

Article

Willing or Not? Rural Residents' Willingness to Pay for Ecosystem Conservation in Economically Underdeveloped Regions: A Case Study in China's Qinling National Park

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Abstract: Implementing payments for ecosystem service (PES) programs in national parks has proven effective in balancing the conflicts between ecosystem conservation and economic development, achieving long-term sustainability. Residents' participation and financial contributions are crucial prerequisites for establishing PES programs in national parks. Hence, it is necessary to investigate residents' willingness to participate in and pay before its official operation in China's Qinling National Park. By adopting a contingent valuation method, this study collects 1431 face-to-face, one-to-one questionnaire answers from rural residents in the region. The results show that 76.7% of the sample are willing to participate in the ecosystem conservation of Qinling National Park, although their willingness to pay is relatively low, with the average being RMB 136.5 (USD 20.3) per household per year. Moreover, informal institutions maintained by social trust continue to play an essential role in this rural area. Residents' willingness to participate is positively influenced by their social trust, which includes both institutional and interpersonal trust. Additionally, their willingness to pay is positively affected by their household income and cultural preferences. Finally, residents' occupation as farmers exhibits a negative moderating effect on the direct influence of their household income on their willingness to pay, while their education level positively moderates the impact of their cultural preferences on their willingness to pay.

Keywords: ecosystem conservation; willingness to pay; social trust; socioeconomic status; cultural preference



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1. Introduction

Establishing national parks in protected areas has proven effective in alleviating the conflicts between human activities and natural ecosystems in the short term, as well as in achieving ecosystem conservation in the long run [1,2]. The Qinling Mountains, located in an economically underdeveloped region of Northwestern China, are recognized for their ecological significance. Consequently, the proposal to establish China's Qinling National Park (CQNP) has been approved to conserve the ecosystem and achieve sustainable development. Hence, it is essential to investigate residents' willingness to participate in and pay for the ecosystem conservation of CQNP for the purpose of implementing payments for ecosystem service (PES) programs in the future. The contingent valuation method (CVM), one of the most widely used non-market valuation methods, is currently the only valuation method that can estimate both the use and non-use values of an ecosystem [3–5]. This study adopts the CVM to investigate residents' willingness to participate in and pay for the ecosystem conservation of CQNP, and further explore how residents' social trust, socioeconomic status (SES), and cultural preferences affect their willingness to participate and pay.

National parks are a critical measure for promoting ecological environments' protection and preservation. Through strict protection and limited human activity, the overall ecosystem within the national park area could be restored and elevated. The root cause of severe ecological and environmental issues is humans' ignorance of the use and non-use value of natural resources [6]. A national park is defined as a broad natural area aimed at protecting wide-ranging ecological courses, species, and ecosystems, which also provides opportunities for recreation, education, and scientific research to the public [7]. Since the establishment of Yellowstone National Park in 1872, the first national park in the world, national parks have become an effective means of preserving natural resources and protecting biodiversity. The establishment of national park holds great significance in promoting the equilibrium between regional economies, ecosystems, local governments, and other stakeholders through various PES programs [8–12].

On 19 October 2021, the National Park Authority approved the establishment of CQNP [13] to reconcile the conflicts between economic development and ecosystem protection in the region, with the aim of building PES programs such as central and local government funding, financial compensation, and the promotion of developing ecological agriculture and ecotourism to compensate for local residents' economic losses and sacrifices towards ecosystem conservation. At the moment, both central and local governments in China provide funding, as well as financial and other forms of compensation, to local residents through different PES programs. However, without prior investigation, it is difficult to determine these amounts scientifically. This study investigates residents' willingness to pay for ecosystem conservation to investigate the amount available for future PES programs in CQNP.

The Qinling Mountains, referred to in this paper in the narrow sense as the region of the Qinling Mountains within Shaanxi Province, are a vital water source for the central route of the South–North Water Transfer Project in China and are of significant geographical and ecological importance to the region. The central route of the water transfer project has benefited over 85 million residents of China [14]. Located in Shaanxi Province, an economically underdeveloped region in Northwestern China, the mountains act as a watershed for the Yangtze River and the Yellow River and are considered a climate divide between northern and southern China [15]. Meanwhile, the Qinling Mountains also have several essential ecological functions in the region, such as water and soil conservation, climate regulation, and biodiversity conservation [16]. The formation of CQNP is primarily aimed at restricting development and preserving the water resources in the Qinling Mountains, which cause conflicts between conservation and development. Therefore, the implementation of additional PES programs is required to alleviate these potential conflicts. According to the National Bureau of Statistics (data source: National Bureau of Statistics: <https://data.stats.gov.cn/index.htm> (accessed on 19 October 2023)), the GDP of Shaanxi in 2022 ranked 14 out of 31 in China and the population of Shaanxi in 2022 was 39.56 million (ranked 16 out of 31), while the average per capita disposal income of residents in Shaanxi was RMB 30 116 (USD 4478.25 (converted using the average China/U.S. Foreign Exchange Rate in 2022 (RMB 1 = USD 0.1487)) per year (the national average is RMB 36,883 (USD 5484.5)). Therefore, both the Qinling Mountains and Shaanxi Province have substantial representativeness for this study.

