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Valuing Recreational Services of the National Forest Parks Using a Tourist Satisfaction Method †

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Abstract: Estimating the economic value of ecosystem services has become one of the most fertile areas in ecological economics. In this paper, we propose a novel method of using a tourist satisfaction model to evaluate the recreational services being embedded in forest ecosystems. We establish a functional relationship between tourist satisfaction and recreational attributes based on the survey data of China National Forest Parks. The results indicate that each recreational attribute considered enables the generation of a significant amount of tourism welfare for tourists, whereas tourist congestion was found to be a negative contributor to tourists' satisfaction. Reducing congestion from the current level is the most valued recreational attribute for tourists, and the willingness to pay for it is as high as CNY 623.18 (USD 92.29) per visitor per trip. Additionally, local and nonlocal tourists display a divergent degree of preference for the recreational attributes and their levels of willingness to pay.

Keywords: economic value; recreational services; tourist satisfaction; national forest parks

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1. Introduction

Forest ecosystem services and the natural capital stocks that produce them are considered an important pillar of human life satisfaction [1]. Although there is growing recognition of the need for their conservation, ecosystems continue to be lost through the world [2]. A key factor behind this degradation is that most ecosystem services have the characteristics of public or quasi-public goods, causing difficulties for the users to be able to accurately identify their true values. Consequently, people can profit from the non-consumptive trade and no incentive exists to pay to maintain them. Therefore, significant efforts are needed to create a market in which ecosystem services can be found, defined, and calculated.

In the past two decades, a growing body of research in ecological economics has concerned satisfaction data and investigated the determinants of satisfaction at the individual level. As respondent's self-reported satisfaction data for ecosystem services can serve as a metric for a personal utility level, valuing ecosystem services directly in satisfaction terms have sparked a strong interest in the field of non-market valuation [3–5].

The basic idea of the satisfaction-based method is simple. This method uses survey data on self-reported satisfaction as an empirical approximation to "the experienced utility" or individual welfare, and models individual satisfaction as a function of their incomes or costs, ecosystem services they used, and other control variables. The estimated parameters are then used to calculate the average marginal rate of substitution between the level of income or cost and ecosystem service. As such, the individual's marginal willingness to pay (WTP) for the service in question can be revealed [5].

To some extent, the satisfaction-based method exhibits certain desirable features or advantages over traditional tools (e.g., the stated preference method and the revealed preference method). For example, there is no need to directly ask about people's willingness to pay in order for the public goods to be valued; instead, it simply requires an individual to rank his or her life satisfaction [6]. As such, it can greatly mitigate the survey burden for both research practitioners and survey participants. Furthermore, the satisfaction survey can effectively avoid strategic bias, which is a common problem in the contingent valuation survey process. In addition, this method can also suppress the model estimation bias that is potentially caused by the strong assumptions of a rational economic actor and the complete market equilibrium condition [7].

Welsch (2002) was the first researcher who used the cross-section life satisfaction data gathered from 54 countries [8]. Since then, there has been a burgeoning number of studies focused on valuing air quality in different countries and geographical locations, in addition to various economic development stages globally, all based on life satisfaction data [6,9,10]. In recent years, the life satisfaction data has gradually gained its foothold in other fields of ecological economics, including valuing aesthetic services [11,12], biodiversity services [13], and cultural goods [3], in addition to the negative externalities of wind turbines [14]. To the best of our knowledge, such a study focused on recreational ecosystem services using tourist satisfaction (TS) data has not been carried out to date.

With respect to recreational services of ecosystems, some studies have demonstrated that there is a close interrelationship between ecosystems and value received by tourists [15,16]. The tourist experiences at a destination are likely to result in positive memories, emotional attachment, and, eventually, tourist satisfaction [17,18]. Furthermore, tourist satisfaction accrued from unforgettable experiences and emotional attachment signifies recreational value for tourists. Barbara (1997) suggested if one's actual experience on a recreational site is better than his or her expectation, then his or her assessment on the site should be considered as being 'satisfactory and valuable' [19]. Similarly, Williams et al. (2003) stated that the value of natural space can be derived from people's satisfaction or their emotional attachment to the space [20]. Therefore, based on these research analyses and insightful arguments, we can extend the satisfaction-based method to the area of valuing recreational services of national forest parks (NFPs). Specifically, we can build a micro-econometric tourist satisfaction function using travel cost, the site attributes, and several other covariates as arguments. Then, the estimated model parameters can be used in computing the recreational attribute's economic values.

This study makes the following contributions to the current literature: (i) Exploring the underlying theory of tourist satisfaction measurement and its connection with tourist welfare. Our proposed theoretical framework can be used in assessing the economic value of forest recreational services. In this study, we discuss the advantages of the TS approach compared to the conventional methods. (ii) Regarding tourism marketing, it is meaningful to examine the differences in economic value that are attributable to the different tourist groups, including local tourists and nonlocal park tourists. (iii) It is expected that the analytical results will have implications for park management regarding park budget allocation, level of admission fees charged, over-crowding control, priority order of park management tasks, and park marketing strategies.

The remainder of the paper is organized as follows. Section 2 proposes an empirical model framework, and outlines the questionnaire design and data collection process. Section 3 addresses the model results, and is followed by Section 4, which presents the study summary and conclusions.

