VALUING IMPACTS OF FOREST QUALITY CHANGE: RECREATION AND NEW YORK'S ALLEGANY STATE PARK

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Abstract: Allegany State Park in southwestern New York State attracts visitors from across western New York State, and neighboring states and Canada, while providing a variety of valuable ecological, social, and recreational benefits. Proposed management of forested park land has generated considerable controversy. Conflicting values regarding older growth versus mixed age forests, conflicting needs of alternative recreational activities, and the potential benefits of harvesting valuable timber underlie this controversy. There has to date been no attempt to estimate direct economic impacts of the proposed changes on the 1.2 million visitors who annually travel to the park. Using existing surveys of park users, a benefit transfer methodology is applied to value present park activities including camping, picnicking, sightseeing, fishing, and hunting. Second, an approach to estimating recreation economic impacts of alternative forest management plans including selective logging is developed.

Introduction

Valuation of non-priced goods is increasingly looked to as an essential component in weighing costs and benefits of alternative actions (see Costanza et al., 1997, for an heroic application). New York's Allegany State Park provides an example of such a good, used to providing ecological, social, and recreational benefits for over one million visitors annually, and an undetermined number of non-users. Despite the significance of the Park as a recreational resource there has been little work on systematically valuing the benefits enjoyed by visitors. This paper has the dual objectives of establishing baseline valuation of visitor benefits, and introducing one framework for estimating impacts on visitor benefits of changes in forest quality for recreation.

Visitor benefits are measured as the willingness-to-pay for the enjoyment of the recreational experience. The purpose is to establish the economic value of the experience tot he visitor. These visitor benefits are distinct from both expenditures by visitors (e.g. costs of travelling to the Park), and the resulting local and regional economic activity generated by visitor expenditures. No attempt is made to estimate these latter impacts of Park visitation.

Study Setting

Allegany State Park in southwestern New York State attracts visitors from across western New York State, and neighboring states and Canada. At approximately 100 square miles in size, it is the largest New York State Park (though the Adirondack and Catskill Forest Preserves are much larger). Visitors engage in a wide variety of year-round recreational activities. Visitors view the relative "naturalness" of the Park as a critical attribute (Palmer, 1988). The Park is heavily forested, with only 6% of current land in alternative uses (e.g. roads, campgrounds, etc.) It is dominated by second growth forest, much of which is nearing 100 years in age. Some areas of older growth are also present, though their extent is limited. A new park management plan is presently being developed, including study of forest management (timber harvesting) on Park land. Considerable controversy has arisen (see, for example, Empire State Report, 1995) surrounding the proposed forest management alternatives. Conflicting values regarding older even aged growth versus mixed age forests, conflicting needs of alternative recreational activities, and the potential benefits of harvesting valuable timber underlie this controversy. A user survey (Palmer, 1988) shows that typical Park visitors do not support harvesting timber for commercial purposes, and are wary of any form of active forest management.

There are no available estimates of visitor benefits under either existing or proposed forest conditions. Providing such estimates is addressed here by first developing an estimate of the non-priced value of visitation by park visitors under existing management. Using a previously completed survey of park users (Palmer, 1988), the benefit transfer methodology is applied to present park activities including camping, picnicking, sightseeing, hiking, fishing, and hunting. An approach to valuing quality changes from proposed management alternatives is then presented.

Benefit Transfer: The Application of Existing Studies

The need to provide cost-effective estimates of non-priced recreation benefits has spurred discussion of differing benefit transfer methodologies. In each approach, benefit estimates from existing studies are applied to a target, or policy site where time or monetary costs preclude developing primary benefit estimates. Boyle and Bergstrom (1992) describe the process as "simply the application of secondary data to a new policy issue." The most promising benefit transfers, applicable when use data for the policy site is available, may be those focusing on average benefit per user day (Loomis, et al., 1995). Such an approach is possible for Allegany State Park visitation, where detailed data on Park attendance and activities is available. Benefit estimates reported by Bergstrom and Cordell (1991) are used here. Alternative representative values are also available (see, for example, Walsh, Johnson, and McKean, 1988).