Previous scholars have studied PES programs in national parks, focusing on issues prior to the establishment of the programs and the effectiveness of the programs. One study found that social trust demonstrated a positive impact on rural residents' willingness to conserve forests in nature reserves in China [17]. Another study determined that individuals' trust in the government was an essential factor in their willingness to support a PES program in national parks in South Korea [18]. Scholars have examined the effects of individual's value orientation and attitudes on their willingness to pay for the conservation of national parks using online survey data [19]. Other scholars assessed the performance of three different PES programs in Costa Rica national parks [20]. A study also evaluated the effectiveness and fairness of PES programs in a protected area in Africa in both short

and long term [21]. Previously, scholars also determined that unstable land ownership, substantial transaction fees, and significant opportunity costs could result in inefficiency of the PES programs in Vietnam, with the profits generated through the PES program failing to benefit the financially vulnerable groups [22]. Hence, to build effective PES programs in the CQNP in the future, this study investigates individuals' willingness to participate in and willingness to pay for ecosystem conservation of the CQNP prior to its operation.

This study selects rural residents living near the Qinling Mountains as the research subject because they are more affected by the establishment of the CQNP and the changes in the surrounding ecosystem due to geographical distance compared to other social groups. Meanwhile, they are the social group that are compensated through the PES programs. Considering the representative of Shaanxi Province and the Qinling Mountains as discussed above, the sample data from this study also have a substantial representativeness for rural China.

The contribution of this study are as follows: First, as the establishment of the CQNP will bring conflicts of interest with local residents, this study investigates local stakeholders' willingness to pay before the official operation of the CQNP. Using face-to-face, one-to-one questionnaire survey data through CVM, this study provides a scientific and empirical research basis for establishing the PES programs in the CQNP to mitigate potential conflicts. Second, based on the sample, this study reveals that rural residents in economically underdeveloped regions have a relatively high willingness to participate in ecosystem conservation, but their willingness to pay is relatively low due to their limited household income. Furthermore, this study examines the direct impact of social trust, household income, cultural preferences, and other socioeconomic factors on residents' willingness to participate in and pay for ecosystem conservation of the CQNP, essential for building effective PES programs in the CQNP. Finally, this study assesses the moderating effects of participants' occupation and education on the relationships between their household income and willingness to pay, as well as between their cultural preferences and willingness to pay. It also estimates the moderating effects of participants' occupation and education across different household income and cultural preference groups.

2. Theoretical Framework

2.1. The Two Stages of Individuals' Willingness to Pay for Ecosystem Conservation

Research in the field of psychology has illustrated that individuals' consumption decisions can be divided into two stages, whether to consume and then how much to consume [23]. Similarly, the concept of CVM involves constructing a hypothetical market for respondents and then inquiring about their willingness to pay or accept a certain amount of money for a public good, as discussed above. Hence, individuals' willingness to pay for ecosystem conservation can also be divided into two aspects, whether individuals are willing to participate in ecosystem conservation and the amount they are prepared to pay for it. Accordingly, this study proposes a two-stage mechanism of individuals' willingness to pay for ecosystem conservation of the CQNP, as shown in Figure 1.

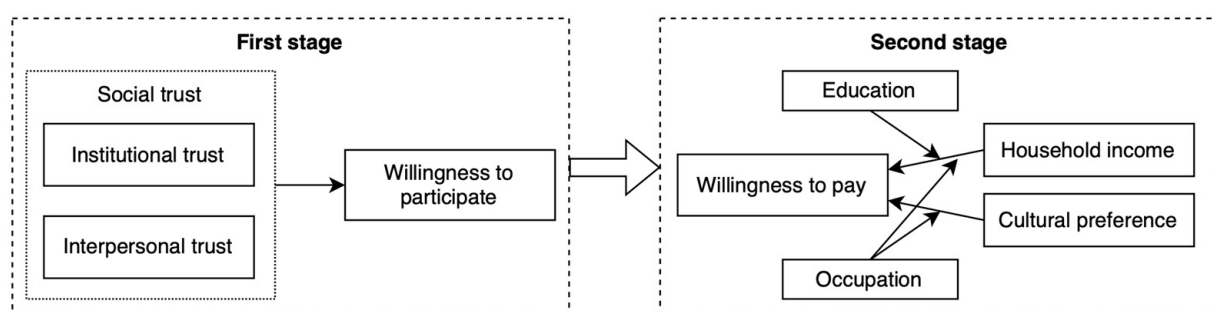


Figure 1. Key factors affecting individuals' willingness to participate in and pay for ecosystem conservation of the CQNP.

2.2. Individuals' Willingness to Participate in Ecosystem Conservation

Social trust is considered an important component of social capital, and the degree of cooperation within a social group depends on its level of trust among members [24–26]. Previous studies have demonstrated that social trust plays an important role in individuals' decision-making by reducing information asymmetry between individuals and promoting their willingness to pay for public goods [27–30].

Social trust comprises institutional trust and interpersonal trust. Institutional trust refers to individuals' degree of trust in law, legislation and the government, whereas interpersonal trust denotes the level of trust individuals have in their relatives, friends and neighbors [31–33]. Due to the closely connected interpersonal relationship (guanxi) within the community in a rural society, informal institutions mainly driven by trust are particularly evident in rural China [34,35]. Institutional trust usually forms into a certain degree of moral constraints, positively influencing residents' willingness to pay for ecosystem services and other public goods [36,37]. Studies have also indicated that interpersonal trust could positively impact individuals' decisions on their pro-environmental behaviors [38–40].

2.3. Individuals' Willingness to Pay for Ecosystem Conservation

After deciding to participate in ecosystem conservation, individuals then proceed to the second stage, where they determine their willingness to pay for ecosystem conservation of the CQNP. Previous studies have demonstrated that SES, such as individuals' household income, directly affects individuals' willingness to pay for ecosystem conservation [41–44]. This study analyzes residents' willingness to pay for ecosystem conservation in relation to individuals' consumption decision; thus, household income is considered as a significant influencing factor.

