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Article

The Mutual Relationship between Protected Areas and Their Local Residents: The Case of Qinling Zhongnanshan UNESCO Global Geopark, China

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Abstract: The relationship between humans and protected areas may contribute to the success of conservation efforts. The Qinling Mountains are significant to China and the rest of the world, and the Qinling Zhongnanshan UNESCO Global Geopark comprises eight distinct scenic spots with residential communities. This study investigated the Geopark's relationship between humans and protected areas by examining local residents' incomes and land ownership characteristics. Data were derived from a questionnaire survey of 164 residents living in or near four of the eight scenic spots. Their individual and household incomes, requisitioned farmland losses and compensations, employment, and participation were analyzed. Most respondents were aged 30–70 years, and 90.9% were locally born and raised in the region. They tended to be self-employed in food catering or accommodation services within the Geopark or near its entrance. Reliance on the Geopark for their livelihoods was significant, because they worked full-time and earned a major share of their household incomes from Geopark-related employment. Fifty respondents reported that their farmland was requisitioned during the Geopark's establishment. However, not all of them were financially compensated, and compensation was not equally distributed among those who received it. Reforming the complex top-down administrative system and developing an effective profit-sharing scheme for local residents are suggested measures for enhancing public satisfaction and knowledge about the Geopark, both factors that were low among the respondents. Increasing the local residents' participation in Geopark activities is an important way to avoid conflict; increasing the number of job opportunities for local residents is proposed to achieve this goal.

Keywords: human–protected area relationship; National Geopark; Global Geopark; China

1. Introduction

Protected areas (PAs), a cornerstone of biodiversity conservation, are effective ways to mitigate the losses of biodiversity and habitat [1,2] and have long been considered significant tools for maintaining habitat integrity, species' diversity, and representative samples of the biotopes [2–5]. The International Union for Conservation of Nature (IUCN) defines these areas as geographical spaces with clear demarcations determined by legal or other effective means, which are recognized, dedicated, and managed to achieve long-term nature conservation with related ecosystem services and cultural values [6]. PAs currently cover more than 15% of the world's land surface [7]. Some concerns have arisen that PAs should contribute to sustaining their local communities' livelihoods [8–10]. However, commercial interests, such as mines, dams, roads, and tourism, might put pressure on those PAs [11].

China's total PA area currently comprises 21.02% of its territory (land area: 15.61%; marine area: 5.41%) [12]. Many scholars have researched China's PAs, such as Xu [13], who pointed out that PAs have

various objectives and criteria for success depending on their goals [4]. For example, PAs variously focus on conserving ecosystems and species, protecting threatened species, ecosystem services, and cultural or social factors [3,14–16]. The effective management of PAs may lead to success [10]. Karanth [17] reported that conservation success is strongly dependent on the relationships between residents and management. Furthermore, positive relationships between PAs and their local communities may improve conservation outcomes [18], as Holmes [19] indicated, that local people can refuse cooperation with management officials if they do not support the PAs. Moreover, Tessema [20] concluded that PA–community relationships are of great significance to the conservation of wild life. Consequently, the human–PA relationship is very important [21] and is a significant predictor of a PA's success [22]. Redpath [23] indicated that this relationship is a highly debated issue because local support does not exert a strong influence on the conservation of wildlife in PAs. Other scholars agree [24,25]; however, the wellbeing of a PA's local community should be considered because it is important to the success of wildlife conservation [24]. As was also stated by Jonathan, appropriate management, including allowing more local participants into management occupations and granting access to resources, would increase local satisfaction. This should lead to a more harmonious relationship between the PAs and their local communities.