In addition to a benefit transfer methodology, estimation of unit day benefits for Allegany State Park visitors requires a methodology for treating the diverse activities present within the Park. Benefit transfers for each of the thirteen distinct activities identified in Palmer's (1988) survey of visitors are

used. A weighted average based on participation rates was then developed to provide unit day benefit estimates for typical user groups (e.g. campers and visitors). Because these estimates are derived from all activities reported by each user group, they are not a benefit estimate for a typical visitor, but are rather an average across all visitors within the group.

Visitors to Allegany State Park report that they typically engage in a variety of recreational activities. Casual observation, and the range of available facilities confirm that multipurpose visits to Allegany State Park are typical. The degree to which recreational activities outside the Park are also engaged in during a typical day for a Park visitor is not known. Because of the substantial travel involved for visitors from surrounding metropolitan regions, their recreational activities outside the Park may be quite limited. In contrast, the literature from which the relevant primary studies are drawn focuses almost exclusively on single uses such as fishing, hunting, hiking, and swimming. The approach used here was to use reported participation in different activities by Allegany State Park visitors (Palmer, 1988) to develop a unit day profile. Because benefit estimates are typically reported based on a full day's participation, it was necessary here to allocate portions of the day to differing activities. Participation rates were not directly available, but were inferred from the percentage of visitors reporting participation in each activity. Let the percentage of Park visitors participating in activity i be given by p_i, and the consumer surplus in the ith activity (estimated by benefit transfer) be V_i. Then the unit day consumer surplus estimate (for each user group) V is given by

$$V = \Sigma_i w_i V_i$$

where $w_i = p_i / \Sigma_i p_i$. Table 1 shows the use of this approach using standard values developed by Bergstrom and Cordell (1991). Adjusted to 1997 dollars using the GDP deflator, visitor benefits are approximately $16 per visitor day under existing conditions.

Table 1. Contribution of recreational activities to total benefits of camping at Allegany State Park.

Activity	Standard Value	Participation	Weighted %	Weighted Value
	($)	(%)	(%)	($)
Hiking	16.52	89.3	15.0	2.48
Scenic (pleasure) driving	12.95	87.9	14.7	1.90
Nature trails (study)	13.12	83.3	13.9	1.82
Swimming	19.89	78.4	13.1	2.61
Picnicking	15.90	63.3	10.6	1.69
Canoeing and kayaking	17.00	59.2	9.9	1.68
Fishing	16.82	58	9.7	1.63
Bicycling	17.85	43.5	7.3	1.30
Big game hunting	16.20	9.8	1.6	0.26
Small game hunting	16.08	6.3	1.1	0.18
X-country skiing	12.84	15.6	2.6	0.33
Horseback riding	15.30	2.6	0.4	0.06
			Total benefits	15.95

Units are 1997 dollars per visitor day.

Towards Valuing Visitor Preferences for Forest Management

Quality of recreation sites is one factor in visitor demand (Bergstrom and Cordell, 1991). Quality is a function of the specific recreation activity, however. In Allegany State Park visitors engage in a broad range of activities: their valuation of alternative forest management is similarly a function of their specific recreation preferences. Applying Bergstrom and Cordell's estimated coefficients across the range of recreation uses provides one approach to valuing changes in recreation quality in Allegany State Park.

In the absence of detailed empirical data on the impact of forest management on site quality be recreational activity, sensitivity analysis is instead used to estimate the likely range of impacts of forest management. It is hypothesized that forest management negatively impacts Park visitors engaging in hiking and nature study, and positively impacts small and large game hunting by increasing suitable habitat and forage. Site quality for other Park uses is assumed unaffected by initiation of forest management. The value of site quality changes is estimated by applying impacts of quality changes (Figure 1, after Bergstrom and Cordell, 1991) to the specific visitor activities in Table 1. The site quality index used by Bergstrom and Cordell ranges from 1 (least suitable) to 10 (most suitable). Using a range of changes in site quality of ±1 to ±5, Table 2 shows the resulting change in visitor benefits. The resulting aggregate change in visitor benefits across all activities ranges from -3% to -14% of the existing value. The reduction in benefits is thus about 40 cents to $2 per visitor day.

