Urban Forestry & Urban Greening 10 (2011) 275–280

Contents lists available at ScienceDirect

Urban Forestry & Urban Greening

journal homepage: www.elsevier.de/ufug

Using contingent valuation to estimate the willingness of tourists to pay for urban forests: A study in Savannah, Georgia

Suman Majumdar[a,*], Jinyang Deng[b], Yaoqi Zhang[a], Chad Pierskalla[b]

[a] Forest Policy Center, School of Forestry and Wildlife Sciences, Auburn University, AL 36849, USA
[b] Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV 26506, USA

ARTICLE INFO

Keywords:
Aesthetic value
Destination loyalty
Nonmarket valuation
Tourism benefits
Urban green spaces

ABSTRACT

This study estimated the monetary value of urban forests' non-priced benefits to tourists. Data collected by a face-to-face self-administered survey of urban tourists in Savannah, Georgia, USA were used to estimate tourists' willingness to pay (WTP) for urban forests by the contingent valuation method. Individual WTP was found higher among tourists with graduate school education. Results suggested that WTP for urban forests also increased significantly with income and destination loyalty of the tourists. Estimated mean and median WTP values were $11.25 (95% confidence interval: $7.34, $15.16) and $2.10 (95% confidence interval: $1.38, $2.82), respectively. Based on the estimated mean WTP, annual value of urban forests to tourists in Savanna in 2009 ranged from a minimum of $81 million to a maximum of $167 million with a 95% confidence interval. The annual value was $11.55 million (95% confidence interval: $7.59 million, $15.51 million) based on the estimated median WTP and assuming at least 50% of the tourists in Savannah would pay the median amount. As the mean was greatly influenced by extreme WTP values in the data, the annual value based on the median value was a more conservative estimate.

Introduction

Most United States (US) cities today embrace and encourage tourism as an important economic sector (Judd, 1995). Many cities, such as Las Vegas, Los Angeles, Orlando, New York City, Washington, DC and San Francisco, are visited by millions of international and domestic tourists annually (Law, 2002). Urban recreation resources play a significant role in satisfying recreational demands of both urban residents and tourists. Although tourism in urban areas is frequently considered as "gray tourism" because of the highly developed nature of the typical recreational resources of cities (Deng et al., 2010), such tourism often includes some elements of the 'green' (Ashworth, 2004). Urban green spaces have been identified as an important source of recreational opportunities in previous research (Smardon, 1988; Botkin and Beveridge, 1997; Tyrväinen and Väänänen, 1998; Lorenzo et al., 2000; Jim and Chen, 2006).

Urban forests are defined as "the sum of all woody and associated vegetation in and around dense human settlements, ranging from small communities in rural settings to metropolitan regions" (Miller, 1988, p. 24). Urban forests include natural and planted trees in streets, domestic yards, recreational areas, parks and gardens, unused public and private lands, transportation and utility corridors, and watershed lands around urban areas. According to Deng et al. (2010), urban forests have the ability to significantly add to the beauty of urban areas and improve the experience of urban tourists. Urban forests function both as a major factor in attracting tourists and as a complement of other urban tourism magnets.

Urban forest resource managers and planners are confronted by the challenge of equilibrating the benefits and costs associated with those resources (Dwyer et al., 1992). In the city of Savannah, Georgia, for example, urban forests are one of the top tourism attractions (Deng et al., 2010). But new development and urban renewal resulting from population growth in Georgia are continuous threats to the city's trees (Savannah Park and Tree Department (SPTD), 2010). Information about the extent and magnitude of the benefits from urban forests can significantly help land-use planning and forest resource management in urban areas (Dwyer et al., 1992).

Several empirical studies have examined and estimated the monetary value of non-priced benefits from urban forests. Tyrväinen and Väänänen (1998), for example, used the contingent valuation method (CVM) to estimate the values of urban forest recreation areas and residents' willingness to pay (WTP) for small forest parks in Joensuu, Finland. Another study by Lorenzo et al. (2000) examined residents' WTP for community urban forest preservation in Mandeville, Louisiana, US. Jim and Chen (2006) estimated the value of urban green spaces to the residents of Guangzhou, China using the CVM. The above studies found that

* Corresponding author. Tel.: +1 334 844 8058; fax: +1 334 844 1084.
E-mail address: majumsu@tigermail.auburn.edu (S. Majumdar).