Zhongnanshan Mountain, famous throughout China and around the world for its geological and geographical significance, is located in the midsection of the Qinling Mountains. Some scholars have focused their research on this region. For example, Yang et al. [26] conducted research on the regional geological setting, evolution, and strata of the Qinling Zhongnanshan UNESCO Global Geopark (QZUGG), and concluded that the area has distinctive, perhaps unique, features compared to the geosites in other global geoparks. Tie [27] discussed protections and ways to develop the area's tourism. However, no studies have described or analyzed the relationship between the management of the Geopark and its local residents. During the field work and preliminary interviews with some local residents, it appeared that the PA–community relationship was tense. Local people seemed dissatisfied with the Geopark's management. Therefore, this study investigated the local community in and around the Geopark, in terms of residents' employment, occupations, financial situations, and the extent to which the local residents were satisfied with the QZUGG.

2. Materials and Methods

2.1. Study Sites

The Qinling Mountains are a major east-west mountain range that provides China with a transcontinental natural boundary between its northern and southern regions, including distinguishing their geology, geography, ecology, climate, and humanities [26]. This study's sites (Figure 1) were four scenic spots of the QZUGG in the main part of the Qinling orogenic belt [26]. Preliminary fieldwork and an interview with a management official suggested the importance of the Zhuque, Taiping, Cuihuashan, and Wangshunshan scenic spots as research targets. These four locations are the most useful because of their relatively long histories, high prestige, and large numbers of tourists. Located in southern Xi'an, QZUGG, which is usually regarded as the "Chinese Central National Park," covers an area of about 1074.85 km^2. Of all the world's geoparks, QZUGG is the closest to a large city because it is a mere 25 km from Xi'an [26]. QZUGG boasts eight scenic spots (Figure 1). However, these eight spots are designated as National Forest Park or National Geopark, and, therefore, they are independently managed by different government agencies (Table 1). In 2009, QZUGG was designated a member of the Global Geopark Network (GGN) and named Qinling Zhongnanshan UNESCO Global Geopark after validation [28].

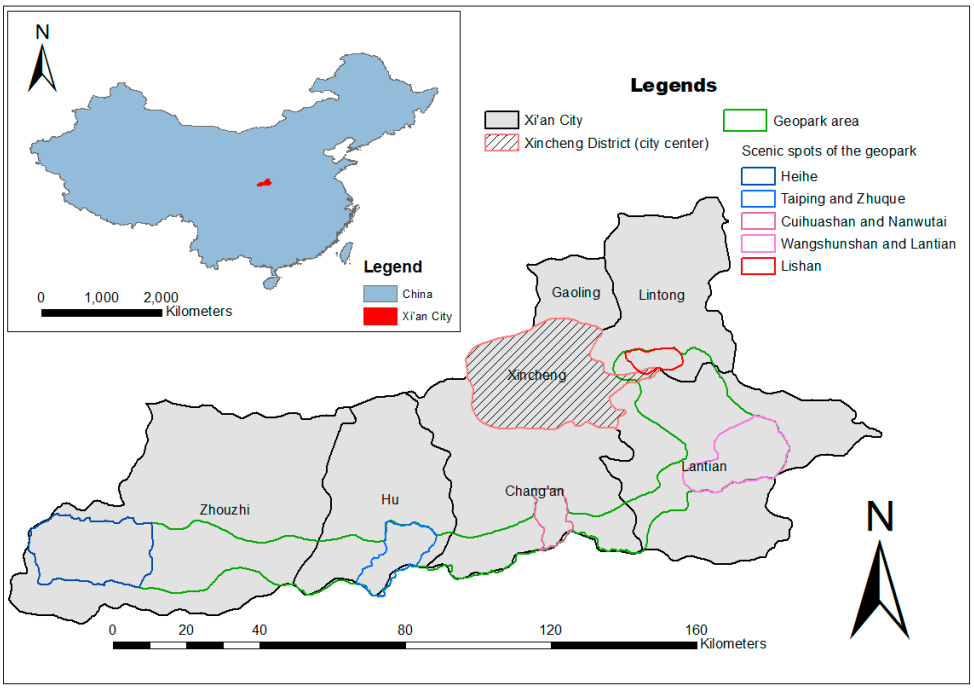

Figure 1. Qinling Zhongnanshan UNESCO Global Geopark (QZUGG) and its proximity to Xi'an City.