2. Materials and Methods

2.1. Methodological Framework

2.1.1. Utility Correlates to Economic Value

The economic concept of value employed here originates from neoclassical welfare economics. The basic premises of welfare economics are that the purpose of economics is to increase the well-being of the individuals who make up the society, and that each individual is the best judge of how well off he or she is in a given situation. Each individual's welfare depends not only on that individual's consumption of private goods, and of goods and services produced by the government, but also on the quantities and qualities of nonmarket goods and service flows received by each individual from the resource–environment system [21]. In the context of tourism economics, each tourist's utility depends not only on his or her consumption of private goods, such as transportation, goods, and lodging services, but also on the quantities and qualities of non-market recreational service flows each tourist receives from the national park's ecological system; for example, health, visual amenities, and opportunities for outdoor recreation. Based on their utility-maximizing behavior, tourists' valuation of recreational services is revealed by their consumption choices [22].

For a tourist who makes consumptive decisions concerning bundles of recreational goods and services, his/her utility, which represents preferences for various recreational attributes and tourism consumption, is given by the property of substitutability among the market and non-market goods which make up the bundles. By substitutability, we mean that if the quantity of one service in the consumed bundle is reduced, it is possible to increase the quantity of other services so as to leave the tourist no worse off as a result of the changes in the bundle. This substitutability is known to represent market demand as if it is the outcome of a decision by a rational consumer [23]. The property of substitutability measured by the marginal rate of substitution (MRS) is at the core of the economist's concept of value because substitutability establishes trade-off ratios between pairs of services that matter to the tourists.

The value measures based on substitutability can be expressed either in terms of willingness to pay (WTP) or willingness to accept compensation (WTA). WTP and WTA measures can be defined in terms of any other service that the tourist is willing to substitute for the service being valued. In valuing the NFP services, we use travel cost as the numeraire so that the trade-off ratios between currency term and a specific park characteristic can be expressed. The WTP is the maximum sum of money that an individual would be willing to pay rather than do without an increase in some service, such as the amount of rubbish reduction in a NFP site [24]. More formerly, a tourist's utility function can be formulated as the following:

$$u = f(r, t, \theta)$$

where u denotes the tourist's utility, and r, t, and θ denote the level of recreational attributes, amount of the travel cost, and tourist's personal traits, respectively.

2.1.2. Utility and Tourist Satisfaction

The study of people's satisfaction with their life or the service quality they experience has long been one of the mainstays in psychology. Only since the "Easterlin paradox" was proposed has this psychological research been connected to economics [25]. The key proposition associated with the theoretical framework is that an individual's true utility is an implicit variable and unobservable, which leads to a controversy about whether self-stated satisfaction is a reliable and valid proxy for the tourist's utility. In general, tourists pursue individual welfare based on some stable evaluation metrics. For a measure of reported satisfaction to serve as a proxy for individual welfare, an important assumption is necessary: the standards underlying people's judgment are those the individual would like to pursue in realizing his/her ideal of a pleasant travel experience.

Tourist satisfaction refers to the perceived discrepancy between prior expectation and perceived performance after consumption. The extent to which tourist satisfaction is identified depends on whether the evaluation standards fit the tourist's judgments about their travel experience. When experiences compared to expectations result in feelings of gratification, the tourist is satisfied, and vice versa [26]. For tourists, the general evaluation of the satisfaction and pleasure associated with their travel may be an appropriate standard to capture judgments about their welfare. Therefore, like most researchers who use TS as a valid proxy for respondent's utility, we employ tourist satisfaction as a measure of tourist's utility [11,27].

2.1.3. Empirical Model

A typical tourist satisfaction model depicts the relationship between the parks' recreational services, tourist's travel cost, and other control variables. Concretely, these can be expressed in Equation (1) below:

$$U_{ij} = \alpha_0 + \beta_i' RA_{ij} + \mu_i' OA_{ij} + \gamma_i' C_{ij} + \delta_i' S_{ij} + \varepsilon_{ij} \quad (1)$$

where U_{ij} is the true but unobservable indirect utility of tourist i as he or she travels to the park j; $RA_{ij} = \left(RA_{ij1}, RA_{ij2}, \ldots RA_{ijk}\right)'$ is a vector representing the recreational attributes of the park j; and $\beta_i' = (\beta_{i1}, \beta_{i2}, \ldots \beta_{ik})'$ is a vector of the park attribute coefficients. Similarly, $OA_{ij} = \left(OA_{ij1}, OA_{ij2}, \ldots OA_{ijk}\right)'$ is a vector of the control variables associated with the park j, which may involve factors such as park land size, temperature, and rainfall; C_{ij} represents a set of travel costs; S_{ij} is a vector of tourists' socio-economic and demographic characteristics; and ε_{ij} is a random error.

As discussed above, the key step of measuring the park service's value is to correctly define and formulate the marginal rate of substitution between the recreational attribute and the tourists' travel cost. To do so, we must first calculate the marginal utility of the park attribute and the marginal utility of the tourists' travel cost; then, by taking the ratio between the two, we can derive the monetary value of the attributes. The MRS can then be directly derived from Equation (1), as presented in Equation (2):

$$MRS = \frac{\Delta Cos\ t}{\Delta\ Recreation\ attribute} = -\frac{\partial U_{ij} / \partial RA_{ij}}{\partial U_{ij} / \partial C_{ij}} = -\frac{\hat{\beta}}{\hat{\gamma}} \Leftrightarrow WTP \quad (2)$$

2.2. Questionnaire Design and Data Collection

2.2.1. Questionnaire Design

In this study, we developed two survey questionnaires: one was used to capture data on the quality of recreational attributes of the NFPs, and the other was used to collect data on the satisfaction of tourists and their socio-economic characteristics.