From the perspective of ecosystem conservation, individuals' willingness to pay for ecosystem conservation can be regarded as a type of pro-environmental behavior. Apart from SES, cultural preferences are crucial to better comprehend individuals' underlying motivations for their willingness to pay for ecosystem conservation [45–47]. In the field of behavioral economics, preference refers to individuals' choice tendencies shaped by their repetitive behavior [48]. In a certain environment, through continuous communication and stimulation, the public's consumption behavior evolves into unique cultural preferences, which, once formed, have a stable, universal and even compulsory impact on individuals' behavior [49,50].

SES factors, such as occupation and education, can influence individuals' household income and cultural preferences to some extent. Given that our research subjects are rural residents in an economically underdeveloped region of China, and considering farmers' household income levels in China are relatively lower than those of urban residents, residents' occupations as farmers may influence their willingness to pay for ecosystem conservation of the CQNP [51]. Similarly, education as a significant factor demonstrates positive impact on individuals' income level [52,53].

Based on the above analysis, this study proposes the following three hypotheses:

Hypothesis 1 (H1): *Residents' institutional trust and interpersonal trust have a positive impact on their willingness to participate in ecosystem conservation of the CQNP.*

Hypothesis 2 (H2): *Residents' household income and cultural preference present a positive influence on their willingness to pay for ecosystem conservation of the CQNP.*

Hypothesis 3 (H3): *Residents' occupation and education level have moderating effects on the direct relationship between respondents' household income level and cultural preference and their willingness to pay for ecosystem conservation of the CQNP.*

3. Methods

3.1. Research Area and Data Collection

According to the Qinling Ecological and Environmental Protection Committee (data source: Shaanxi Provincial Forestry Bureau: http://lyj.shaanxi.gov.cn/zwx/mtd/202208/t20220817_2246583.html (accessed on 16 June 2023)), the CQNP area covers 110 townships in 21 counties, cities, and districts within 6 cities: Xi'an, Baoji, Weinan, Hanzhong, Ankang and Shangluo. Furthermore, the core protection area of the CQNP is 8240 km², accounting for 61%, while the general control area is 5275 km², accounting for 39%. Our research indicates that the area of the CQNP is very similar to the core and important areas of the Qinling Mountains in Shaanxi Province. Thus, the sample selection was based on the core and important areas of the Qinling Mountains in Shaanxi province, as disclosed by the Shaanxi government in the Shaanxi Qinling Ecological and Environmental Protection Overall Plan [54], as shown in Figure 2.

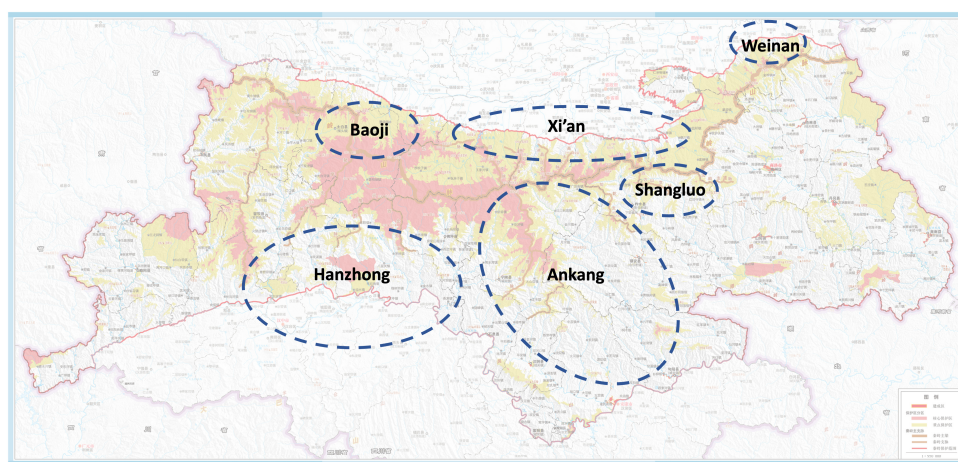


Figure 2. Sketch map of the location of investigation area, investigation cities, the core and important areas of the Qinling Mountains. Map source: Shaanxi government website, Shaanxi Qinling Ecological and Environmental Protection Overall Plan. Available online: http://www.shaanxi.gov.cn/zfxgk/fdzdgknr/zcwj/gfxwj/202208/t20220805_2233453.html (accessed on 22 January 2024). Note: The outside red line represents the area of Qinling protected area, the yellow area represents the important protected area, the red area represents the important protected area. The map is from government website, any errors are unrelated to the author.

This study adopts the stratified random sampling method. Six cities within the CQNP area were selected for sample selection. Sample sizes were calculated based on the population of each city. Taking into account various factors such as the district and county characteristics, the distance from the districts and counties to the core and important areas of the Qinling Mountains in Shaanxi Province, the distance from the districts and counties to existing nature reserves, and the levels of local economic development and income levels of the districts' and counties' residents. In total, 18 townships in 11 districts and counties within the 6 cities were randomly selected as the locations for the questionnaire survey. Respondents were randomly selected in the 18 townships' villages and streets during the questionnaire survey implementation.

Considering that our research subjects are rural residents in an economically underdeveloped region, this study chooses the payment card method for its simplicity and ease of understanding compared to other inquiry methods because it simply requires respondents choose their preferred payment level from a list of bidding points. Studies have demonstrated that among the most common four inquiry methods, bidding game, open-ended, payment card and closed-ended dichotomous choice, using different methods, can lead to different valuation results, with the closed-ended dichotomous choice method usually generating higher results compared to open-ended and payment card methods [55–59].