Table 1. QZUGG's eight scenic spots by name, area, and proximity to Xi'an City's center.

Scenic Spots	Area (km^2)	Distance from Xi'an City Center (km)
Heihe National Forest Park	447.78	138
Taiping National Forest Park	122.13	48
Zhuque National Forest Park	48.08	63
Cuihuashan National Geopark	99.81	38
Nanwutai National Forest Park	26.57	35
Wangshunshan National Forest Park	210.62	80
Lantian Ape Man Site	56.63	72
Lishan National Forest Park	63.23	48
Total area	1074.85	

2.2. Analytical Methods

This study is part of a larger study of the same area that examined and evaluated QZUGG's management as well as its users' perceptions and satisfaction. This study employed a mixed method of interviews and questionnaire surveys, including a face-to-face household questionnaire survey, to obtain data. The questionnaire contains two types of questions. The first type contained several questions related to their demographics, occupations, livelihood, and incomes. The other type of questions employed a five-point Likert scale to evaluate respondents' satisfaction. In-depth interviews were conducted in 2017 with four management officials (one at each of the four scenic spots, namely, the Zhuque, Taiping, Cuihuashan, and Wangshunshan) as well as a professional hiking expert. In addition, in 2017, a questionnaire survey was conducted on a sample of local residents from 50% of the households at each scenic spot (n = 164). Within the area where we were allowed to conduct our research, we visited each household and conducted our questionnaire survey face to face with one representative. The survey targeted the occupational and financial situations of the local residents. To enhance the quality of the questionnaire data, several workshops were held with other professionals before the questionnaire was administered. Furthermore, its reliability and validity were tested using the SPSS version 24 statistical package (by checking the coefficient of Cronbach's alpha and Pearson

correlation), which found acceptable results of 0.926 and 0.728, respectively. The data were faithfully imported into SPSS version 24 for the statistical analysis.

3. Results

3.1. Survey Sample Characteristics

The gender of the respondents of the household survey was almost evenly divided, with 47.6% males and 52.4% females (Table A1). Regarding age, the respondents were mostly aged 30 through 70 (the oldest respondent was 70 years old); respondents younger than age 30 years were just 25% of the sample (Table A1). Most of the respondents (89%) completed middle school or had less education (Table A1). Most of the respondents originated in the local areas (90.9%).

3.2. Employment and Occupation

More than one-half of the respondents at each of the four scenic spots reported holding full-time jobs related to the Geopark (Zhuque (73.2%), Taiping (68.4%), Cuihuashan (62.8%), and Wangshunshan (95.2%)) (Table A2). About 2.6% of the Taiping respondents and about 2.4% of the Zhuque respondents stated that they were civil servants, and about 7% of the Cuihuashan respondents reported employment as business staff. The highest percentage was self-employed (Zhuque: 12.2%, Taiping: 15.8%, Cuihuashan: 9.3%, and Wangshunshan: 4.8%) (Table A2). Some respondents were teachers, students, peasants, or others. The average household size was four, of which 1.25 (on average) were employed at jobs related to the Geopark. On average, 36.1% of the respondents had family members whose jobs were based on the scenic spots, including such roles as catering services, which were the most common (Zhuque: 97.6%, Taiping: 97.4%, Cuihuashan: 90.7%, and Wangshunshan: 83.3%) (Table A2). The second most common job was accommodation services (Zhuque: 63.4%, Taiping: 42.1%, Cuihuashan: 32.6%, and Wangshunshan: 11.9%).