1618-8667/$ – see front matter © 2011 Elsevier GmbH. All rights reserved.
doi:10.1016/j.ufug.2011.07.006

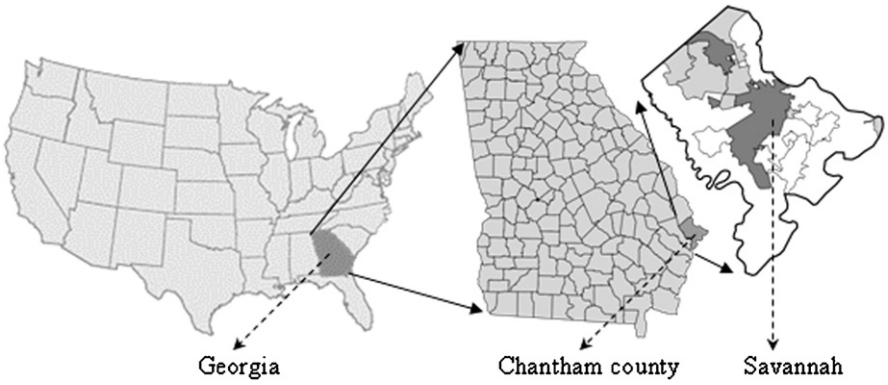

Fig. 1. Location of Savannah, Georgia.

a majority of their survey respondents were willing to pay for the use, protection and preservation of urban forest resources. All these studies, however, focused on estimating value of urban green spaces solely to urban residents. Recently, Notaro and Salvo (2010) estimated tourists' value for ornamental cypress trees on the Trentino region's shore of Lake Garda, Italy using the CVM. Their study was important in terms of policy regarding the maintenance of a specific species in a region. However, for a city with significant tourism income, evaluating the overall contribution of urban forest resources to tourism can provide useful information for efficient management of those resources by local government and agencies.

The importance of linking urban forests and tourism is gaining national recognition in the US (Neamtzu, 2003). In spite of their crucial contribution to enhance urban tourism, however, sufficient research on urban forests as the basis of urban tourism is lacking (Deng et al., 2010). According to Buhyoff et al. (1984, p. 71), "perhaps because it is so well accepted that people like trees, very little research has been conducted regarding the visual aesthetic values of urban trees and forests." Very recently, Deng et al. (2010) made an attempt to study tourists' perceptions about urban forests' role in enhancing tourism experience. They developed a structural equation model using data collected from Savannah, Georgia to examine the links between urban forest appeals, city beauty, and tourism experience and satisfaction. However, to our knowledge, no study has estimated the value of the non-priced benefits of urban forests in a city to tourists, although a number of studies have explored the mental and physical benefits of visual pleasure from natural environment (see for example, Ulrich, 1984; Kaplan and Kaplan, 1989; Kaplan et al., 1998; Ode and Fry, 2002; Price, 2003).

The primary objective of this study was to assess the monetary value of non-priced urban forest benefits to tourists. We used the CVM to estimate tourists' value for urban forests in Savannah, Georgia. Urban forest resources were represented by roadside trees, public squares, gardens and parks, in Savannah. The influences of tourists' demographic characteristics and destination loyalty on their valuation of urban forests were examined. A maximum likelihood technique was used for econometric estimation. The next section describes study methodologies including study area, data collection procedures, econometric approach and model specifications. In the following section we present and discuss the findings. The paper ends with a brief conclusion section.

Methods

Study area and data collection

This study focused on urban tourism in the city of Savannah, Georgia, USA. Established in 1733, Savannah is located at 32°3′3″N, 81°6′14″W with a total area of 202.3 square kilometers (Deng et al., 2010). It is the fourth largest city in Georgia and the largest city in Chatham County (Fig. 1) with an estimated population of 135 thousand in 2009 (United States Bureau of the Census (USBOC), 2010).

Savannah's rich historical and cultural amenities and natural beauty attracted more than 50 million visitors during the 1990s (New Georgia Encyclopedia (NGE), 2010). In 2009, total number of tourist visits in Savannah was about 11 million with direct spending of $1.63 billion in the city (Jenny Dent, Visit Savannah, Savannah, Georgia, personal communication, April 2011). The majority of the tourists visit Savannah for the historic and cultural experience. However, components of urban forests in Savannah, such as botanical gardens, city parks and gardens, tree-lined streets and public squares, are also popular nature-based attractions to visitors (Deng et al., 2010). These resources are an important part of the character, charm, and beauty of Savannah (SPTD, 2010). The urban forest resources of the city are a result of continuous efforts in planning, planting and maintenance of trees for more than a century. Savannah has been recognized by the National Arbor Day Foundation as a Tree City USA since 1985 and has received Tree City USA Growth Awards eight times for its advancements in urban forest programs. The City also received the Outstanding Community Award from the Georgia Urban Forest Council in 2007.