1. Rreational attributes of NFPs: The tourist satisfaction or tourist welfare primarily depends on a range of recreational attributes of the NFPs. To correctly identify these attributes, we conducted an extensive literature review, which enabled us to identify the six core park attributes of the level of tourist satisfaction, including the park natural resources [28–30], accessibility [31,32], infrastructure that relates to tourists' basic needs [31,33], and park management [29]. Table 1 shows the details of these attributes in addition to several control variables considered in this study.
2. Measurement of tourist satisfaction: The level of tourist satisfaction was measured using the China tourist satisfaction index, which was developed by "The China tourist satisfaction evaluation system" in 2012 and is administrated by the China National Tourism Administration. The tourist satisfaction index is characterized by five categories: flat satisfaction, loyalty, demand, expectation, and recommend intention. Each category is measured using a 5-point Likert scale from 'Completely dissatisfied' to 'Completely satisfied'. The validity tests of this satisfaction index are presented in Table 2.

3. Travel cost: This covers all the travel expenses occurred during the travel process, from a tourist's home origin to the park destination. The basic calculation formula is given by Equation (3):

$$Cos\ t = C_1/N_1 + C_2 + C_3 \quad (3)$$

where C_1 represents the expenses paid before a tourist arrives at the entrance point of the forest park, which covers the costs paid for transportation, lodging, food and beverage, and other. N_1 represents the number of sites visited by the tourist, which is used in allocating the costs to a specific park site to avoid the problem of possible double counting. C_2 is the cost spent at the park site, including admission fees, amusement, food and beverages, accommodation, and souvenirs. C_3 denotes the time opportunity cost, which is computed using Equation (4):

$$1/3 \times (T_1 + 2 \times T_2)/(\mathrm{Y} \div 12 \div 23 \div 24) \quad (4)$$

where T_1 is the length of time spent touring the park site (unit: h); T_2. is the time taken on one-way travel from the home to the park (unit: h); Y is the household income; 12 means the number of months during which a tourist works in a year, excluding the legal weekends; the work time per month is calculated as 23 days.

4. Socio-economic characteristics. These include age, sex, education, marital status, household income, and whether a respondent is a repeat tourist or is visiting from areas outside of the park [34].

2.2.2. Data Collection

The data collection involved two aspects: one related to the physical conditions of the recreational services, was provided by the park management personnel, and included the natural environment, the park history, and the park operations. The other regarded the tourist's personal trait information, such as travel satisfaction, money spent during the tour, and demographic data. Before the formal survey activity was undertaken, a statistical pretest was administrated to ensure the survey questions were understandable and meaningful to the respondents. The pretests were based on data gathered from 4 park managers and 30 tourists at Yin-Shi-Tan NFP and Xi-Jiao NFP, respectively, in Western Dalian, China, and were implemented during 10–15 April 2017. The pretest outcomes were used to check and upgrade the survey questionnaires.

As shown in Figure 1, the study sample covered 22 NFPs across over 14 provinces in China, and thus represented a wide range of conditions of the NFPs in China with regards to the park grade rankings, land size, length of establishment, rates of forest vegetation, etc. (see Table S1 for detail). The whole survey process lasted for about 7 months, from early April to December in 2017. Due to the constraints of both time and budget, it was not possible for the researchers to travel to every sampled park site to carry out field survey activities. Thus, most survey activities were delegated to the parks' management personnel, with the mutually agreed service fees paid to the clients. Thus, the tourist surveys were executed by the park managers on behalf of our research team members. On average, 200–300 tourists were sampled from each selected park site. A total of 4531 valid questionnaires were collected.

Table 1. The definition of the recreational attributes and the type of variable specified.

	Attribute	Attribute Description	Type of Variable	Variable Name
Recreational attributes	Rate of vegetation coverage	The vegetation coverage rate <60% The vegetation coverage rate 60–85% The vegetation coverage rate >85%	Dummy	Forest * Forest^{+} Forest^{++}
	Quantity of rubbish	No. garbage can distributed per 200 m: 1; No. pieces in a visible scope: >10 No. garbage can distributed per 200 m: 2; No. pieces in a visible scope: 3–10 No. garbage can distributed per 200 m: 4; No. pieces in a visible scope: <3	Dummy	Garbage^{-} Garbage * Garbage^{+}
	Traffic condition	Less convenient, Time spent from city to park: >180 min Partially convenient, Time spent from city to park: 60–180 min Well convenient, Time needed from city to park: <60 min	Dummy	Traffic * Traffic^{+} Traffic^{++}
	Congestion	No. people observed in a visible scope(per 100 m^2): >60 No. people observed in a visible scope(per 100 m^2): 50 No. people observed in a visible scope(per 100 m^2): 35 No. people observed in a visible scope(per 100 m^2): 20 No. people observed in a visible scope(per 100 m^2): <10	Dummy	Congestion^{--} Congestion^{-} Congestion * Congestion^{+} Congestion^{++}
	Support facility	Elements including eco-lavatory, wood path, parking lot, service center, and special eateries and shops, each item earns 1 point (Excellent = 5, Good = 4, Medium = 3, Average = 2,Inferior = 1).	Continuous	Support
	Recreation facility	Including 5 factors such as playground, song and dance, tourism guide service, sightseeing vehicle, as well as a channel of the official information. With each item earning 1 point. (Excellent = 5, Good = 4, Medium = 3, Average = 2, Inferior = 1).	Continuous	Recreation
Control variable	Area	National Forest Parks (hm^2)	Continuous	Area
	Temperature	Average monthly temperature (°C)	Continuous	Temperature
	Temperature^2	Average monthly temperature squared (°C)	Continuous	Temperature^2
	Rainfall	Average monthly precipitation (mm)	Continuous	Rainfall
	Air	Aero-anion concentration monitored every quarter (10,000/cm^3)	Continuous	Air
	Humanity	Number of cultural attractions with historical and cultural heritage open to the public	Continuous	Humanity

Note: Variable with "*" stands for a baseline status.