3.3. Income and Livelihood Characteristics

The respondents at the four study sites reported that income from employment related to the scenic spots comprised more than 60% of their household's total income: 74% in Zhuque, 62% in Taiping, 70% in Cuihuashan, and 77% in Wangshunshan. Most of the respondents reported that they had always lived in their communities: 75.6% in Zhuque, 73.7% in Taiping, 79.1% in Cuihuashan, and 88.1% in Wangshunshan. Approximately one-half of the respondents had lived there for more than 20 years: 83.3% in Zhuque, 47.4% in Taiping, 51.1% in Cuihuashan, and 70.7% in Wangshunshan scenic spots. In Cuihuashan, about 65.1% of the respondents knew that their residences were in the Geopark; about 71.1%, 63.4%, and 69% in Taiping, Zhuque, and Wangshunshan, respectively, were aware of their residential location. They reported various ways by which they had obtained this information; however, the least common was via the GGN official website. They mostly knew they were living in a geopark from their village committees or other governmental organizations (24.2% on average; see Table A3).

3.4. Farmland Requisition for QZUGG

In Cuihuashan, about 60.5% of the respondents reported that their farmlands had been requisitioned for the Geopark (Table A4). The next highest requisition rate was in Taiping (39.5%), followed by Wangshunshan (16.7%). Just 2% of the respondents at Zhuque reported that their farmland had been requisitioned. All of the Wangshunshan respondents whose farmland had been requisitioned had also received some financial compensation; however, none of the Zhuque respondents had been compensated. Some of the respondents from Taiping (26.3%) and a few Cuihuashan respondents (4.7%) reported that they had received financial compensation. The extent of satisfaction with the compensation received varied (Table A4). All of the Cuihuashan respondents reported that they were

satisfied, but none from Wangshunshan were satisfied. In fact, in Taiping and Wangshunshan, more than one-half of the respondents were very dissatisfied (Taiping: 60.0%, Wangshunshan: 57.1%).

A bonus from the Geopark was reported only by Taiping respondents, and also only by just 10.5% of them: none of them were satisfied with it (7.9% dissatisfied, 2.6% neutral). Interestingly, 30.2% of the Cuihuashan respondents reported that they received other types of compensation, which included 100 kg of wheat flour per household member per year. One household reportedly received three rooms as compensation; one Taiping respondent stated that he receives about USD 3000 to USD 4500 each year, and one Zhuque respondent did not disclose the nature of his compensation.

4. Discussion

Our research shows that there were few respondents younger than 30 years (Table A1). Some respondents explained that young adults could earn relatively more money for their families as migrant workers. These rural migrant workers (people working outside of where there were born) tend to be young adults who work at home only during planting and harvest seasons [29]. These statements support Chinese government data on the increase in migrant workers in Shaanxi Province [30]. Teye et al. [31] suggested that people with high educational attainment have more positive attitudes, than less educated people regarding tourism development. Education increases awareness and understanding of environmental and political issues [32]. Educated people tend to be better informed on matters, than their less educated counterparts [33]. However, about 70% of the sample had no more than a middle school education (Table A1). Low educational attainment might relate to low satisfaction and negative perspectives, as a result of a lack of understanding the benefits and other positive aspects of geoparks. These respondents may also have had an insufficient understanding of the Geopark itself.

It is interesting that, although more than 90% of the respondents were born in their communities (Table A1), and although several reported more than 20 years of residence there (Table A3), many of them were unaware that they lived in a geopark. This might be related to their low educational attainment or to the GGN's failure to disseminate and communicate information to the public. In a study conducted in India and Nepal, it was indicated that most local residents knew that they were living in PAs [17]. The main way through which respondents became aware that they lived in a geopark was learning about it from a village committee or other government agency. Before the establishment of the Geopark, each of the scenic spots was either a National Geopark or a National Forest Park. However, it seemed that information regarding this Geopark was not publicized among local residents. It appears that government agencies have an important role in the development and conservation of such areas [34]. Consequently, we suggest that disseminating educational information to PAs' local communities should be enhanced to raise collective awareness and understanding of the Geopark.

