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Social Impact Assessment of the Giant Panda National Park in China: A Comparative Analysis of the Inside, Gateway, and Fringe Communities

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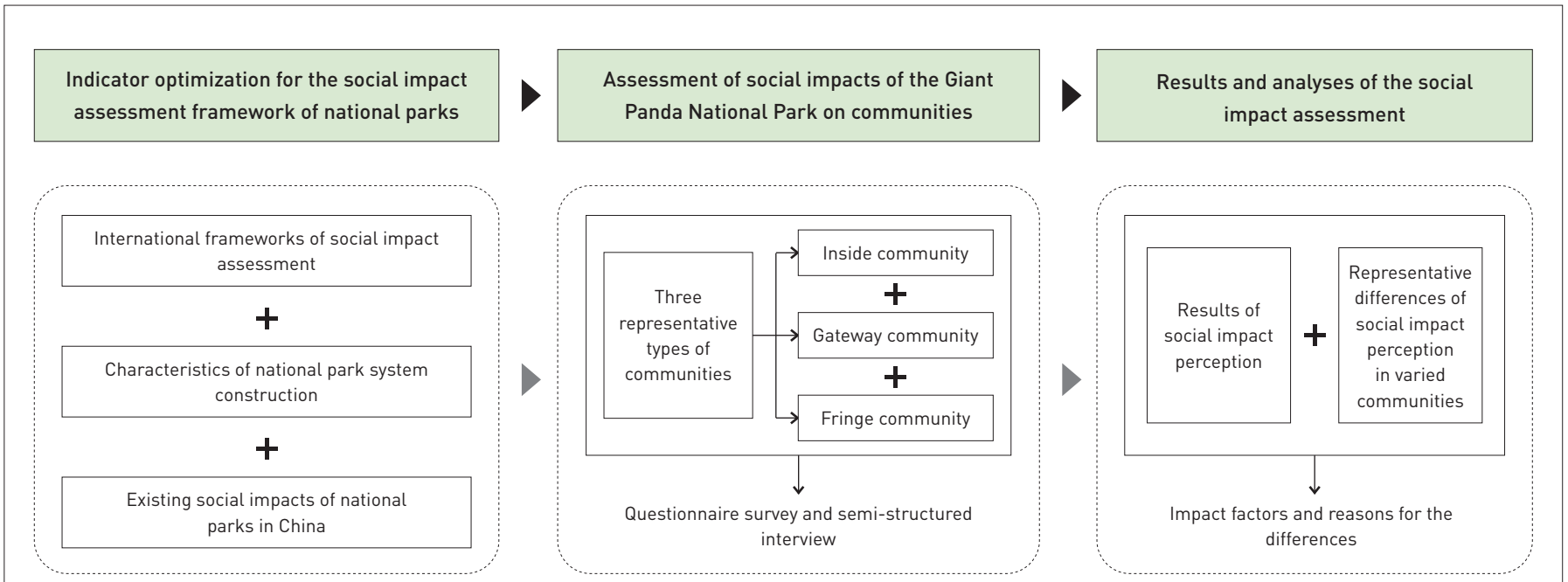
GRAPHICAL ABSTRACT



HIGHLIGHTS

- Proposes a social impact assessment framework and indicator system suitable for Chinese protected areas
- Identifies significant differences in social impact perceptions among the inside, gateway, and fringe communities
- Summarizes three primary causes of social impact differences: conservation policies, economic development, and location and transportation
- Proposes that national park construction should attach importance to fringe communities and non-economic social impacts

KEYWORDS

National Park;
Protected Area;
Social Impact Assessment;
Perception;
Inside Community;
Gateway Community;
Fringe Community;
Tangjiahe National Nature Reserve

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ABSTRACT

Social impact assessment is a practical requirement for the construction of the national park system, but there is still a lack of comprehensive conceptual frameworks, theoretical explanations, and systematic evaluations. Considering the distinctive characteristics of China's national park system construction, this study improves the existing framework and indicator system for social impact assessment. It conducts a comparative analysis of three typical communities—the inside community, gateway community, and fringe community—surrounding the Giant Panda National Park (Tangjiahe area). Through questionnaire surveys, semi-structured interviews, factor analysis, and One-way ANOVA analysis, we find that the comprehensive perception value of social impacts by the Giant Panda National Park was relatively negative. Respondents' perception values ranked from high to low were social relations, local culture, equity and rights, economy and livelihoods, and knowledge and education. Moreover, except the dimension of economy and livelihoods, there were significant differences in the perception of impacts by the three types of communities. Specifically, the gateway community has the most positive perception of social relations, local culture, and equity and rights; the inside community has the most positive perception of knowledge and education; while the fringe community perceived the most negative impacts in all four dimensions. Furthermore, the primary causes of social impact perception are conservation policies, economic development, and location and transportation. This study suggests that non-economic social impacts should be given more attention, such as equity and rights, and knowledge and education. Also, to ensure that the fringe communities can benefit from the construction and development of national parks, more attention and support from the governments and management agencies are necessary. This study can provide theoretical insights and case-based evidence for the improvement of social impact discussions on protected areas.