In this study, willingness to pay is used instead of willingness to accept to produce conservative and reliable values. Compared to willingness to pay, it is proven that willingness to accept typically generates higher results in practices [60,61]. A pilot experiment consists of 60 valid questionnaires, contains both willingness to pay and willingness to accept questions, and is administered before the final questionnaire survey. It was found that respondents tend to choose the highest bidding point for willingness to accept, resulting in higher values compared to willingness to pay, and hence we adopt willingness to pay in this study.

3.2. Questionnaires

The questionnaire survey was conducted face to face, one to one by 20 trained doctoral and master's students with rural residents aged between 18 and 65 years. The students were trained in basic concepts and knowledge of the questionnaire, questionnaire survey techniques and precautions, and underwent safety training. Each questionnaire survey lasted around 20 min. We ensured respondents did not choose answers randomly or without consideration and prevented overthinking by controlling the average time of the questionnaire survey. Based on the results and feedback from the pilot experiment, we revised the payment card bidding points and amended the description of some questions to reduce ambiguities. To mitigate survey method bias, hypothetical bias, and payment instruments bias [62,63], we added cheap talk [64,65] before the willingness to pay question. The script, accompanied by photos, described the hypothetical market and reminded respondents to consider their actual family household income when choosing their willingness to pay for ecosystem conservation. Moreover, after asking respondents' willingness to pay, we then inquired about their percentage of certainty regarding their chosen payment level. The final willingness to pay was calculated as the product of their average willingness to pay and the according percentage. A total of 1431 valid questionnaires were collected over a period of 4 months, with a questionnaire validity rate of 98.69%. The questionnaire adopted a 5-point Likert scale [66] with a positive scoring approach, and some questions were added separately to represent corresponding variables. Table 1 provides a description of the key variables.

Table 1. Descriptions of key variables in questionnaire.

Category	Variables	Description
Dependent variables	Willingness to participate	Respondents' willingness to participate in ecosystem conservation of the CQNP in the next 5 years, 1 = willing, 0 = unwilling
	Willingness to pay	Product of the average of respondents' chosen minimum and maximum willingness to pay and respondents' chosen percentage of certainty of their chosen payment level
Independent variables	Institutional trust	Sum of the following 3 questions: "The introduction of national environmental regulations will improve the ecosystem of the Qinling Mountains", do you agree with this view?", "Local governments have a big role to play in the improvement of the ecosystem of the Qinling Mountains protected area", do you agree with this view?" and "If village officials are willing to pay a certain amount of money per year for the protection of the Qinling Mountains protected area, would you be willing to pay a certain amount of money as well out of trust?", 5 = strongly agree/willing, 4 = agree/willing, 3 = unsure, 2 = disagree/unwilling, 1 = strongly disagree/unwilling
	Interpersonal trust	Sum of the following 2 questions: "If your relative/neighbor is willing to pay a certain amount of money per year for the protection of the Qinling Mountains, would you be willing to pay a certain amount of money as well out of trust?", 5 = strongly willing, 4 = willing, 3 = unsure, 2 = unwilling, 1 = strongly unwilling
	Household income	Respondents' annual household income in the year of 2021
	Cultural preferences	Sum of the following 3 questions: "How regular have you or your family visited museums/public library/cinema in the last 5 years?", 5 = never, 4 = occasionally, 3 = unsure, 2 = sometime, 1 = often

Table 1. Cont.

Category	Variables	Description
Moderating variables	Occupation	famer = 1, other = 0
	Education	1 = primary school and below, 2 = middle school, 3 = high school, 4 = undergraduate or vocational education, 5 = postgraduate and above
Control variables	Geographic location	Respondents live in the Northern piedmonts of the Qinling Mountains = 1, Southern piedmonts = 0
	Gender	male = 1, female = 0
	Age	Respondents' age
	Travel experience	"Have you visited the Qinling Mountains protected area in the last 5 years?", 1 = yes, 0 = no
	Family size	Total number of adults and minors in respondents' family
	University students	Total number of undergraduate students and graduate students in respondents' family
	Travel preference	Respondents' travel preference among "nature scenery", "cultural heritage" and "there is no difference between the above two", 1 = "nature scenery", 0 = not "nature scenery"

4. Results

4.1. Reliability and Validity Tests

The Cronbach's alpha value is 0.738, indicating the reliability of the questionnaire is "good". The KMO (Kaiser–Meyer–Olkin) value is 0.826 and the Bartlett's sphericity value $p < 0.05$, hence the questionnaire passes the validity test.

4.2. Descriptive Statistics

Table 2 presents the descriptive statistics. According to the sample, 76.7% of the respondents choose "willing", indicating that the majority of the respondents are willing to participate in ecosystem conservation. Respondents' average annual family willingness to pay is RMB 136.5 (USD 20.3), whereas the median is between RMB 55 (USD 8.18) and RMB 56.25 (USD 8.36). Percentage conversion result of respondents' average institutional trust is 79.18%, illustrating that respondents are confident and optimistic about the effect of law and regulations, local government and village officials in improving the ecosystem in the CQNP area. The percentage conversion result of respondents' average interpersonal trust is 66.49%, which is lower than respondents' institutional trust. The per capita income of the sample is calculated to be RMB 14,093.5 (USD 2095.7) (per capita income of rural respondents in Shaanxi Province in 2021: RMB 14,744.8 (USD 2192.55), per capita income of rural respondents nationwide in 2021: RMB 18,930.9 (USD 2815.02), data source: 2022 Shaanxi Province Statistical Yearbook <http://tjj.shaanxi.gov.cn/upload/2022/zk/indexch.htm> (accessed on 19 October 2023)). Percentage conversion result of respondents' average cultural preferences is 17.79%, demonstrating that respondents infrequently visit cultural and educational institutions such as museums, public libraries, and cinemas. A total of 62.5% of the respondents live in the northern piedmont of the Qinling Mountains, 38.5% live in the southern piedmont. The average education level of the respondents is between "middle school" and "high school". Also, 50.9% of the respondents are males and 49.1% are females. A total of 69% of the respondents have visited the Qinling Mountains protected area in the past 5 years. The percentage conversion result of the average number of university students within respondents' family is 11.42%.