It can be inferred from the data that the respondents were highly dependent on the Geopark for their livelihoods. A large share of the respondents worked full-time jobs related to the Geopark (Table A3), suggesting that they no longer farmed or had other occupations. Furthermore, almost 40% of the respondents relied on the Geopark for their entire family's income (Table A5). Almost one-half of the household members (on average) had jobs related to the Geopark, indicating the Geopark's positive function for providing job opportunities and support to its local residents. However, these were mostly food catering and accommodation service jobs in or near the entrance to the Geopark. Few jobs were posted for which local people qualified, and, during the interviews, only two local people reported being directly hired by the Geopark. It is clear that the Geopark does not offer sufficient job opportunities for the local people, which could alienate the local residents from the Geopark and impede their understanding and perception of the Geopark.

It is reasonable for employment contractors to seek the people with the best work experience and education to fill a particular job opening; however, they should consider hiring local residents as it would lead to more efficient management of the PA, particularly regarding conflict with the local people [35]. Bookbinder [36] argued that employment of the local people can make them view the PAs in a positive way and discourage them from collecting firewood or poaching wildlife, which will

in turn make the management of the PA easier and more effective. Furthermore, when more land is needed to expand the geopark or when new rules are implemented for management purposes, it would be helpful to have local people on the payroll because the extent of the local people's understanding and awareness of geopark activities depends on their level of engagement with the geopark [37]. Karanth [17] also pointed out that constructive engagement with local residents would support long-term success of conservation. A profit-sharing or bonus scheme might help to secure local people's financial interests [38] and increase their satisfaction with the Geopark, which is crucial to QZUGG's success. Previous studies have emphasized the need to increase job opportunities for local residents [39,40], which would significantly strengthen the human–geopark relationship.

Directly benefitting the local people might be key to avoiding conflicts between them and the PAs, as the benefits to the locals can be substantial, such as tourism-generated income [41]. Understanding the local people's benefits related to the Geopark is essential for striking a balance between conservation goals and local communities' needs [11,42]. However, only a small number of local households received compensation, and not many appeared satisfied with it. In addition to a one-time monetary payment, four respondents received wheat flour every year, one received rooms as additional compensation, and another received additional money every year. This seems to be an unequal, perhaps inappropriate, compensation scheme (or even a non-existent compensation scheme). In another developing country (Nepal), researchers indicated uneven benefit distribution which was largely restricted to people living close to tourism centers [43].

One reason for the failure to implement a reasonable compensation scheme might be the complexity of the top-down management system. The eight QZUGG scenic spots (Table 1) are managed by different government agencies (The Ministry of Forestry, Water Conservancy Bureau, Tourist Administration, and Bureau of Land Resources), although they are centrally managed by a QZUGG management office in Xi'an City. Negotiations and agreements for compensation might have been made with some, but not other, residents. Otherwise, it seems that there should have been more local residents in our sample to have been compensated. A close examination of the incomes of those 50 people reveals that almost one-half of them earned all of their income from Geopark-related employment (Table A6). Because the Geopark's tourism business is seasonal, annual incomes must be rapidly ensured and generated during those months when the tourists visit. These circumstances help to explain the unhappy or angry respondents during the interviews, and it is not difficult to understand their dissatisfaction with the Geopark's management officials.

To increase the local residents' levels of satisfaction, good management is fundamental [38]. The combined efforts of eight scenic spots in applying for UNESCO Global Geopark status have created a contradiction. The integrity of a UNESCO Global Geopark requires unified action and conservation. However, these eight spots conduct tourism activities, development, and business independent of each other, and unification is difficult. This might create problems, such as unclear themes of the individual scenic spots because of variations in design and construction standards, as well as a lack of effective communication among them. These problems may reduce the numbers of visitors, which, in turn, may negatively affect local residents' incomes.

The complex top-down management system of multiple administrative agencies adds inefficiency regarding the implementation of new policies or new management schemes. Therefore, efforts should be made to reform the system to be more unified. It is essential that policymakers and managers understand PAs and their status quo [3,43] as the basis of future activities. The QZUGG central management office should perform a thorough assessment of the four scenic spots toward achieving a balanced tourism resource distribution. Furthermore, an online communication platform should be established to improve cooperation.

