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Willingness and motivation of residents to pay for conservation of urban green spaces in Jinan, China

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ABSTRACT

Research indicates a relationship between motivation and willingness for conservation of urban green spaces. This study assessed the value of urban green spaces in Jinan using a contingent valuation method and payment card approaches, explored the motives behind payment, and identified the residents' recreational patterns of using urban green spaces. A total of 606 respondents in the 18–70 age groups from different parks and socio-economic groups were interviewed using cluster sampling. About 47% of respondents visited urban green spaces weekly, with 15.2% of respondents scarcely visiting parks. Companions during visits were family members, especially children. Leisure activities and exercising topped the list of activities undertaken in parks. 81.4% of respondents were willing to pay for the conservation of urban green spaces, and trust in the government was the most important factor that led to a high protest ratio. The average and median willingness to pay (WTP) values were RMB 81.81 per year and 50.0 per year, respectively, which were higher than actual park entrance fees. A Logistic regression analysis indicated that WTP value was linked to monthly income and frequency of visits. And the results suggested that individual resident intention to pay was mainly based on existence value, and supplemented by option value and bequest value. These results could assist planning and conservation of urban green spaces, and provide motivation for further research in these areas.

1. Introduction

Urban green spaces can be viewed as an environmental resource, which despite being highly artificial, maintain the characteristics of a natural resource and play an important role in improving the living environment. They provide residents with outdoor recreational opportunities and contact with nature and other persons [1,2]. It has been suggested that green spaces promote health by restoration and relieving stress [3,4], serving as a resource for physical activity [5], preventing chronic disease and reducing mortality [6]. Moreover, properly managed urban green spaces can facilitate engagement in the neighborhood and enhance the social cohesion. High quality urban green spaces around residences have universal appeal and can influence house prices [7]. Therefore, it would be helpful for the government to estimate their value to meet public expectations and formulate relevant planning strategies.

Resources value evaluation methods which are commonly used include revealed preference approach and stated preference approach. The revealed preference approach includes travel cost method and hedonic price method, which are adopted to speculate consumers' preferences based on their purchase. The stated preference approach is an economic technique used to estimate the monetary value of non-marketed goods, such as wild plants and animals, air environment and urban green spaces. It asks people to directly estimate the value of goods in a virtual market environment, and the contingent valuation method (CVM) is often used. It is difficult to measure the value of urban green spaces by traditional means such as the dose-response method. The CVM is an effective tool, as it can obtain a monetary value for intangible goods that does not have a market price. People's attitudes are revealed through the construction of a hypothetical market toward the maximum willingness to pay (WTP) for environmental improvement or the minimum willingness to accept (WTA) for environment deterioration. In summary, people express their willingness to pay or receive compensation money in the simulated market. In recent years, CVM has been commonly used in environmental economics [8,9]. Davis [10] first applied CVM in studying recreation values of forest in Maine, USA. During the 1980s and 1990s, CVM was widely employed to value ecosystem services in western countries. A blue-ribbon study by NOAA indicated that CVM could provide reliable estimates for policy making [11]. Recently, the method had been used for evaluation of public goods and related policy. In China, the basic concepts of CVM were introduced in 1980s, and case studies appeared until the 1900s. Study

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areas were concentrated within the living environment [12], ecological system [13], tourism resources [14] and in recent studies, in urban green spaces [15-17]. However, most studies regarding urban green spaces have focused on spatial gradient analysis [18,19], recreation–amenity analysis [4,20], accessibility [21], and pricing of public parks [22].

Many researchers have explored the correlation between willingness to pay and motivation. Krutilla [23] and Weisbrod [24] laid the foundation for the study of non-use value motivation. They believed that resources were not traditional economic goods, and residents were willing to pay for their use and conservation. Non-use values include existence value, option value, and bequest value. The existence value concept was put forward by Krutilla [23], explains that people would be willing to pay if they could get satisfaction from existing resources. Krutilla [23] also presented the bequest value concept, where people were willing to pay to ensure their descendants could share the resources. The option value concept [24] refers to the idea that people pay insurance money for the future use of resources instead of using opportunity. In general, the more motivation, the WTP value is greater. Philip et al. [25], taking the improvement of lake water quality as an example, studied the influence of cognition on goods evaluation; Heberlein et al. [26] analyzed the influence of cognition, emotion and attitude on goods evaluation.