Table 2. Key variables and socioeconomic characteristics of 1431 respondents.

Variables	Mean	Std. Dev	Min	Max
Willingness to participate	0.767	0.423	0	1
Willingness to pay	136.5	276.5	0.150	2970
Institutional trust	12.71	2.007	4	15
Interpersonal trust	7.319	2.387	2	10
Household income	56,374	58,091	1500	400,000
Cultural preferences	5.135	2.644	3	15
Occupation	0.498	0.500	0	1
Education	2.375	1.079	1	5
Geographic location	0.625	0.484	0	1
Gender	0.509	0.500	0	1
Age	46.08	12.01	18	65
Travel experience	0.690	0.462	0	1
Family size	4.407	1.603	1	12
University students	0.685	0.865	0	6
Travel preference	0.574	0.495	0	1

4.3. Regression Results

As discussed above, individuals' willingness to pay for ecosystem conservation of the CQNP is divided into two stages, whether individuals are willing to participate in ecosystem conservation and then how much they are prepared to pay for it. Hence, zero responses exist in the questionnaire survey. Therefore, the use of ordinary least squares (OLS) regression may cause selective bias, resulting in inaccurate research findings, and this endogeneity problem can be better addressed by the Heckman selection model [67]. Table 3 presents the regression results of respondents' two stages of willingness to pay for ecosystem conservation of the CQNP using the Heckman selection model [67]. The Wald Chi-Square of the regression model is significant at 1% level and therefore the model fitting is good. The maximum variance inflation factor (VIF) is 1.86, and the average VIF is 1.3; hence, multicollinearity does not exist in the regression model.

Table 3. Regression results of respondents' two stages of willingness to pay for ecosystem conservation.

Variables	Willingness to Participate	Willingness to Pay
Wald	77.39 ***	
Mean VIF	1.30	
Institutional trust	0.204 *** (7.876)	
Interpersonal trust	0.178 *** (8.258)	
Household income	0.203 * (1.825)	91.65 *** (3.986)
Cultural preferences	0.0122 (0.613)	8.889 ** (2.577)
Occupation	0.000458 (0.00454)	−17.98 (−0.940)
Education	0.0719 (1.380)	4.129 (0.408)
Geographic location	−0.218 ** (−2.311)	76.00 *** (4.284)
Gender	0.159 * (1.833)	52.51 *** (3.144)

Table 3. Cont.

Variables	Willingness to Participate	Willingness to Pay
Age	−0.0182 *** (−4.257)	−2.201 *** (−2.725)
Travel experience	0.0999 (1.092)	−10.47 (−0.549)
Family size	−0.00493 (−0.184)	−2.082 (−0.394)
University students	−0.00376 (−0.0672)	−0.470 (−0.0460)
IMR		−29.05 (−0.901)
Constant	−3.265 *** (−5.710)	−284.2 *** (−2.584)
Observations	1431	1098
Adjusted R ²	0.0705	0.0705

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In the first stage, both institutional trust and interpersonal trust are significant at 1% level, indicating respondents' willingness to participate in ecosystem conservation of the CQNP is positively influenced by their social trust. Respondents' institutional trust has a stronger positive effect on their willingness to participate compared to interpersonal trust. Respondents' household income, geographical location, gender, and age affect their willingness to participate at different degrees, as shown in Figure 3. Respondents' willingness to participate is lower in the northern piedmont of the Qinling Mountains than in the southern piedmont. Females are marginally more willing to participate compared to males, while respondent's willingness to participate decreases moderately as their age increases.

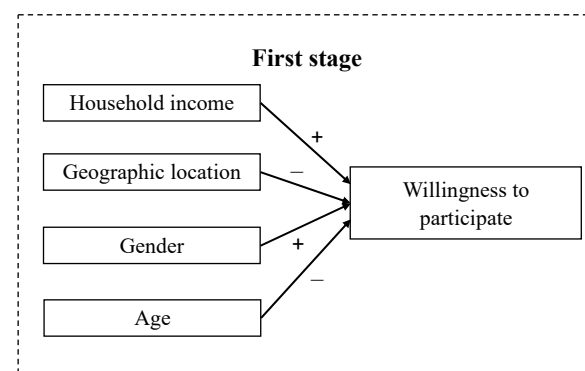


Figure 3. Socioeconomic characteristics affecting individuals' willingness to participate in ecosystem conservation of the CQNP. Note: The "+" in the figure represents positive effect, and the "−" in the figure represents negative effect.

In the second stage, household income and cultural preferences are significant at 1% level and 5% level, respectively, demonstrating that respondents' willingness to pay is positively affected by their household income and cultural preferences. Respondents' household income has a more substantial effect on their willingness to pay compared to cultural preferences. Respondents' geographical location, gender, and age also display different levels of influence to their willingness to pay, as shown in Figure 4. Northern piedmont respondents demonstrate considerably higher willingness to pay compared to

those in the southern piedmont, and males present greater willingness to pay compared to females, while the degrees of respondents' willingness to pay decline as their age increases.