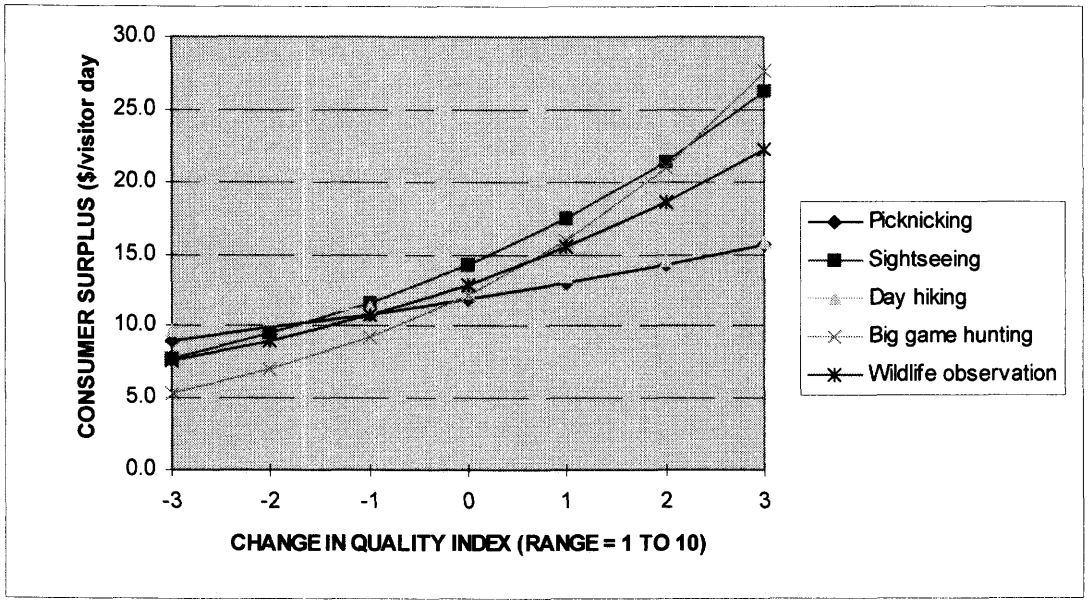

Figure 1. Sensitivity of visitor benefits to recreation site quality (after Bergstrom and Cordell, 1991).

Table 2. Potential impacts to recreational benefits at Allegany State Park with forest quality change.

Activity	Existing Value	Impact of change in quality index on existing value			Impact on final weighted value with change in quality index		
		±1	±2	±5	±1	±2	±5
Hiking	16.52	-1.37	-2.74	-6.86	-0.21	-0.41	-1.03
Scenic (pleasure) driving	12.95						
Nature trails (study)	13.12	-2.38	-4.75	-11.88	-0.33	-0.66	-1.65
Swimming	19.89						
Picnicking	15.90						
Canoeing and kayaking	17.00						
Fishing	16.82						
Bicycling	17.85						
Big game hunting	16.20	+4.47	+8.94	+22.35	0.07	0.14	0.36
Small game hunting	16.08	+2.80	+5.59	+13.99	0.03	0.06	0.15
X-country skiing	12.84						
Horseback riding	15.30						
		Total change in benefits			-0.43	-0.87	-2.17
		Final total benefit			15.51	15.08	13.78
		Change in total benefits			-3%	-5%	-14%

Units are 1997 dollars per visitor day

Discussion

Using a benefit transfer methodology, baseline estimates of visitor benefits at Allegany State Park under existing conditions can be developed. These non-priced benefits are the willingness-to-pay of Park users for their recreational experiences, and thus capture the economic value of the Park resource to its users. With 1.2 million visitors annually (New York State Office of Parks Recreation and Historic Preservation, 1992), Allegany State Park generates almost $20 million (1997 dollars) in non-priced benefits annually.

Changes to the quality and hence value of recreational experiences at Allegany State Park would likely occur with the initiation of forest management. Under one hypothetical set of impacts, annual benefits to Park visitors would decline by 3 to 14%. The potential annual loss in benefits of $0.6 million to $2.8 million (1997 dollars) would represent the economic cost to Park users initiating forest management for timber production. These estimates do not include impacts to non-users, or valuation of ecological impacts (e.g. biodiversity gains or losses). In the context of a benefit cost approach to forest management activities, it would be appropriate to contrast potential stumpage values to these annual loss estimates.

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