The data used in this study were from a survey of visitors to Savannah conducted in July 2008 and January, July and August 2009. The questionnaire used in the survey was designed to extract information on visitors' perceptions of tourism attribute importance and performance, destination loyalty, expenditures, willingness to pay for urban forest resources in Savannah, trip characteristics and background information. The questionnaire was reviewed by staff from the SPTD and other project collaborators. Face-to-face onsite self-administered survey was conducted at the River Street, one of the most popular outdoor relaxing and sightseeing places in the city.

Tourists were approached by a surveyor who introduced himself/herself and the study first and then asked them if they were willing to participate in the survey. If a visitor was not willing to participate, the surveyor then approached the next available visitor. If a visitor was willing to participate in the survey, the questionnaire on a clip board was given to him or her to fill out. The questionnaire was collected by the surveyor once it was done onsite. Similar onsite survey method has been used by recent contingent valuation studies (Goffe, 1995; Lee, 1997; Lee and Han, 2002; Togridou et al., 2006).

A payment card technique was used for CVM elicitation. This method has been used in several recent contingent valuation studies (see for example, Legget et al., 2003; Jim and Chen, 2006; Notaro and Salvo, 2010). In the payment card method, the respondents are asked to go through a range of values and to circle the amount

which is the most they would be willing to pay. This method gets around the problem of starting point in a sequential bidding method (Mitchell and Carson, 1989, p. 100). Payment cards also provide the respondents with more of a context for their bids than what open-ended questions provide. However, the WTP responses obtained by this method can be influenced by the range of values presented (Mitchell and Carson, 1989, p. 242).

In this study, respondents were first asked if they were willing to pay for their experience with urban forest resources, such as roadside trees, squares, gardens and parks, in Savannah. Respondents with a "no" answer were assigned a WTP value of zero. Respondents with a "yes" answer were asked to pursue a range of values and to circle the amount they would be willing to pay per visit. The listed values were $1, $5, $10, $15, $20, $25, $30, $35, $40, $45 and $50. The respondents were also given an option to specify any other amount of their choice. To avoid range bias, the range of values were designed based on the responses received in a previous survey done in February 2008 (Deng et al., 2010) wherein most participants provided an integer amount in response to an open-ended direct question about their WTP for urban forest resources in Savannah. In Savannah, visitors do not need to pay a fee to access any of the urban forest resources. It was explained to the respondents that they were asked to provide the amount they would be willing to pay as a fee per visit if they had to pay for viewing or enjoying urban forests, for the purpose of proper maintenance of those resources, in a way that they were paying for hotels, foods and other marketed goods. Potential bias due to scenario misspecification was reduced by face-to-face onsite survey aided by explanations when necessary (Jim and Chen, 2006).

Econometric model

Use of payment cards as CVM elicitation method assumes that a respondent's true valuation lies in between the circled value and the next highest option. Payment cards thus provide intervals and not point valuations. Cameron and Huppert (1989) provide an efficient maximum likelihood estimation method for estimating the parameters of a WTP function for payment card data. Recent contingent valuation studies with payment card data (Legget et al., 2003; Notaro and Salvo, 2010) have used this method for estimating WTP.

In the Cameron and Huppert (1989) method, the WTP function for the ith respondent is specified as:

$$\log(\mathrm{WTP}_i) = X_i'\beta + \varepsilon_i, \tag{1}$$

where X_i is a vector of explanatory variables and $\varepsilon_i \sim N(0, \sigma^2)$. If the respondent's true valuation, WTP_i, is known to lie within the interval (t_i, t_{i+1}), then $\log(\mathrm{WTP}_i)$ will lie between $\log(t_i)$ and $\log(t_{i+1})$. Each pair of individual thresholds for $\log(\mathrm{WTP}_i)$ can then be standardized to state the probability that respondent i will select t_i as:

$$\Pr(t_i) = \Phi\left(\frac{\log t_i - X_i'\beta}{\sigma}\right) - \Phi\left(\frac{\log t_{i+1} - X_i'\beta}{\sigma}\right), \tag{2}$$

where Φ is the cumulative standard normal density function. The log likelihood function for a sample of n independent observations can be written as:

$$\log L = \sum_{i=1}^{n} \log\left[\Phi\left(\frac{\log t_i - X_i'\beta)}{\sigma}\right) - \Phi\left(\frac{\log t_{i+1} - X_i'\beta}{\sigma}\right)\right]. \tag{3}$$

The formulas for the gradients and the Hessian matrix associated with the log likelihood function can be found in Cameron and Huppert (1989).

With the assumed lognormal distribution of valuations, the median of an individual's conditional WTP distribution was estimated as the anti-log of that individual's predicted log(WTP) (Cameron and Huppert, 1989). The mean of WTP, for each individual, was obtained by scaling the median by $\exp(\sigma^2/2)$. The median and mean WTP per visit for urban forests in Savannah were estimated by averaging across all tourists in the sample.