Table 2. Measurement of tourist satisfaction and its validity tests.

Tourist Satisfaction Scale		Score
In general, I am satisfied with this park visit. This visit meets my expectation. The overall travel meets my expectation. If there is an opportunity, I would like to revisit this site. I would like to recommend the park to my friends and relatives.		5-pt Likert Scale: 1 'completely agree' 5 'completely disagree'
Number of items		5
Cronbach's alpha coefficient		0.854
Kaiser–Meyer–Olkin Measure		0.893
Bartlett's Test of Sphericity	Approx. Chi-Square	11,990.865
	df.	21
	Sig.	0.000

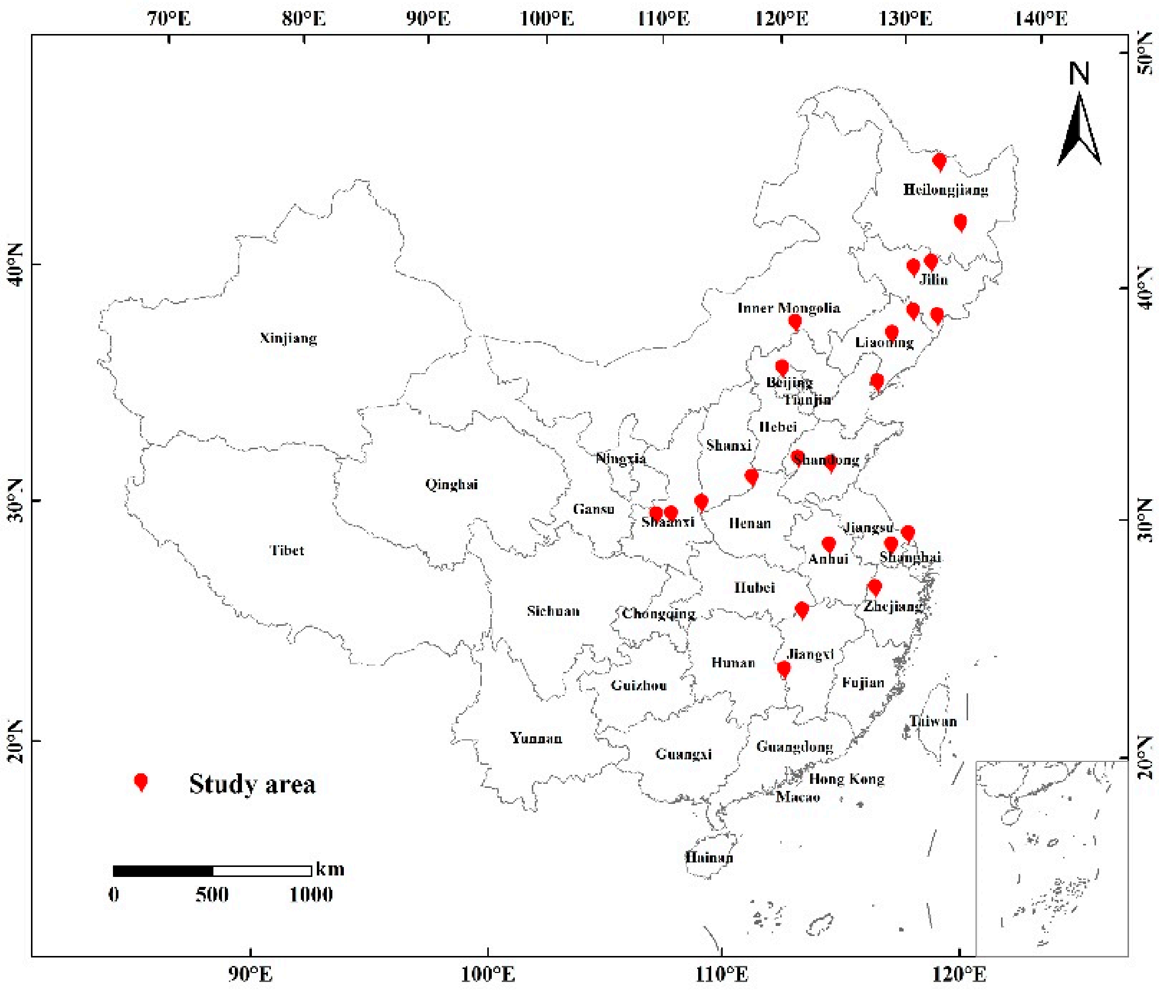

Figure 1. Geographical distribution of 22 National Forest parks.

3. Results and Discussion

As mentioned in the literature review, the tourist satisfaction function can be properly estimated using an ordered probit model [9,35]. If the satisfaction function is characterized as being cardinal, then the satisfaction function can be estimated via the ordinary least squares (OLS) model [27]. However, numerous studies have shown that treating satisfaction as either an ordinal or cardinal variable makes little difference to the estimated model results [36]. Therefore, here we chose to use both ordinary least squares and ordered probit models for estimating model parameters. This analogy is very similar to the life satisfaction measurement commonly used by non-market valuation researchers [37].

Based on the origins of the tourists, we subdivided the whole survey dataset into two subsamples: a local tourist group and a nonlocal tourist group. A local tourist was defined as a tourist who resided in the same city as the location of the NFP; and a nonlocal tourist was defined as one whose residential location differed from that of the NFP they visited. The detailed descriptive statistics for each sample dataset are presented in Table S2.

