



Original article

Protest response and contingent valuation of an urban forest park in Fuzhou City, China

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ABSTRACT

Urban forest parks, such as Fuzhou National Forest Park (FNFP), provide residents with landscape amenities, recreational opportunities, and interaction with nature. Understanding the recreational quality of green spaces and visitors' behaviors and preferences is essential for effective forest park conservation strategy. We aimed to assess the recreational use and amenities of FNFP and calculate the monetary value of provided services using a contingent valuation method (CVM). A total of 249 park visitors were interviewed face-to-face based on a questionnaire using entrance fee as the payment vehicle, in October 2015 and January 2016. A considerable number of protest responses may cause selectivity bias; consequently, we used models excluding protest zeros. Sample selection models were estimated using Heckman's two-step and full information maximum likelihood methods. The average willingness-to-pay (WTP) was estimated to be 13.79 RMB (equivalent to 2.00 USD) for the unconditional model, and the lower mean values were estimated for two selectivity bias corrected models. In this case, park visitors would be willing to pay an average 11.6 RMB (equivalent to 1.69 USD) per person according to the full information maximum likelihood estimate and an average 10.96 RMB (equivalent to 1.60 USD) per person by the two-step method. Respondents' satisfaction of forest park facilities and service significantly influenced their WTP value for forest park improvements. Socio-demographic features could not effectively discriminate the protest bidders and the other non-protest bidders. Our results suggest that protesters may value the resource less than positive bidders. The high percentage of protest respondents may be due to the current free use of FNFP and payment vehicle of entrance fee. The CVM approach takes residents' preferences into consideration and allows the study of heterogeneous socio-demographic groups; thus, our data may help to develop effective management plans for improving urban forest parks in China.

1. Introduction

Green space in urban areas has been studied extensively to better understand its functions and services. Previous studies have evaluated the potential of urban forests to mitigate air pollution, purify water, and provide landscape amenities as well as recreational opportunities (Escobedo et al., 2011; Konijnendijk, 2003; Konijnendijk et al., 2006, 2013). Urban forests can potentially mitigate adverse environmental impacts, but can also create problems due to high maintenance cost, damage to buildings or infrastructure, or increased populations of pests and pathogens (Roy et al., 2012).

Urban forest planning and management need to take into consideration urban forest attributes and visitors' preferences. Although numerous studies have been performed on the ecological importance and vegetation of urban forests, the interaction between urban residents

and green spaces remains unclear and needs further investigation (Kabisch et al., 2015), since opinions among recreationists of different socio-demographic attributes regarding recreational uses are often contradictory.

Recreationists have varying preferences for forests located in different areas (Koo et al., 2013). The most important factor determining forest park attractiveness was the biotic condition of forests in Korea, the environmental quality provided by a forest in China, (Jim and Chen, 2006b), and the uniqueness of forest landscapes, accessibility and quality of lodging facilities, and catering services in Taiwan (Lee et al., 2010). Surveys conducted in Chinese cities (Jim and Chen, 2006a) and Hong Kong City (Lo and Jim, 2010) revealed that living conditions are closely related to the frequent use of public open areas and a high rate of willingness to pay for urban green space conservation. Therefore, residents' preferences for green spaces is geographically specific as well

Abbreviations: CVM, contingent valuation method; FIML, full information maximum likelihood; FNFP, Fuzhou national forest park; WTP, willingness-to-pay

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as highly connected to city conditions.

In China, the number of forest parks has increased dramatically in the past 30 years. In 2015, 3292 forest parks were designated, of which 828 were titled “National Forest Parks.” A forest park can be classified as a mountainous forest park, suburban forest park, or urban forest park based on its distance from the urban area (Luo et al., 2005). Most of the forest parks in China were established and developed based on former state-owned forest farms, which implies that management transformation and forest resource conservation is urgently needed. The establishment of a forest park is marked by the development of recreational use as the main purpose, and timber production is no longer the primary use. A high entrance fee is levied on park visitors to collect park management funds, with few exceptions.

Consistent with the global trend, various studies have focused on urban forest parks and have shown that visits to such parks are determined by tree density and overall accessibility (Jim and Chen, 2006a; Zhang et al., 2013). However, information on visitors’ preferences and usage patterns regarding the urban forest parks is still limited in China.

The valuation of urban forests in terms of recreational use and amenities can provide valuable information to policy makers for urban development and forest park management (Kong et al., 2007; Jim and Chen, 2006a; Lo and Jim, 2010). The CVM is the most common method used for placing a monetary value on environmental assets (Wang et al., 2006; Whittington, 2002). By calculating the average WTP of respondents, researchers can estimate the monetary value of the asset. The main objective of this study was to examine the sample-selection issue in contingent valuation method (CVM) models with open-ended data and calculate the monetary value of the services provided, involving different levels of estimation and diagnostics. To this end, visitors’ preferences and demographic features were surveyed. In addition, we explored the relationship between respondents’ assessments of forest amenities, park facilities, presentation of information, and management and services with the average willingness-to-pay (WTP) value.