Table 1
Variable descriptions.

Variable	Description	Mean
Age1	=1 if 18 ≤ respondent's age < 26, =0 otherwise	0.17
Age2	=1 if 26 ≤ respondent's age < 55, =0 otherwise	0.47
Age3	=1 if respondent's age ≥55, =0 otherwise	0.36
Gender	=1 if respondent is male, =0 otherwise	0.45
Education1	=1 if highest education achieved by respondent is high school degree or equivalent, =0 otherwise	0.26
Education2	=1 if highest education achieved by respondent is undergraduate degree or equivalent, =0 otherwise	0.44
Education3	=1 if highest education achieved by respondent is graduate school degree, =0 otherwise	0.31
Income[a]	Annual family income before taxes ($1000)	67.70
Foreign	=1 if respondent is from a foreign country, =0 otherwise	0.02
Group	Number of people accompanying the respondent during the visit	2.77
Loyalty1	Number of previous visits to Savannah	4.53

[a] Calculation of mean includes estimated values for the missing income values as described in this section.

Empirical specification and variables

In this study, WTP for urban forests was modeled as a function of demographic characteristics and destination loyalty of the respondents. The following functional relationship was estimated using maximum likelihood technique:

$$\log(\mathrm{WTP}_i) = f(Age2_i, Age3_i, Gender_i, Education2_i, Education3_i, \times Income_i, Foreign_i, Group_i, Loyalty_i), \tag{4}$$

where as described in the last section, WTP was a latent variable. The other variables are defined in Table 1.

Age, gender, education and income of tourists were included in the model to control for demographic variables that may influence WTP. The original datasets included six categorical variables on family income groups. The average income of a group, calculated as the mean of the highest and lowest income of the group, is assigned to each individual in the group in this paper. The value of the lower boundary is used as the level of income for the open ended group. Annual family income was not reported by 41 respondents in the final sample used in this study. To compensate for possible item nonresponse bias, income was imputed for missing observations by regressing the logarithm of *Income**1000 on other observed demographic characteristics of the respondents (Mitchell and Carson, 1989, p. 273). The results are given below, with standard errors in parentheses:

$$\widehat{\log}(Income*1000) = \underset{(0.08)}{10.08} + \underset{(0.08)}{0.56}*Age2 + \underset{(0.09)}{0.67}*Age3 + \underset{(0.06)}{0.03}* \times Gender + \underset{(0.07)}{0.42}*Education\,2 + \underset{(0.08)}{0.56}*Education\,3 \tag{5}$$

$N = 437$; $R^2 = 0.26$; F-statistics=31.05 (p-value < 0.0001).

Annual family income was predicted for respondents with missing income values as $\hat{\theta} * \exp(\widehat{\log}(Income*1000))$, where $\hat{\theta}$ is the estimated coefficient of $\exp(\widehat{\log}(Income*1000))$ from regressing *Income**1000 on $\exp(\widehat{\log}(Income*1000))$ without an intercept (Wooldridge, 2003, p. 208).

The dummy variable *Foreign* was included in the model to account for any difference in WTP between domestic and foreign tourists. The *Group* variable was used as an explanatory variable

Table 2
Distribution of responses to contingent valuation question.