3.1. Model Results for the Whole Sample

To better understand the underlying effects of the NFP recreational attributes on tourist satisfaction, we begin by estimating the models defined by Equation (1) using the entire dataset; the results are presented in Table 3. Columns 4–5 in Table 3 show the results estimated from Equation (1), based on the ordered probit model in which tourist satisfaction is considered as the latent variable. It can be seen clearly that both the OLS and the ordered probit models have a high goodness of fit. Furthermore, the two models generated very similar results in terms of the magnitudes of the model coefficients and their statistical performance.

Table 3. The model results based on the whole dataset.

Variable	Linear Form		Ordered Probit Model	
	Coef.	**S.E.**	**Coef.**	**S.E.**
Cost	-3.66×10^{-4} ***	6.74×10^{-5}	-4.33×10^{-4} ***	8.66×10^{-5}
$Forest^{+}$	0.066 **	0.033	0.116 ***	0.043
$Forest^{++}$	0.120 ***	0.037	0.200 ***	0.048
$Traffic^{+}$	0.037	0.035	0.069	0.045
$Traffic^{++}$	0.041	0.026	0.048	0.034
$Garbage^{-}$	−0.103 ***	0.035	−0.145 ***	0.045
$Garbage^{+}$	0.131 ***	0.033	0.142 ***	0.043
$Congestion^{--}$	−0.166 ***	0.032	−0.174 ***	0.042
$Congestion^{-}$	−0.092 ***	0.034	−0.127 ***	0.043
$Congestion^{+}$	0.228 ***	0.035	0.281 ***	0.046
$Congestion^{++}$	−0.091 **	0.046	−0.182	0.059
Support facility	0.040 ***	0.016	0.080 ***	0.021
Recreation facility	0.045 ***	0.017	0.093 ***	0.021
Humanity	−0.001	0.001	−0.001	0.001
Air	0.045 ***	0.005	0.062 ***	0.007
Area	−0.0001 **	5.75×10^{-5}	-0.28×10^{-4} ***	7.83×10^{-5}
Temperature	−0.001	0.001	−0.001	0.001
Temperatureˆ2	−0.001 ***	0.000	−0.002 *	0.000
Rainfall	−0.007	0.007	−0.012	0.009
Revisit or not	−0.051 *	0.026	−0.071	0.034
Age	−0.013 *	0.007	−0.014	0.010
Ageˆ2	1.56×10^{-4} *	0.000	1.75×10^{-4}	1.05×10^{-4}
Gender	0.016	0.026	0.027	0.033
Education	−0.074 *	0.016	−0.099 ***	0.021
Marriage	0.015	0.020	0.019	0.026
HH income	0.000	0.009	−0.002	0.011
Residence	−0.267 ***	0.043	−0.278 ***	0.055
Cons	3.438	0.178	-	-
Number of observation	4531		4531	
R^2	0.1029		0.0495	
Log-likelihood			−5218.121	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Regarding the recreational services, there is a significant positive relationship between the two attributes ('Rate of vegetation coverage' and 'Quantity of rubbish') and tourist satisfaction. However, the attribute of 'Congestion' seems to impose a non-linear effect on tourist satisfaction because, as the level of congestion reaches a rate of 'more than 35 people/100 m^2', the crowding imposes a statistically negative effect on tourist satisfaction. However, as the level of congestion decreases to a level of '20 people/100 m^2', the crowding is shown to make a positive contribution to tourist satisfaction. Interestingly, the negative effect reoccurs as the congestion level reaches 'Less than 10 people/100 m^2'. This may reflect the fact that tourists exhibit a dual preference regarding the congestive conditions in the park, such that they neither appreciate over-congestion nor enjoy an environment at the site that is too isolated. Regarding the attribute of support facilities at the park sites, tourists prefer more convenient 'support facilities' provided in the parks. Nevertheless, this notion does not seem to be supported by the statistical test results because 'Convenience of transportation' does not significantly affect tourist satisfaction.

Among the considered tourists' traits, 'age', 'education' and 'origins' all affect TS significantly. However, 'age' exhibits a U-shaped relationship with TS in such a way that the level of satisfaction reaches the lowest as tourists attain middle age. As shown by Jarvis et al. (2016), tourists with a lower level of education tend to be more satisfied than those who received more advanced education [34]. Moreover, the origin of a tourist has a strong influence on his or her travel satisfaction ($\alpha = 0.01$). However, nonlocal tourists tend to be more likely to report a better level of satisfaction than do the local tourists. This may be attributable to the fact that tourists who reside in areas near the NFPs are used to or more familiar with the park environment; thus, to some extent, they may have a lesser feeling of freshness and are less sensitive to the level of satisfaction.

3.2. Valuing the National Forest Parks' Recreational Service

As discussed previously, the monetary value of the NFP's service is estimated using the marginal rate of substitution (MRS), i.e., by computing the ratios between the estimated recreational attribute coefficients and the tourist's travel cost. In order to account for the non-linear relationship between the variation in each attribute and the travel cost, we computed the MRS based on alternative combinations of travel costs and recreational attributes. Table 4 presents the mean WTP results derived from using the whole dataset. It is clear that the WTP results vary by model. However they do not seem to differ greatly, which indicates a high degree of robustness of the estimated model results.

Table 4. The economic values accrued to the changes in the park characteristics.