5. Conclusions

The complex QZUGG management system requires better scrutiny. Currently, there is a lack of effective communication and cooperation among the eight scenic spots, which may negatively influence

the Geopark. Multiple management agencies inevitably reduce the efficiency of the operations and create conflicts. A profit-sharing scheme that includes the local residents may improve their opinions of the Geopark, which is significant for the QZUGG's future development and success. An online communication platform should be established for unified and coordinated activities, and a unified and more direct management system would benefit the Geopark and local residents. The Geopark administrators should provide more job opportunities to the local residents, which would increase their participation in Geopark activities, improve their knowledge of the Geopark's value, and hopefully, raise their opinions of the Geopark. Geopark administrators would find that their jobs become less burdensome as local resident satisfaction improves.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Sample characteristics of the respondents.

		Number of Cases	Percent
Gender	male	78	47.6
	female	86	52.4
	Total	164	100.0
Age	under 20 years	12	7.3
	20–30 years	29	17.7
	31–40 years	42	25.6
	41–50 years	44	26.8
	over 50 years	37	22.6
	Total	164	100.0
Education level	middle school and less	114	69.5
	high school	32	19.5
	college or university	17	10.4
	master or more	1	0.6
	Total	164	100.0
Where are you from?	Local [a]	149	90.9
	non-local	15	9.1
	Total	164	100.0

[a] "Local" refers to respondents born in and currently residing in the community.

Appendix B

Table A2. Employment and occupations of the respondents and their family members.

Statements	Scenic Spots			
	Cuihuashan *n* = 43	Wangshunshan *n* = 42	Zhuque *n* = 41	Taiping *n* = 38
	%	%	%	%
1. This is your full-time job.	62.8	95.2	73.2	68.4
2. If it is not your full-time job, what else do you do?				
2.1. Civil servants	0.0	0.0	2.4	2.6
2.2. Business staff	7.0	0.0	0.0	0.0
2.3. Self-employed	9.3	4.8	12.2	15.8
2.4. Teacher	2.3	0.0	2.4	2.6
2.5. Students	14.0	0.0	0.0	5.3
2.6. Peasants	2.3	0.0	7.3	5.3
2.7. Other	2.3	0.0	2.4	0.0
Total	37.2	4.8	26.7	31.6
3. All my family member do the job related to this scenic area.	34.9	28.6	43.9	36.8
4. Number of my family member doing the job related to this scenic area.				
4.1. one	11.6	38.1	26.8	31.6
4.2. two	25.6	26.2	22.0	10.5
4.3. three	18.6	4.8	2.4	13.2
4.4. four	2.3	0.0	2.4	2.6
4.5. five	0.0	0.0	2.4	2.6
4.6. six	0.0	2.4	0.0	0.0
4.7. nine	0.0	0.0	0.0	2.6
Total	58.1	71.5	56.0	63.1
5. Number of my family member.				
5.1. two	0.0	2.4	0.0	0.0
5.2. three	4.7	9.5	7.3	10.5
5.3. four	18.6	9.5	14.6	13.2
5.4. five	20.9	21.4	22.0	15.8
5.5. six	9.3	14.3	7.3	7.9
5.6. seven	2.3	7.1	2.4	7.9
5.7. eight	2.3	4.8	2.4	2.6
5.8. nine	0.0	0.0	0.0	2.6
5.9. ten	0.0	2.4	0.0	0.0
5.10. eleven	0.0	0.0	0.0	2.6
Total	58.1	71.4	56.0	63.1
6. The kinds of job my family member do.				
6.1. catering services	90.7	83.3	97.6	97.4
6.2. accommodation service	32.6	11.9	63.4	42.1
6.3. raw materials service	2.3	0.0	0.0	0.0
6.4. tour guide service	0.0	0.0	0.0	0.0
6.5. scenic area employee	4.7	0.0	0.0	0.0
6.6. transport service	0.0	2.4	0.0	5.3
6.7. other	2.3	14.3	2.4	2.6
Total	132.6	111.9	163.4	147.4

Appendix C

Table A3. Income and livelihood characteristics.