Tourist characteristics	Percentage of respondents											
	<$1	$1–$5	$5–$10	$10–$15	$15–$20	$20–$25	$25–$30	$30–$35	$35–$40	$40–$45	$45–$50	≥$50
Age												
18–25	58.75	1.25	11.25	6.25	3.75	3.75	6.25	5.00	0.00	2.50	0.00	1.25
26–54	57.27	1.32	4.41	8.37	3.52	5.29	4.41	1.32	1.76	2.64	3.96	5.73
>54	55.56	0.58	1.17	5.26	2.92	6.43	2.34	4.09	1.75	7.02	4.68	8.19
Gender												
Female	57.58	0.76	4.17	5.68	4.55	5.68	2.65	2.65	1.52	4.55	3.79	6.44
Male	56.07	1.40	4.67	8.41	1.87	5.14	5.61	3.27	1.40	3.74	3.27	5.14
Education												
High school or less	63.11	0.82	9.02	8.20	4.92	4.92	1.64	2.46	0.00	0.82	0.82	3.28
Undergraduate	58.17	0.48	4.33	6.73	1.44	6.25	5.29	2.40	0.96	4.81	3.85	5.29
Graduate school	50.00	2.03	0.68	6.08	4.73	4.73	4.05	4.05	3.38	6.08	5.41	8.78
Income												
≤$20,000	55.00	2.50	15.00	0.00	2.50	5.00	2.50	7.50	0.00	7.50	0.00	2.50
$20,001–$40,000	68.42	1.75	10.53	10.53	3.51	1.75	1.75	0.00	0.00	0.00	0.00	1.75
$40,001–$60,000	62.89	1.03	1.03	12.37	8.25	5.15	2.06	1.03	0.00	0.00	1.03	5.15
$60,001–$80,000	54.17	0.00	4.17	6.94	4.17	5.56	8.33	4.17	1.39	2.78	2.78	5.56
$80,001–$100,000	59.26	1.23	3.70	3.70	0.00	11.11	0.00	2.47	2.47	6.17	6.17	3.70
≥$100,001	48.09	0.76	1.53	5.34	1.53	3.82	6.87	3.82	3.05	7.63	6.87	10.69
Loyalty[a]												
Repeat visitor	44.59	1.69	4.73	8.45	4.39	7.43	4.39	3.72	2.03	5.74	5.07	7.77
First time visitor	76.92	0.00	3.85	4.40	1.65	2.20	3.30	1.65	0.55	1.65	1.10	2.75
Group[a]												
With group	61.58	1.13	3.67	7.34	2.82	4.52	3.95	2.54	1.69	3.67	1.98	5.08
Alone	43.55	0.81	6.45	5.65	4.84	8.06	4.03	4.03	0.81	5.65	8.06	8.06
Foreign												
Domestic	57.05	1.07	4.27	6.84	3.21	5.34	4.06	2.99	1.28	4.27	3.63	5.98
Foreigner	50.00	0.00	10.00	10.00	10.00	10.00	0.00	0.00	10.00	0.00	0.00	0.00
Total sample	56.90	1.05	4.39	6.90	3.35	5.44	3.97	2.93	1.46	4.18	3.56	5.86

[a] In this table *Loyalty* and *Group* are presented in categories.

to capture the possibility that, despite instructions to the contrary, tourists traveling in groups considered cost increase for the whole group in selecting the WTP value (Legget et al., 2003). The coefficient of *Group* was expected to be negative if this was true.

Destination loyalty (*Loyalty*) was measured as the number of previous visits. Repeat visitation is often considered desirable in tourism literature (Oppermann, 2000). Lower marketing costs are needed in attracting repeat visitors and repeated visits indicate satisfaction. Repeat visitors are also more likely to return (Opperman, 1998). Deng et al. (2010) found that urban forests positively contributed to the development of destination loyalty among tourists. This study examined the other side of the relationship. The coefficient of *Loyalty* would determine whether or not WTP for urban forests increased with destination loyalty.

Results and discussion

A total of 1219 visitors were approached during the four survey periods. The number of visitors who participated in the survey was 640, resulting in a response rate of 52.5%. Questionnaires took about 5–6 min for each respondent to fill in. Usable information for contingent valuation analysis was provided by 478 visitors.

Before turning to the WTP estimation, we examined the distribution of WTP responses by respondent characteristics (Table 2). The percentage of respondents willing to pay less than $1 was slightly lower in higher age and education groups. Percentage of respondents willing to pay more than $40 was, however, much higher among respondents aged more than 54 years and among respondents with graduate school degree. Although about 56% of both males and females were willing to pay less than $1, greater percentages of women placed the higher valuations above $35. Distributions of WTP responses were not consistent among income groups. For example, percentage of respondents willing to pay less than $1 was lower in the income group less than $20,000 than the next two higher income groups. The highest income group, however, had the lowest percentage of respondents willing to pay less than $1 and the highest percentage of respondents willing to pay more than $50.

Higher percentages of both repeat visitors and visitors traveling alone were willing to pay higher amounts (see Table 2). Compared to the foreign respondents, a higher percentage of domestic respondents were willing to pay <$1. However, the percentage willing to pay >$40 was higher among the domestic respondents. Overall, more than half of the respondent tourists in the sample were willing to pay less than $1, about 7% were willing to pay $10–$15, about 4% were willing to pay $40–$45, and about 6% were willing to pay more than $50 for urban forests.

WTP estimation results are given in Table 3. Coefficients of age and gender of tourists were not significant. Coefficient of *Education3* was higher in value than the coefficient of *Education2*. However, only *Education3* was significant, suggesting that tourists with graduate school degree were willing to pay more than tourists with high school education or less. As lower education was suspected to be a likely reason of nonresponse in the survey, the significance of *Education3* implied the possibility of overestimating WTP from the model. Demographic variables are often found insignificant in contingent valuation studies (see for example, Legget et al., 2003; Jim and Chen, 2006; Notaro and Salvo, 2010). Although they were not significant, all demographic variables were left in the model to avoid specification error. Moreover, estimated variance inflation factors did not suggest the presence of multicollinearity problem for any of the explanatory variables.