	Linear Form		Ordered Probit Model	
	WTP	**Proportion**	**WTP**	**Proportion**
Forest *	-	-	-	-
$Forest^{+}$	180.921	0.62	270.394	0.93
$Forest^{++}$	327.263	1.13	468.133	1.61
Traffic *	-	-	-	-
$Traffic^{+}$	100.846	0.35	162.410	0.56
$Traffic^{++}$	110.793	0.38	112.289	0.39
$Garbage^{-}$	−281.882	−0.97	−339.634	−1.17
Garbage *	-	-	-	-
$Garbage^{+}$	356.450	1.23	333.010	1.15
$Congestion^{--}$	−454.590	−1.56	−407.551	−1.40
$Congestion^{-}$	−251.720	−0.87	−297.075	−1.02
Congestion *	-	-	-	-
$Congestion^{+}$	623.184	2.14	655.801	2.26
$Congestion^{++}$	−249.647	−0.86	−426.315	−1.46
Support facility	109.289	0.38	184.988	0.63
Recreation facility	122.951	0.42	214.781	0.74

Note: 1 USD = 6.752 CNY in 2017. Proportion = WTP/mean travel cost. The mean value of travel cost in the whole sample is CNY 290.63 (USD 43.04). Variables with "*" represent a baseline status.

In the discussion below, we use the results generated from Model 1 to address the attribute values. This is simply because Model 1 has the best goodness of fit among the three models. It is interesting to see that, among all the recreational attributes, tourists attach the greatest importance to the attribute of '$Congestion^{+}$' which is evidenced by the highest value of the WTP (CNY 623.18, i.e., USD 92.29), followed by the WTP for the attribute of vegetation coverage (CNY 327.26, i.e., USD 48.54). This indicates that tourists have a strong desire to experience a less crowded environment and better coverage of green land in the forest parks. However, as the congestion level changes from the status quo to the worst level ('Congestion^{--}'), the WTP falls to CNY 454.59 (USD 67.33). Similarly, the effect of changing the 'amount of rubbish' from the status quo to 'Garbage^{-}' results in an economic loss of CNY 281.88 (USD 41.75). Finally, the average WTP for a one-level increment in 'Support facility' and 'Recreation facility' is CNY 109.29 (USD 16.19) and CNY 122.95 (USD 18.21), respectively.

In contrast to Chinese tourists, who pay the greatest attention to the attribute of 'Congestion^{+}', Penn et al. (2016) found 'little congestion' was relatively less important in Hawaii beach, and tourists are only willing to pay USD 6.37 for ideal crowding conditions [38]. In China, the exploitation of forest tourism resources is far greater than that of ocean tourism. From April to November each year, i.e., when we collected the data in this study, multiple millions of tourists travel to NFPs, causing overcrowding in the parks. Therefore, tourists are more sensitive to changes in the congestion level in forest parks and ultimately show a higher willingness to pay.

3.3. Model Results for the Two Sub-Samples

To better examine the difference in the tourists' WTP for various recreational attributes between local and nonlocal tourist groups, we conducted a separate analysis on each group using the two types of models, i.e., linear and ordered probit models. The two columns listed under each model in Table 5 represent the estimated results developed from each sub-sample dataset.

As expected, the two tourist groups exhibit different attribute preferences and economic values. Regarding the nonlocal group of tourists, their satisfaction displays an inverted U-shaped relationship with the travel costs, such that the level of satisfaction reaches the highest level as the per person's travel expense reaches CNY 108.93 (USD 16.13). In comparison, the local group of tourists is subject to fewer cost constraints, so their satisfaction is not significantly affected by this factor. Regarding parks' recreational attributes, both 'Congestion' and 'Support facility' are statistically significant for the two groups of tourists. However, they differ in terms of the attribute of 'Convenience of traffic', such that the coefficient of the 'Best' level of traffic variable indicates a statistically significant positive effect for the local tourist group, whereas the effect is not significant for the nonlocal group. This may be because, relative to the nonlocal tourists, the local park tourists are more sensitive to the park conditions, such as whether it is more convenient for them to use the park facilities. In contrast, because they experienced a long journey from home to the NFP site, the nonlocal tourists tend to be less sensitive to the traffic conditions in the areas surrounding the park. Instead, the nonlocal tourists paid more attention to the parks' environmental quality, as reflected by 'Quantity of rubbish', and the diversity of recreational activities provided on the site (i.e., 'Recreation facility'). Hence, these attributes exhibit a statistically significant relationship with nonlocal tourists' satisfaction.

Table 6 presents the mean values of the WTP calculated from Equation (1) of the OLS and ordered probit models using the sub-datasets. In addition, we also carried out 1000 simulations using the parametric bootstrapping method to generate robust or stable estimated WTP outcomes [39]. To be consistent with the estimates using the complete dataset, we ran the models separately using the sub-datasets. It was found that using the sub-datasets yielded a higher WTP for the park attributes of 'Congestion' and 'Rate of vegetation coverage', such that the nonlocal tourists would be willing to pay CNY 556.03 (USD 82.35) as a tradeoff for a lower level of congestion in the parks; this is CNY 438.56 (USD 64.95) more than the local tourist's WTP. These results are similar to those of Lindberg and Veisten (2012), and indicate that the economic values that potentially accrue to the recreational attributes are different between local tourists and nonlocal tourists [40].

Table 5. Comparison between the two groups of tourists.