In Jinan, environmental conservation is considered a utilitarian pursuit. Planning and management of urban green spaces have been dominated by city administrators and technical experts, who even copy existing designs and management strategies. All of these ignore the true feelings of residents in urban green spaces or other open spaces [3,27]. Previous studies in Jinan have examined urban green spaces using spatial gradient analysis [18] or landscape planning of the city moat [28], and have paid little attention to the motives behind paying behavior. Here we attempted to establish an alternative view by investigating the residents' motivations behind the preservation of urban green spaces. This study assessed the value of urban green spaces in Jinan with CVM, explored the motivations behind paying, and identified residents' recreational patterns of using urban green spaces. We also discuss the possible linkages between the residents and urban green spaces through visiting habits.

2. Study area and methods

2.1. Study area

Jinan is located between latitude 36°10′-37°90′ N and longitude 116°12′-117°35′E and is a typical land-locked city in northern China, with jurisdiction over four rural and six urban districts. Its urban area is approximately 32,257 km^2, with more than 3 million inhabitants as of 2007. Jinan is the capital of Shandong Province, located with Taishan Mountain to the south and Huanghe River to the north, and has a typical warm-temperature semi-humid continental monsoon climate and well-defined seasons. Jinan also has a distinct geological structure. Underground streams from Taishan Mountain flow along the limestone strata to Jinan, but in the north are blocked by rocks and therefore, spurt out in the form of numerous springs that spew to converge on Daminghu Lake. Jinan is a Chinese traditional landscape city, with mountains, springs, and lakes. As the city is undergoing high-rise expansion, now more green space is constructed to meet residents' needs. There are various large spatial structures, such as urban parks, roadside green corridors, and small pocket gardens in residential areas. Whether public, semi-public or private, they play an important role in satisfying residents' demands.

2.2. Questionnaire and survey design

The questionnaire survey is commonly adopted in CVM to assess the non-use value of urban green spaces [15,17,29,30]. CVM has been produced in several formats including open-ended, dichotomous choice and payment card. Among these methods, the open-ended format can better discern variations in WTP estimates, but it presents difficulty to people unfamiliar with such a bidding game, and it has been often undertaken as a precursor to a dichotomous choice survey. Dichotomous choice is easy to understand by respondents, but it requires a large sample size, and it also suffers from a starting point bias. The payment card has emerged as a hybrid of the above two approaches, inheriting some of strengths and weaknesses of both. The open-ended method was not selected because most residents would mistake the notion of "purchasing" for charge for urban green resources. The dichotomous choice was less suitable because of resource constraints. The payment card offered a compromise between the two approaches. And the payment card approach could provide explicit and straightforward information to respondents. This information helped them construct hypothetical transactions, and encouraged them to reveal willingness to pay amounts. This study selected the payment card format, which could improve protest sample ratio and overcome the problem of deficient interval setting.

In this study, respondents were first asked if they were willing to pay for their sightseeing in urban parks in Jinan, for maintenance of the parks. Those who answered "yes" were asked to circle the amount they would be willing to pay per year. The listed values were RMB 10, 50, 100, 200, 500 and 1000. To avoid range bias, the range of values was designed based on the responses received in a previous survey in February 2012, wherein most participants provided an integer amount in response to an open-ended direct question about their WTP for urban green spaces in Jinan. Those who answered "no" were assigned zero, and they would be asked to give reasons about zero bids.

Pretest and pilot studies were conducted to assess the effectiveness of the survey. A pretest was conducted in February 2012, which ascertained that all 40 respondents understood the questions, and 70 people were interviewed in a pilot test a week later, which focused on the content of the WTP questions. After modification, the final questionnaire consisted of three parts. The first section contained socio-economic questions, including those relating to gender, age, education, and monthly income. The second part consisted of the habits of visiting urban green spaces, including five questions: frequency of visits, companions during visits, activities in parks, satisfaction, and time cost required to access parks. These questions help respondents understand why they were being asked to pay. The final section consisted of the contingent valuation survey and the motivations of bidding decisions. Potential bias due to scenario misspecification was reduced by face-to-face onsite survey aided by necessary explanation [20].

A final survey was conducted in April to May 2012. Surveys were conducted face to face by two groups of trained student interviewers. A random selection of 1300 adults who agreed to participate in the survey was chosen in 8 urban green spaces of Jinan (Table 1). The visitors from different places in each park were selected randomly in different periods. The number of sampling units was determined according to the daily population in each park to ensure that the samples were representative. The sample ratio was about 5.0%, that is to say 5% of visitors (including locals and outsiders) participated in the survey. All respondents were between the ages of 18 and70 years, because residents outside this range usually need not pay to use public resources.

2.3. Statistical tools and method

The data were analyzed using SPSS software. Descriptive statistics was used to analyze averages and standard deviations. After initial statistical analysis, the Logistic regression model [31,32], based on maximum likelihood technique, was used to identify the variables that affect the respondents' final decision on WTP value.