Family income of tourists had a small but positive and significant influence on WTP (Table 3). For every $1,000 increase in family income tourists were willing to pay $0.02 more for urban forests. No significant difference in WTP was found between domestic and foreign tourists. The coefficient of *Group* was negative and significant.

Table 3
Maximum likelihood estimation of WTP.

Variable	Coefficient	S.E.
Intercept	−0.6320	0.6632
Age2	−0.0703	0.5696
Age3	−0.0355	0.6044
Gender	0.1606	0.3713
Education2	0.4313	0.4952
Education3	1.1055	0.5598*
Income	0.0158	0.0075*
Foreign	0.4981	1.2456
Group	−0.5736	0.1277**
Loyalty	0.0515	0.0165**
σ	1.8661	0.0035**
Median WTP	2.0702	0.3661
Mean WTP	11.2510	1.9894
N	478	
Log likelihood	−921.99	

* Statistical significance at 5% level.
** Statistical significance at 1% level.

This coefficient implied that, on average, one additional member in a group reduced WTP by 57%. Thus some tourists in the sample considered the cost of their entire group (or family) when answering to the WTP question.

The coefficient of *Loyalty* was positive and significant (Table 3). On average, an extra visit in the past contributed about 5% more in WTP for urban forests. This implied that perceived satisfaction with urban forests in Savannah increased with number of visits. This result has important implications for economic sustainability of Savannah's urban forestry because of the greater likelihood of coming back among repeat visitors and the reduced cost of attracting them.

The median and mean WTP for urban forests per visit to Savannah were estimated as the sample averages of estimated individual median and mean WTP values, respectively. The median WTP was estimated to be $2.10 with 95% confidence interval of ($1.38, $2.82). Estimated mean WTP was $11.25 with 95% confidence interval of ($7.34, $15.16). Assuming a constant annual number of visits of about 11 million (Jenny Dent, Visit Savannah, Savannah, Georgia, personal communication, April 2011), estimated total annual value of Savannah's urban forests in terms of tourism was $124 million with a 95% confidence interval of ($81 million, $167 million) in 2009. The mean was greatly influenced by extreme WTP values in the data (Table 2). Therefore, a more conservative approach would be to use the median value. Our results suggested that at least 50% of the tourists in Savannah would be willing to pay, on average, an amount greater or equal to $2.10. This implied a total annual value of $11.55 million with a 95% confidence interval of ($7.59 million, $15.51 million).

Conclusions

Tourism is one of the major drivers of urban economies. Urban forest resources play an important role in attracting tourists to urban areas by enhancing the beauty of cities and working as a complement of other urban attractions (Ashworth, 2004; Deng et al., 2010). It is thus important for city government and agencies to better understand the relationship between urban forests and tourism. However, little is known about the value of the urban forests from the perspective of tourism. This study fills this gap in the literature of urban forestry and tourism by examining tourists' behavior towards urban forests and by providing monetary value estimates of urban forests' non-price benefits to them.

WTP for urban forests by tourists in Savannah, Georgia was estimated using the contingent valuation method (CVM). The influence of tourists' demographic characteristics and destination loyalty on WTP was examined. The results indicate that WTP would be higher among tourists with graduate school education. It also seems that WTP would increase with higher income. An important finding of this study is that loyal tourists would be willing to pay more for urban forests. WTP increases significantly with the number of previous visits. Both first time and repeat visitors are important for a city's tourism industry. However, a marketing strategy towards retaining the repeat visitors would be beneficial in terms of increasing the overall WTP for urban forests.

Land use in urban areas is highly competitive (Deng et al., 2010). Georgia is one of the fastest growing states in the US. Population growth and urban development puts continuous pressure on open and green spaces in Georgia cities. If urban forest areas are not justified for their existence in terms of economic revenues generated from tourism and other sources, it would be very likely that some of the green areas may give way to residential or commercial development. This was experienced in 1954 when one of the oldest squares in Savannah, Ellis Square, was converted into a parking garage (Southeast Real Estate Business [SREB], 2003). Conversion of green spaces to other land uses not only deteriorates urban environment and quality of life, but also causes loss of non-market benefits (Ulrich, 1984; Kaplan and Kaplan, 1989; Kaplan et al., 1998; Ode and Fry, 2002; Pauleit et al., 2005). As estimated by this study, value of Savannah's urban forests in tourism is enormous.