	Linear Form				Ordered Probit Model			
	Local Tourists		Nonlocal Tourists		Local Tourists		NonLocal Tourists	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Cost	-2.54×10^{-3} ***	5.53×10^{-4}	$-3.23 \times^{4}$ ***	6.56×10^{-5}	-3.72×10^{-3} ***	6.43×10^{-4}	-3.93×10^{-4} ***	8.82×10^{-5}
$Forest^{+}$	0.068	0.075	0.067 *	0.037	0.105 *	0.087	0.101 **	0.050
$Forest^{++}$	0.152 **	0.082	0.112 ***	0.042	0.208 ***	0.097	0.133 ***	0.057
$Traffic^{+}$	0.020	0.075	0.004	0.040	0.083	0.087	0.013	0.054
$Traffic^{++}$	0.129 **	0.057	0.007	0.030	0.161 ***	0.066	0.003	0.040
$Garbage^{-}$	−0.111	0.074	−0.119	0.041	−0.157 *	0.086	−0.136 ***	0.055
$Garbage^{+}$	0.128 *	0.075	0.137	0.037	0.208 ***	0.090	0.131 ***	0.051
$Congestion^{--}$	−0.242 ***	0.089	−0.126 ***	0.038	−0.360 ***	0.104	−0.111 **	0.052
$Congestion^{-}$	−0.142 **	0.073	−0.096 **	0.045	−0.115 *	0.086	−0.166 ***	0.060
$Congestion^{+}$	0.298 ***	0.081	0.179 ***	0.044	0.303 ***	0.096	0.216 ***	0.061
$Congestion^{++}$	−0.148	0.101	−0.059	0.053	−0.107	0.118	−0.043	0.071
Support facility	0.131 ***	0.033	0.073 **	0.019	0.168 ***	0.038	0.103 ***	0.026
Recreation facility	0.051	0.038	0.047 ***	0.019	0.057	0.045	0.063 ***	0.025
Humanity	0.004 **	0.002	−0.002 **	0.001	0.003 **	0.002	−0.003 ***	0.001
Air	0.054 ***	0.012	0.037 ***	0.006	0.063 ***	0.014	0.051 ***	0.008
Area	2.98×10^{-4}	2.23×10^{-4}	-1.48×10^{4} *	0.60×10^{-4}	1.50×10^{-4}	2.62×10^{-4}	-2.97×10^{-4}	2.62×10^{-4}
Temperature	0.020	0.022	−0.001	0.001	0.005	0.026	−0.001	0.001
$Temperature\hat{}^{2}$	−0.003 ***	0.001	−0.001 ***	0.000	−0.003 **	0.001	−0.002 ***	0.003
Rainfall	0.002	0.015	−0.009	0.007	−0.001	0.018	−0.014	0.010
Revisit or not	−0.064	0.056	−0.045	0.030	−0.081	0.065	−0.067	0.040
Age	−0.025	0.015	−0.002	0.008	−0.025	0.018	−0.002	0.011
$Age\hat{}^{2}$	2.33×10^{-4}	1.78×10^{-4}	5.86×10^{-5}	0.91×10^{-4}	2.17×10^{-4}	2.08×10^{-4}	0.79×10^{-4}	1.25×10^{-4}
Gender	0.007	0.055	0.018	0.029	0.003	0.064	0.035	0.039
Education	−0.019	0.034	−0.095 ***	0.018	−0.024	0.040	−0.127 ***	0.024
Marriage	0.034	0.041	0.000	0.023	0.037	0.048	0.003	0.031
HH income	0.002	0.018	−0.002	0.010	0.001	0.021	−0.006	0.013
Cons	3.187	0.374	3.324	0.202	-	-	-	-
No. of observation	1205		3326		1205		3326	
R^2	0.1341		0.1039		0.0526		0.0539	
Log-likelihood					−1472.593		−3704.635	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6. The economic values accrued to the recreational attributes based on different tourist groups.

	Linear Form				Ordered Probit Model			
	Local Tourist		Nonlocal Tourist		Local Tourist		Nonlocal Tourist	
	WTP	Proportion	WTP	Proportion	WTP	Proportion	WTP	Proportion
Forest *	-	-	-	-	-	-	-	-
$Forest^{+}$	26.58	0.33	208.11	0.57	28.38	0.36	255.23	0.70
$Forest^{++}$	59.73	0.75	348.00	0.95	56.05	0.70	336.49	0.92
Traffic *	-	-	-	-	-	-	-	-
$Traffic^{+}$	8.04	0.10	12.67	0.03	22.39	0.28	33.19	−0.09
$Traffic^{++}$	50.92	0.64	23.14	0.06	43.30	0.54	6.55	0.02
$Garbage^{-}$	−43.63	−0.55	−369.05	−1.01	−42.27	−0.53	−346.47	−0.94
Garbage *	-	-	-	-	-	-	-	-
$Garbage^{+}$	50.29	0.63	424.16	1.16	56.05	0.70	332.63	0.91
$Congestion^{--}$	−95.09	−1.20	−389.58	−1.06	−96.77	−1.22	−281.65	−0.77
$Congestion^{-}$	−55.95	−0.70	−297.15	−0.81	−47.15	−0.59	−421.73	−1.15
Congestion *	-	-	-	-	-	-	-	-
$Congestion^{+}$	117.47	1.48	556.03	1.51	81.58	1.03	549.46	1.50
$Congestion^{++}$	−58.43	−0.73	−182.66	−0.50	−28.76	−0.36	−110.33	−0.30
Support facility	51.55	0.65	226.12	0.62	45.30	0.57	260.83	0.71
Recreation facility	20.08	0.24	145.43	0.40	15.47	0.19	160.09	0.44
Total	138.05	1.73	813.38	2.22	106.93	1.34	829.32	2.26

Note: 1 USD = 6.752 CNY in 2017. Variables with "*" represent a baseline status.