However, CVM has been criticized because of methodological flaws, e.g., validity and existence of a large portion of protest zeros. A wide review of related studies reported that it was rare to report on how protest responses are identified, and subsequently treated (Meyerhoff and Liebe, 2010). The protest respondents may state a zero value for a good that they actually value (Halstead et al., 1992). Hence, another purpose of this article is to determine whether respondents who give protest zero bids differ from other bidders. We analyzed whether protest zero bidders can be effectively characterized by socio-demographic factors. Our findings are useful for forest park management, as well as explaining the motivations of protest zero bidders to environmental goods in a Chinese context. This paper will contribute to further understanding of CVM.

1.1. Literature review

Protest zero bids are common in a contingent valuation and may cause selectivity bias on the estimates of WTP (Cho et al., 2008). Some previous studies also reported a high protest zero rate, nearly 50% or higher (Desvousges et al., 1987; Rowe and Chestnut, 1982). Table 1 presents several previous studies related to protest response in contingent valuation research for environmental goods. A protest zero response may be due to a variety of reasons: free riding, opposing to the interview in general, or to the payment vehicle (Strazzer et al., 2003). How to deal with protest zero responses has been a major issue facing researchers. There have been three major means: (1) In early literature, these protests zero responses were just discarded from the analysis (Mitchell and Carson, 1989; Whitehead et al., 1993; Tyrväinen and Väänänen, 1998). However, deleting protest zeros may result in an upward bias in WTP estimates (Ready et al., 1996; Meyerhoff and Liebe, 2006). (2) Consider the protest bids as legitimate zero bids and include them in the analysis. (3) Assign WTP values based on their socio-

demographic characteristics relative the non-protestor group. If protest bidders are the “same” as the non-protest bidders, approach (1) may be feasible (Halstead et al., 1992). Following Halstead et al. (1992), we applied discriminant analysis to examine the socio-demographic features of protestors and non-protestors. A discriminant analysis was more appropriate than a logit analysis since the main interest was to differentiate between two groups (Halstead et al., 1992).

The relationship between protest belief and zero response was examined in several previous studies, although the conclusion remains disputable. The attitudes towards paying were a larger influence on variability in WTP than the price (Jorgensen and Syme, 2000). The stated WTP value was significantly influenced by protest beliefs, which were determined by many different explanatory factors (Meyerhoff and Liebe, 2006; Jones et al., 2008). However, the negative or positive relationship between protest and WTP was identified (Lo and Jim, 2015), although earlier studies found that the stated WTP value was negatively affected by protest beliefs (Meyerhoff and Liebe, 2006).

2. Methods

2.1. Study area

Fuzhou City, the capital of Fujian Province, China, is situated at 26° N 119° E. Fuzhou National Forest Park (FNFP; Fig. 1) encompasses 8.6 km² and is located in the northern part of the city. Fuzhou City has a population of approximately 7.49 million people (Fuzhou Statistics Bureau, 2016). FNFP is popular with urban residents as a recreational site due to its proximity to the city center (7 km). Approximately 77.5% of the park is covered by a mixture of more than 1700 native and introduced plant species (Lin, 2004). It also includes a bamboo garden with a collection of Chinese species and varieties, and a cycad garden. In addition, it is endowed with rich cultural landscapes and historical relics such as ancient road posts and old temples. The entrance fee to FNFP was waived since September 2008. However, a usage fee was required for recreational facilities inside FNFP, such as, barbecue sites, Bird World, and dryland slide track.

2.2. Questionnaire design and method

The study applied a quantitative approach via a four-part questionnaire survey. The questionnaire was developed according to the guidelines in the scientific literature on CVM (Hoyos and Mariel, 2010) and related to contingent valuation of urban forest parks (Jim and Chen, 2006). The first part aimed to collect information about the usage pattern of FNFP, including the purpose of the visit, as well as the frequency, timing, and duration of visit. The second part was to collect information about the natural and cultural resources and landscapes of FNFP and respondents’ knowledge regarding the vegetation or cultural attractions. A five-point Likert’s scale (1, highly disagree; 2, disagree; 3, neither agree nor disagree; 4, agree; and 5, strongly agree) was used to categorize respondents’ opinions. The third part was to collect information about respondents’ willingness to pay a park usage fee. Lastly, the fourth part was to collect socioeconomic information, including respondents’ gender, age group, educational level, and monthly income.

In the third part, we illustrated a scenario that the facilities degrade, and a park usage fee is required to support management and maintenance, as it is common for Chinese citizens to pay for park usage fee (Jim and Chen, 2006). The CVM questionnaire section is written in Chinese; an exact translation is below:

Currently, management and maintenance of FNFP is funded by Government Financial Allocation. However, some facilities degraded and urgent repairs are needed. Moreover, plants that have been damaged by visitors need care. Extra funds should be collected to strengthen the maintenance of the forest park. Therefore, if FNFP levies an entrance fee

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