The results of this study would be useful for urban resource managers and planners in making efficient land use and management decisions. Economic efficiency in maintaining urban forests can be achieved by capturing the tourism benefits in the form of fees for enjoying urban forest resources in Savannah. One option would be to have the tourism industry of Savannah to contribute financially to the urban forest management services provided by the Savannah Park and Tree Department which include hazard/emergency tree removal, fallen limb removal, stump grinding, service request pruning, preventive maintenance pruning, tree planting, and young tree care/maintenance (SPTD, 2011). Fees could be collected through coin-operated gates, spot checks of tickets from self-service machines, trolley bus vendors who provide bus tours that pass through the public squares and other urban forest features (for example, for a ticket of $2, $0.50 may be returned to the city's Park and Tree Department for the planting and maintenance of urban forests). The magnitude of the estimated aggregate value of urban forests from tourism perspective gives the policymakers valuable information on the contribution of urban forest resources to the quality of Savannah's landscape.

The majority of the respondents in this study reported very low WTP for urban forests. Thus policymakers need to consider the trade-off between funds acquired through fees and the resulting reduction in number of visits (Reynisdottir et al., 2008). A fee policy ignoring this issue would undermine the objective of promoting access. However, it should be noted that urban forest resources are not the primary determinant of tourist visits in Savannah. These resources enhance urban tourism experience. Imposing a fee, therefore, is not expected to result in a significant reduction in number of visits. Tourists not willing to pay for urban forests can simply ignore visiting urban forest attractions in Savannah. Finally, a donation program can also be a useful additional way of capturing the consumer surplus value estimated in this study.

This study is not free from limitations and thus the WTP estimates should be used with caution. The data collected using the convenience sampling method may not be representative of the actual population although the survey was conducted in different seasons. No significant difference was found in WTP between seasons. Since the actual population of tourists to Savannah was unknown, this study took the best possible measures in an attempt to understand tourists' WTP for urban forests. As one anonymous reviewer pointed out, another limitation of this study lies in

the definition of "visits." The respondents answered the survey questions in terms of a trip, which could be one or more days. We were unable to obtain the definition used by the consultant firm who estimated the total number of tourist visits in Savannah as the formula used by the firm was "proprietary" (Jenny Dent, Visit Savannah, Savannah, Georgia, personal communication, April 2011). A consultant firm working with hotel records, etc. might have estimated tourist days and called them visits. This possible difference in the definition of visits may have affected the aggregate value estimated in this study. Finally, the value of urban forests to local residents and the indirect impact on job creation and related sectors were not included in our study. The value of urban trees is very much dependent on the context (e.g., social vs. environmental) and the type of stakeholders (e.g., tourists vs. local residents). A more holistic valuation approach is needed in the future towards understanding the value of urban forests.

Acknowledgements

This research was funded by the USDA Forest Service to the second author of this article under the recommendation of the National Urban & Community Forestry Advisory Council. We thank Susan Reisch (Urban & Community Forestry Coordinator, Georgia Forestry Commission) and Kacey Ratterree for their interest in this study and review of the survey questionnaire. Thanks go to West Virginia University graduate students David Dyre and Stacy Casinelli for help with the survey, and and Rogelio Andrada II and Ishwar Dhami for data entry and cleaning. Special thanks to David White (Director of Savannah Park and Tree Department) and his colleagues Bill Haws and Ronald Kevin Brown for their assistance and coordination during the survey. We also gratefully acknowledge the comments of Diane Hite and Peng Zeng of Auburn University, and the two anonymous reviewers.

References

Ashworth, G.J., 2004. The Blue-grey Transition: Heritage in the Reinvention of the Tourism Resort, Retrieved September 20th, 2010 from http://www.thebestinheritage.com/files/pdf/the_blue-grey_transition.pdf.

Botkin, D.B., Beveridge, C.E., 1997. Cities as environments. Urban Ecosystems 1, 3–19.

Buhyoff, G.J., Gauthier, L., Wellman, J.D., 1984. Predicting scenic quality for urban forest using vegetation measurements. Forest Science 30, 71–82.

Cameron, T.A., Huppert, D.D., 1989. OLS versus ML estimation of non-market resource values with payment card interval data. Journal of Environmental Economics and Management 17 (3), 230–246.

Deng, J., Arano, K.G., Pierskalla, C., McNeel, J., 2010. Linking urban forests and urban tourism: a case of Savannah, Georgia. Tourism Analysis 15 (2), 167–181.

Dwyer, J., McPherson, E., Schroeder, H., Rowntree, R., 1992. Assessing the benefits and costs of the urban forest. Journal of Arboriculture 18, 227–234.

Goffe, P.L., 1995. The benefits of improvements in coastal water quality: a contingent approach. Journal of Environmental Management 45, 305–317.

Jim, C.Y., Chen, W.Y., 2006. Recreation—amenity use and contingent valuation of urban green spaces in Guangzhou, China. Landscape and Urban Planning 75, 81–96.

Judd, D., 1995. Promoting tourism in US cities. Tourism Management 16 (3), 175–187.

Kaplan, R., Kaplan, S., 1989. The Experience of Nature: A Psychological Perspective. Cambridge University Press, Cambridge, UK.