For example, regarding the attribute of '$Congestion^{+}$', the distribution of tourists' WTP for the related attributes is depicted in Figure 2 based on the results presented in Table 6. The x-axis represents the WTP, and the y-axis represents the probability distribution of the WTP. The red dotted line shows the WTP distribution for the local tourist group and the blue solid line shows that for the nonlocal tourist group. Obviously, the nonlocal tourist group exhibits a much higher WTP than the local tourist group. Nonetheless, the latter displays a wider dispersion of distribution. A possible reason for this could be that the higher level of WTP for these important NFP attributes indicates the nonlocal tourists, in general, attach the greatest importance to the parks they chose to visit. It is also likely that these nonlocal tourists have a relatively higher expectation than the local tourists to be motivated to make the decision to travel to the NFPs. Because the expectation and actual perception do not considerably differ, tourists would be willing to pay more money to the park sites they visited. The descriptive statistics show that most tourists expressed a higher level of tourist satisfaction, which seems to provide the underlying reason why the nonlocal tourist group exhibits a higher level of WTP than the local tourists.

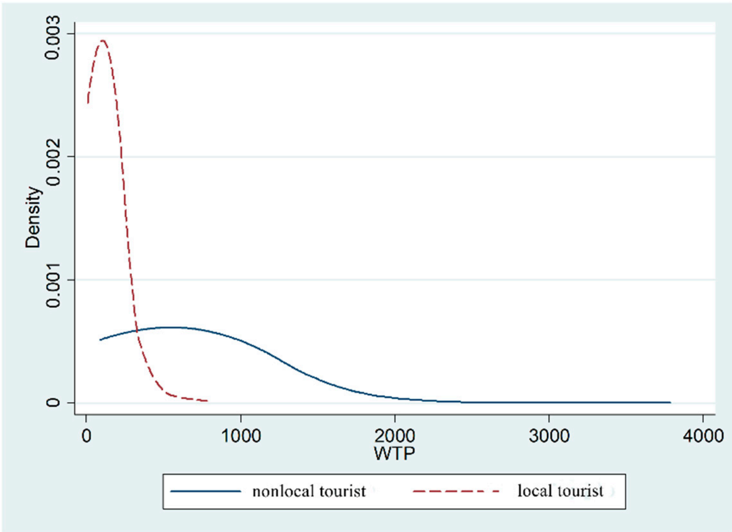

Figure 2. The WTP's distribution with the two different datasets, taking 'Congestion^{+}' as an example; 1 USD = 6.752 CNY in 2017.

4. Conclusions

As alluded to in the introduction, the satisfaction-based method has been commonly used in valuing ecosystem services, such as natural resources and environmental quality. In comparison with conventional nonmarket valuation methods, such as the travel cost and contingent valuation approaches, the satisfaction-based method has a number of advantages. These primarily relate to its survey design, which provides several desirable features, including simplified and less ambiguous questions in the survey, and the removal of the need to describe the public good to be valued, thus eliminating the possibility of strategic biases. Furthermore, the economic value derived using the marginal rate of substitution (MRS) between the numeraire variable of income/cost expenditure and the public good being valued based on a compensated demand function is straightforward and much easier to implement compared to the value derived using the CV method. For these reasons, among others, in this study we aimed to undertake novel research to propose the tourism satisfaction (TS) method for the valuation of important characteristics of the national forest parks in China.

The analytical results of our empirical analysis were based on a large sample dataset gathered from 22 NFPs and 4531 survey participants in China. The analysis leads us to the following conclusions: (i) The quality of the park recreational attributes has a significant effect on tourist satisfaction. Specifically, tourists attached the greatest importance to the rate of vegetation coverage, environment condition, and facilities offered at the park sites. Furthermore, the analysis also encompassed several park management factors, which showed tourists are sensitive to the status of the park's congestion because it has a significantly negative effect on tourist satisfaction. Thus, tourists exhibit a high level of willingness to pay to suppress the level of park congestion. (ii) There is a divergence in the preferences of local and nonlocal tourists regarding both the NFP attributes and their willingness to pay. For instance, nonlocal tourists pay more attention to the vegetation coverage and environmental quality than the local tourists; thus, the two attributes make a considerable contribution to the level of tourist satisfaction. In comparison, the local tourists attach more importance to the traffic conditions. Specifically, the nonlocal tourists are willing to pay as much as CNY 556.03 (USD 82.35) to reduce the level of congestion at the sites, whereas the local tourists' WTP for the same attribute is only CNY 117.47 (USD 17.39). (iii) The quality enhancement of the recreation attributes, and tourists' level of satisfaction, provide significant benefits to their travel experience.

The monetized values of the recreational attributes of NFPs can not only help policy makers understand the total economic value that can potentially accrue to the recreational services of the forest ecosystem, but they can also be used to derive some insightful implications for future NFP management. First, it appears that rubbish reduction and congestion control at the park sites are the most important tasks for the park management, thus suggesting that, in future resource allocations, including of both finance and labor, these two items should be targeted first. Second, the quantity of rubbish and tourist numbers at the NFP sites should be considered to be important indicators in ranking the NFPs, instead of placing too much emphasis on the parks' land sizes, which have been historically used as a criterion for ranking NFPs. Finally, the notable difference in the WTPs of the local and nonlocal tourists may constitute economic rationality for implementing differential park admission charges. Thus, the park management could impose a relatively higher price on outside tourists compared to local tourists. Given the digital technology that currently prevails in China, such as instant payments using mobile phones, the park authority would face few technical barriers or challenges to the implementation of such a discriminatory price policy. However, it should be noted that the revealed WTP of the nonlocal tourists should not be interpreted as the optimal admission fee to be charged by the NFPs. Rather, it should only be deemed to be a meaningful reference for the level of the fee.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/f12121688/s1, Table S1: The selected National Forest Park and its basic information, Table S2: The descriptive statistics result of individual characteristic.

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