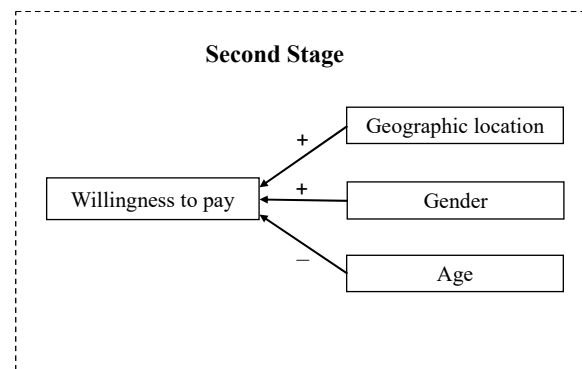


Figure 4. Socioeconomic characteristics affecting individuals' willingness to pay for ecosystem conservation of the CQNP. Note: The "+" in the figure represents positive effect, and the "-" in the figure represents negative effect.

4.4. Robustness Tests

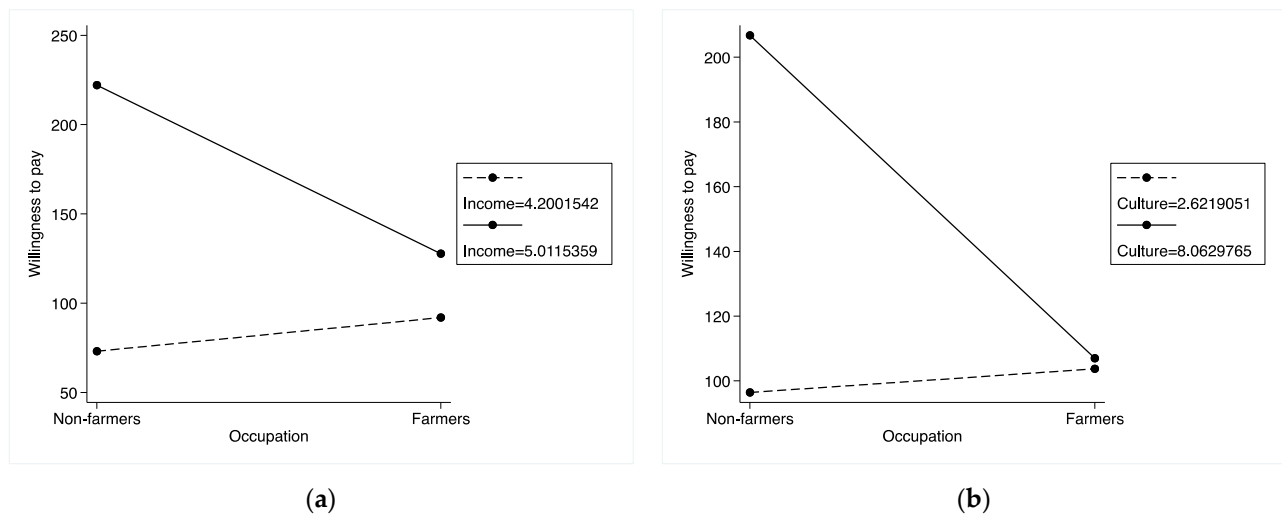
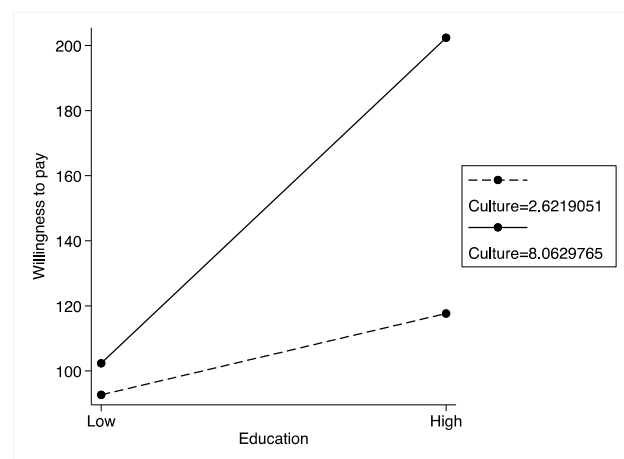
Robustness of the regression results (Table S1) is tested using four approaches: replacing core variables, replacing the regression model, adding variables, and using subsample. First, interpersonal trust is replaced with respondents' trust in relatives, while willingness to pay is replaced with product of respondents' maximum willingness to pay and their corresponding chosen percentage of certainty. The significances and coefficients of the core independent variables do not show significant change. Second, adopting the double-hurdle model [68], the significances and coefficients of the core independent variables remain unchanged. Furthermore, after adding the variable of travel preference into the model, no substantial change is observed in the significances and coefficients of the core independent variables. Finally, using the sample of respondents who prefer natural scenery as their travel destinations, no considerable change is observed in the significances and coefficients of the core independent variables. The regression results are therefore robust.

4.5. Moderating Effects

Table 4 shows the results of moderating effects of respondent's occupation and education. To address the potential substantial changes in variable coefficients and significances due to decentralization, the variables are first centered. Respondents' occupations demonstrate a negative moderating impact on the direct relationship between respondents' household income and their willingness to pay, indicating that respondents whose occupation is farmer present a minor effect on the household income to willingness to pay relationship. Further slope analysis, as shown in Figure 5a, reveals a significant negative moderating effect of occupation in the higher household income group, but a marginal positive moderating effect of occupation in the lower household income group. Similarly, the moderating effect of occupation on the positive cultural preferences to willingness to pay relationship also present a negative result. Slope analysis in Figure 5b illustrates a substantial negative moderating effect of occupation in the higher culture preferences group, but a minor positive moderating effect of occupation in the lower culture preferences group. Additionally, respondents' education level presents a positive moderating effect on the direct positive impact of respondents' cultural preferences on their willingness to pay. Further slope analysis in Figure 6 indicates that the moderating effect of respondent education level is more pronounced in the higher cultural preferences group.