Kaplan, R., Kaplan, S., Ryan, R.L., 1998. With People in Mind. Island Press, Washington, DC.

Law, C.M., 2002. Urban Tourism: The Visitor Economy and the Growth of Large Cities. Continuum, New York.

Lee, C.-K., 1997. Valuation of nature-based tourism resources using dichotomous choice contingent valuation method. Tourism Management 18 (8), 587–591.

Lee, C.-K., Han, S.-Y., 2002. Estimating the use and preservation values of national parks' tourism resources using a contingent valuation method. Tourism Management 23, 531–540.

Legget, C.G., Kleckner, N.S., Boyle, K.G., Duffield, J.W., Mitchell, R.C., 2003. Social desirability bias in contingent valuation surveys administered through in-person interviews. Land Economics 79, 561–575.

Lorenzo, A.B., Blanche, C.A., Qi, Y., Guidry, M.M., 2000. Assessing residents' willingness-to-pay to preserve the community urban forest: a small-city case study. Journal of Arboriculture 26 (6), 319–325.

Miller, R.W., 1988. Urban Forestry: Planning and Managing Urban Greenspaces. Prentice-Hall, Englewood Cliffs, NJ.

Mitchell, R.C., Carson, R.T., 1989. Using Surveys to Value Public Goods: The Contingent Valuation Method. Resources for the Future, Washington, DC.

Neamtzu, C., 2003. Oregon urban forestry on the map. Oregon Community Tree News 13 (2), 1–12.

New Georgia Encyclopedia (NGE), 2010. Savannah, Retrieved September 17th, 2010 from http://www.georgiaencyclopedia.org/nge/Article.jsp?id=h-1056&hl=y.

Notaro, S., Salvo, M.D., 2010. Estimating the economic benefits of the landscape function of ornamental trees in a sub-Mediterranean area. Urban Forestry & Urban Greening 9, 71–81.

Ode Åsa, K., Fry, G.L.A., 2002. Visual aspects in urban woodland management. Urban Forestry & Urban Greening 1 (1), 15–24.

Opperman, M., 1998. Destination threshold potential and the law of repeat visitation. Journal of Travel Research 37, 131–137.

Oppermann, M., 2000. Tourism destination loyalty. Journal of Travel Research 39 (1), 78–84.

Pauleit, S., Ennos, R., Golding, Y., 2005. Modeling the environmental impacts of urban land use and land cover change—a study in Merseyside, UK. Landscape and Urban Planning 71, 295–310.

Price, C., 2003. Quantifying the aesthetic benefits of urban forestry. Urban Forestry & Urban Greening 1 (3), 123–133.

Reynisdottir, M., Song, H., Agrusa, J., 2008. Willingness to pay entrance fees to natural attractions: an Icelandic study. Tourism Management 29 (6), 1076–1083.

Savannah Park and Tree Department (SPTD), 2010. Introduction to Savannah's Urban Forest, Retrieved September 17th, 2010 from http://www.ci.savannah.ga.us/cityweb/p&tweb.nsf/950e01f292e02b9c852568ab00686f30/e32fed55a733a87085256c5a004a73c4?OpenDocument.

Savannah Park and Tree Department (SPTD), 2011. Tree Services provided by the Department, Retrieved February 17th, 2011 from http://www.savannahga.gov/cityweb/p&tweb.nsf/3f8306be7ac3fe6f85256c06004e912c/bebfeffde507f11b85256c5a004a73c6?OpenDocument.

Smardon, R.C., 1988. Perception and aesthetics of the urban environment: review of the role of vegetation. Landscape and Urban Planning 15, 85–106.

Southeast Real Estate Business (SREB), 2003. Strong Infrastructure Development Helps Savannah, Retrieved February 17th, 2011 from http://www. southeastre-business.com/articles/FEB03/highlight1.html.

Togridou, A., Hovardas, T., Pantis, J.D., 2006. Determinants of visitors' willingness to pay for the National Marine Park of Zakynthos, Greece. Ecological Economics 60, 308–319.

Tyrväinen, L., Väänänen, H., 1998. The economic value of urban forest amenities: an application of the contingent valuation method. Landscape and Urban Planning 43, 105–118.

United States Bureau of the Census (USBOC), 2010. Population Estimates: Incorporated Places and Minor Civil Divisions, Retrieved September 17th, 2010 from http://www.census.gov/popest/cities/SUB-EST2009-4.html.

Ulrich, R.S., 1984. View through a window may influence recovery from surgery. Science 224, 420–421.

Wooldridge, J., 2003. Introductory Econometrics: A Modern Approach. Thompson and Southwestern Publisher, Cincinnati, OH.