Statements	Scenic Spots			
	Cuihuashan $n = 43$	Wangshunshan $n = 42$	Zhuque $n = 41$	Taiping $n = 38$
1. The degree to which my income from this job account for my family's total income	%	%	%	%
1.1. one-fourth or less	14.0	14.3	4.9	18.4
1.2. one-third or less	11.6	11.9	7.3	5.3
1.3. half	11.6	38.1	26.8	34.2
1.4. three-fourth or more	20.9	19.0	14.6	13.2
1.5. all from it	41.9	16.7	46.3	28.9
Total	100.0	100.0	99.9	100.0
2. I have been always living here	79.1	88.1	75.6	73.7
2.1. 20 years and under	23.3	4.8	4.9	23.7
2.2. 20–40 years	20.9	64.3	26.8	23.7
2.3. 40 years and above	30.2	19.0	43.9	26.3
Total	74.4	88.1	75.6	73.7
3. I know this is a geopark (via)	65.1	69.0	63.4	71.1
3.1. QZUGG official website	11.6	0.0	7.3	7.9
3.2. GGN official website	0.0	0.0	0.0	5.3
3.3. Other cyber-resources	7.0	0.0	9.8	10.5
3.4. Friends and relatives	2.3	7.1	14.6	13.2
3.5. Travel agency	2.3	31.0	7.3	5.3
3.6. Village committees and other government organizations	27.9	33.3	12.2	23.7
3.7. Adervertisement of the geopark	14.0	23.8	22.0	23.7
Total	65.1	95.2	73.2	89.6

Appendix D

Table A4. Farmland requisitions for QZUGG.

Statements	Scenic Spots			
	Cuihuashan $n = 43$	Wangshunshan $n = 42$	Zhuque $n = 41$	Taiping $n = 38$
	%	%	%	%
1. My land was taken over for use during the park construction.	60.5	16.7	2.0	39.5
2. I received financial compensation.	4.7	100.0	0.0	26.3
3. The degree to which the financial compensation satisfied me,				
3.1. very dissatisfied	0.0	57.1	0.0	60.0
3.2. dissatisfied	0.0	42.9	0.0	20.0
3.3. neutral	0.0	0.0	0.0	10.0
3.4. satisfied	100.0	0.0	0.0	10.0
3.5. very satisfied	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0
4. This Geopark provides bonus.	0.0	0.0	0.0	10.5
5. The degree to which the bonus satisfied me,				
5.1. very dissatisfied	N/A	N/A	N/A	0.0
5.2. dissatisfied	N/A	N/A	N/A	7.9
5.3. neutral	N/A	N/A	N/A	2.6
5.4. satisfied	N/A	N/A	N/A	0.0
5.5. very satisfied	N/A	N/A	N/A	0.0
Total	N/A	N/A	N/A	**10.5**
6. This Geopark provides other forms of compensation.	30.2	0.0	2.4	2.6

Appendix E

Table A5. Relationship between type of employment and income contribution to total household income (percentage).

		My Income Accounting for My Family's Total Income				
		1/4 or less	**1/3**	**one-half**	**3/4 or above**	**all**
		%	%	%	%	%
Full-time job or not	Yes	10.6	7.3	26.0	17.9	38.2
	no	19.5	14.6	31.7	14.6	19.5

Appendix F

Table A6. Annual income/total household annual income ratio of respondents whose farmland was requisitioned for the geopark (n = 50).

Income Ratio	Cuihuashan	Wangshunshan	Zhuque	Taiping	%	Total
1/4 or less	1	2	0	0	6.0	3
1/3	3	0	0	1	8.0	4
half	2	1	0	3	12.0	6
3/4 or more	9	1	1	3	28.0	14
all	11	3	1	8	46.0	23
Total	26	7	2	15	100.0	50

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