Table 4. Moderating effects of respondents' occupation and education.

Variables	Household Income $\times$ Occupation			Cultural Preferences $\times$ Occupation			Cultural Preferences $\times$ Education		
	Benchmark	Original	Centered	Benchmark	Original	Centered	Benchmark	Original	Centered
Household income	95.63 *** (4.239)	162.6 *** (5.335)	94.41 *** (4.202)	95.63 *** (4.239)	97.99 *** (4.356)	97.99 *** (4.356)	95.63 *** (4.239)	101.0 *** (4.470)	101.0 *** (4.470)
Cultural preferences	9.099 *** (2.644)	8.179 ** (2.379)	8.179 ** (2.379)	9.099 *** (2.644)	15.03 *** (3.780)	5.066 (1.372)	9.099 *** (2.644)	−12.65 (−1.434)	5.275 (1.419)
Occupation	−18.42 (−0.963)	610.3 *** (3.141)	−14.74 (−0.772)	−18.42 (−0.963)	81.07 ** (2.090)	−21.66 (−1.134)	−18.42 (−0.963)	−18.07 (−0.947)	−18.07 (−0.947)
Education	4.349 (0.430)	3.674 (0.365)	3.674 (0.365)	4.349 (0.430)	2.817 (0.279)	2.817 (0.279)	4.349 (0.430)	−36.73 ** (−2.001)	2.012 (0.199)
Interaction term		−136.8 *** (−3.251)	−136.8 *** (−3.251)		−20.00 *** (−2.946)	−20.00 *** (−2.946)		7.545 *** (2.677)	7.545 *** (2.677)
Observations	1098	1098	1098	1098	1098	1098	1098	1098	1098
Adjusted R ²	0.0788	0.0788	0.0788	0.0772	0.0772	0.0772	0.0759	0.0759	0.0759
Mean VIF	1.30	27.26	1.28	1.30	2.08	1.31	1.30	3.84	1.32

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.**Figure 5.** Slope analysis for the moderating effect of occupation: (a) Slope analysis for the moderating effect of occupation on the household income—willingness to pay relationship; (b) Slope analysis for the moderating effect of occupation on the cultural preferences—willingness to pay relationship.**Figure 6.** Slope analysis for the moderating effect of education on the cultural preferences—willingness to pay relationship.

4.6. Heterogeneity Analysis

Table 5 shows the results of heterogeneity analysis of the northern and southern piedmont of the Qinling Mountains. The positive influence of respondents' institutional and interpersonal trust on their willingness to participate demonstrate no significant differences in the northern and southern piedmonts. The positive effect of respondents' household income on their willingness to pay in the northern piedmont is substantially greater than that in the southern piedmont, indicating that northern piedmont respondents' willingness to pay is influenced more by their household income. Respondents' cultural preferences demonstrate a pronounced impact on their willingness to pay for those who live in the southern piedmont.

Table 5. Heterogeneity analysis of the northern and southern piedmont of the Qinling Mountains.

Variables	Northern Piedmont		Southern Piedmont	
	Willingness to Participate	Willingness to Pay	Willingness to Participate	Willingness to Pay
Institutional trust	0.212 *** (6.617)		0.201 *** (4.434)	
Interpersonal trust	0.196 *** (7.291)		0.150 *** (4.037)	
Household income	0.104 (0.717)	127.3 *** (3.511)	0.357 ** (2.001)	38.01 ** (2.079)
Cultural preferences	0.0123 (0.462)	10.03 * (1.796)	0.0148 (0.488)	8.304 *** (3.157)
Occupation	−0.0143 (−0.109)	−24.63 (−0.848)	−0.0175 (−0.110)	−0.155 (−0.00966)
Education	0.0576 (0.835)	−2.179 (−0.132)	0.0631 (0.777)	10.97 (1.412)
Gender	0.210 * (1.884)	75.59 *** (2.921)	0.0911 (0.640)	12.94 (0.938)
Age	−0.0179 *** (−3.292)	−3.106 ** (−2.521)	−0.0204 *** (−2.849)	−0.268 (−0.386)
Travel experience	0.0614 (0.519)	−28.93 (−0.947)	0.162 (1.094)	1.473 (0.0989)
Family size	0.0280 (0.856)	3.411 (0.437)	−0.0694 (−1.455)	−9.654 ** (−2.058)
University students	−0.0248 (−0.361)	6.367 (0.404)	0.0331 (0.336)	−8.806 (−1.046)
IMR		−8.888 (−0.183)		−59.87 ** (−2.138)
Constant	−3.359 *** (−4.569)	−350.6 ** (−1.977)	−3.404 *** (−3.645)	−77.84 (−0.933)
Observations	895	677	536	421
Adjusted R ²	0.0701	0.0701	0.0909	0.0909

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5. Discussion

According to the results above, this study first discovered that residents' willingness to participate is relatively high, but residents demonstrate deficient willingness to pay for ecosystem conservation of the CQNP.

In the first stage, residents' social trust positively enhanced their willingness to participate in ecosystem conservation, aligning with previous studies [69,70]. This result further supports the notion that informal institution propelled by trust persist to be apparent

in rural regions in China. The results of this study illustrate that both institutional and interpersonal trust could increase residents' willingness to participate.

In the second stage, residents' willingness to pay is profoundly affected by their household income levels and frequencies of visiting cultural and educational institutions. These results are consistent with previous findings [71–75], suggesting that residents who frequently visit cultural and educational institutions may pay more attention to ecosystem conservation, resulting in higher willingness to pay.

