee to improve scenic quality. Further analysis will allow us to calculate the incremental value of these improvements, along with the incremental value of changes in hiking trails, activity areas, and number of overlooks. This information will be useful for staff members of the Blue Ridge Parkway since they will be able to estimate the value to visitors of making various changes in their management plan, and compare these benefits to the costs of making such changes.

### Conclusion

The economic tools of nonmarket valuation are designed to estimate the values of the goods and services that are not readily exchanged in a market, such as the value of a natural soundscape or visibility. Estimating these values can provide important information to the park manager. While each park will face different decisions and thus have different information needs, the Blue Ridge Parkway example provides a case of applying these methods to park management decisions. Parks face several challenges if they decide to use these methods. Perhaps most daunting will be finding the money and expertise needed to conduct the survey and accompanying analysis. In addition, since each study is unique, it is time-consuming to do effective nonmarket valuation studies—expect a minimum of one-and-a-half to two years from conception to implementation.

### References

- Adamowicz W., J. Swait, P. Boxall, J. Louviere, and M. Williams. 1997. Perceptions versus objective measures of environmental quality in combined revealed and stated preference models of environmental valuation. *Journal of Environmental Economics and Management* 32:1, 65-84.
- Bowker, J.M., and J.R. Stoll. 1988. Use of dichotomous choice, non-market methods to value the whooping crane resource. *American Journal of Agricultural Economics* 70:2, 372-381.
- Boyle, K.J., and R.C. Bishop. 1987. Valuing wildlife in benefit-cost analyses: a case study involving endangered species. *Water Resources Research* 23:5, 943-950.
- Brothers, G., and R.J.C. Chen. 1997. *1995-96 Economic Impact of Travel to the Blue Ridge Parkway: Virginia and North Carolina*. Asheville, N.C., and Roanoke, Va.: The Coalition for the Blue Ridge Parkway and the National Park Service.
- Clawson, M. 1992. Outdoor recreation. Pp. 301-336 in *The Economics of the Environment*. Wallace E. Oates, ed. Cheltenham, U.K.: Edward Elgar. Originally published as M. Clawson, *Statistics on Outdoor Recreation* (Washington, D.C.: Resources for the Future, 1958).
- Field, B.C. 1994. *Environmental Economics: An Introduction*. Boston: McGraw-Hill.
- Freeman, A.M., III. 1993. *The Measurement of Environmental and Resource Values: Theory and Methods*. Washington, D.C.: Resources for the Future.
- Hausman, J.A. 1993. *Contingent Valuation: A Critical Assessment*. Amsterdam: Elsevier Science.
- Johnson, G., W. Orr, and L. Rotegard. 1997. *A Process for Scenic Quality Analysis Along the Blue Ridge Parkway*. Asheville, N.C.: Blue Ridge Parkway.
- Prewitt, R.A. 1949. *The Economics of Public Recreation—An Economic Study of the Monetary Evaluation of Recreation in the National Parks*. Washington, D.C.: National Park Service.
- Smith, V.K. 1996. *Estimating Economic Values for Nature: Methods for Non-Market Valuation*. Cheltenham, U.K.: Edward Elgar.

- Turner, R.W. 2000. Managing multiple activities in a national park. *Land Economics* 76:3, 474-485.
- Walsh, R.G., and J.R. McKean. 1999. Option and anticipatory values of US wilderness. Pp. 483-510 in *Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the US, EU, and Developing Countries*. I.J. Bateman and K.G. Willis, eds. New York: Oxford University Press.