Other socioeconomic factors such as household income, geographic location, gender and age also demonstrate that residents' willingness to participate and pay are also affected by their geographic location, gender, and age. Similar results were reached in previous studies [76–79]. The geographic location of residents demonstrates contrasting results in two stages; one of the suggested interpretations is that the overall quality of the ecosystem is better in the southern piedmont of the Qinling Mountains compared to the northern piedmont. Therefore, residents living in the southern piedmont may express greater willingness to maintain and enhance the ecosystem, leading to higher willingness to participate in ecosystem conservation. Nevertheless, because of the economic development and household income gaps between the northern and southern piedmonts, residents living in the southern piedmont demonstrate lower willingness to pay.

The moderating results of occupation demonstrate that residents' occupation as farmers could reduce the positive effect of residents' household income on their willingness to pay. Slope analysis demonstrates opposite moderating effects of residents' occupation between higher and lower household income groups. Considering farmers' low household income in the study area, the marginal positive effect in the lower household income group is possibly explained by the fact that farmers pay more attention to the ecosystem due to their occupation. Residents' occupation also illustrates adverse moderating effect on the positive impact of residents' cultural preference on their willingness to pay. Slope analysis expresses the opposite moderating effect of residents' occupation between higher and lower cultural preference groups.

Meanwhile, the moderating results of education show that residents' education levels enhance the positive influence of residents' cultural preference on their willingness to pay. Slope analysis exhibits different levels of positive moderating effect of residents' education on higher and lower cultural preference groups. A possible explanation is that in the higher cultural preference groups, a higher education level leads to an increase in frequencies of visiting cultural and educational institutions, thereby enhancing residents' willingness to pay.

The heterogeneity analysis results demonstrate that household income of residents living in the northern piedmont positively impact their willingness to pay. This is due to the higher level of economic development and household income in the northern piedmont (GDP in 2021: the northern piedmont (Xi'an, Baoji and Weinan): RMB 1532.42 billion (USD 227.87), the south piedmont (Hanzhong, Ankang and Shangluo): RMB 383.05 billion (USD 56.96); per capita household income of rural residents in 2021: Xi'an: RMB 17,389 (USD 2585.74), Baoji: RMB 15,694 (USD 2333.7), Weinan: RMB 15,184 (USD 2257.86), Hanzhong: RMB 13,274 (USD 1973.84), Ankang: RMB 12,464 (USD 1853.4), Shangluo: RMB 11,969 (USD 1779.79); data source: 2022 Shaanxi Province Statistical Yearbook <http://tjj.shaanxi.gov.cn/upload/2022/zk/indexch.htm> (accessed on 19 October 2023)).

6. Conclusions and Policy Recommendations

Based on the 1431 face-to-face, one-to-one valid questionnaire data, this study investigates rural residents' willingness to pay for ecosystem conservation of the CQNP and its influencing factors, finding the following conclusions. First, based on our research, 76.7% of the participants are willing to participate in the ecosystem conservation of the CQNP. However, due to the insufficient economic development and household income levels, rural residents' willingness to pay for ecosystem conservation is comparatively limited. Meanwhile, regional development is limited as the purpose of building the CQNP

is to preserve the water resources; effective PES programs could equilibrate the conflicts between development and conservation.

Moreover, according to our results, informal institutions that are maintained by social trust, including institutional trust and interpersonal trust, continue to play an essential role in the economically underdeveloped regions. Hence, as a significant influencing factor in the economically underdeveloped regions in China, residents' social trust should be considered in future PES programs in the CQNP.

Furthermore, to establish PES programs in the future, compensation levels are affected by the willingness to pay levels of rural residents. This study finds that residents' willingness to participate in ecosystem conservation is positively affected by their social trust, and residents' willingness to pay is positively influenced by their household income and cultural preferences. Residents' occupations (farmers) illustrate negative moderating effects on the direct impact of household income and cultural preferences on their willingness to pay. Nevertheless, it demonstrates a minor positive moderating effect within the lower household income and cultural preferences groups. Residents' education level positively moderates the direct effects of cultural preferences on their willingness to pay, presenting a more pronounced positive moderating effect in the higher cultural preferences group. Further heterogeneity analysis results suggest that residents' willingness to pay for ecosystem conservation is influenced at different levels by the disparate economic development levels in the northern and southern piedmonts of the Qinling Mountain. Specifically, in the northern piedmont, residents' willingness to pay is considerably affected by their household income, whereas in the southern piedmont, cultural preferences exert a more significant influence.

The above conclusions highlight the necessity of PES programs for establishing national parks in the economically underdeveloped regions for long-term sustainable development. Meanwhile, the substantial role of social trust in rural regions in China suggests that policymakers could consider increasing residents' willingness to participate in ecosystem conservation by enhancing their social trust. Additionally, this study also found a substantial positive effect of residents' household income on their willingness to participate in and willingness to pay for ecosystem conservation. When designing the PES programs in the CQNP, rather than simply providing one-off compensation to local residents, policymakers need to consider long-term strategies to increase residents' household income, for example, prioritizing local residents for job positions in the park and reinvesting income generated from the park to regional ecosystem conservation. In addition, other socioeconomic characteristics such as geographic location, gender, and age need to be considered when establishing PES programs.

Finally, our research, a case study of the China's Qinling National Park, presents findings on rural residents' willingness to pay for ecosystem conservation that may differ from other studies. Therefore, other national parks and PES programs may require different CVM research based on field investigations.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su16062440/s1>, Table S1. Robustness tests results.

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