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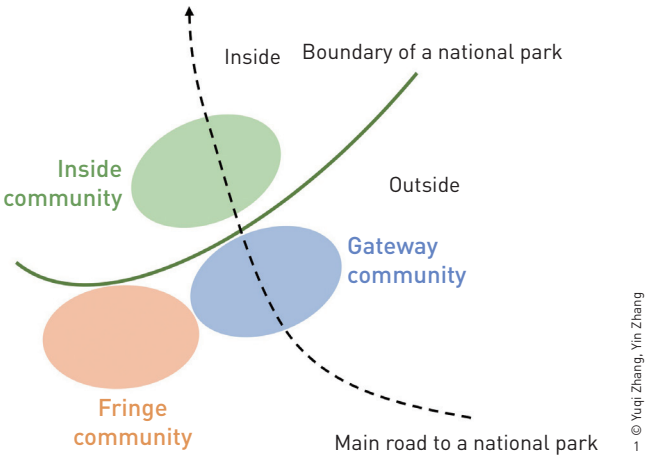
1 Introduction

Establishing a national park system is necessary to promote ecological civilization and achieve harmonious coexistence between human and nature. In China, the construction of this system is based on the fundamental principles of "ecological protection first," "national representativeness," and "public welfare for all"[1]. But the local areas surrounding national parks are prone to conflicts between communities and the natural environment, often characterized by a large population, complex land ownership, and socio-economic poverty[2]~[4]. Indeed, national parks and the surrounding communities constitute an integrated social-ecological system[5][6], wherein local communities play a pivotal role in sharing, co-constructing, and co-managing national parks[7]. Failure to establish harmonious relationships in the areas surrounding national parks, as well as the lack of positive perceptions, attitudes, and behaviors among local people, can potentially hinder the integrity and authenticity protection of the ecosystems of national parks[8]. Only by addressing the social impact of national parks effectively, can we achieve a win-win situation for both biological conservation and the sustainable development of local communities[7][9].

The objective of Social Impact Assessment (SIA) is to create a sustainable and equitable biophysical and human environment[10][11]. This assessment methodology has gained international attention and prominence, driving the development of relevant international standards, policies, and regulations, thereby playing a crucial role in environmental conservation and sustainable development[10]. In China, the Technical Regulations for the National Park Master Plan (LY/T 3188—2020) (TRNPMP) explicitly mandates the conduct of SIA to analyze the favorable and adverse effects of national park development on society, communities, and the region in which they are situated, along with the proposal of corresponding optimization measures[12]. However, research related to the SIA of protected areas (PAs) in China is still in its nascent stages[13][14]. Much discussion focuses on single dimensions of social impacts such as economy[15][16], wellbeing[9][17], equality and rights[18]~[20], and local culture[21][22], and has not yet evolved into systematic research. While scholars like Junzhi Chen have attempted to construct a social impact assessment system for national parks from a macro perspective[13], there is limited consideration from the bottom-up perspective of local communities. Moreover, due to limitations in the assessment content, direction, and data analysis, there is currently no widely accepted assessment framework in the international academia[23][24].

At the same time, only a few studies have focused on the

differences in social impacts on communities in different areas surrounding national parks[25][26]. From the policy perspective, the General Plan for Establishing National Park System (GPENPS) states that "in accordance with the functional orientation of national parks, it is imperative to delineate the boundaries of residents' livelihoods and production activities within the national park [...] to make sure surrounding communities align with the overarching conservation objectives of the national park [...] and to guide local governments in the planning and construction of gateway communities and distinctive townships around the national park," reflecting policy differences for communities in different areas[27]. From the research perspective, studies have found significant spatial differences in local communities' perceptions of national parks[19][28][29]. For example, communities serving as tourism hubs around the Shennongjia National Park perceive the strongest economic impact from tourism, while communities located farther from core attractions perceive the strongest environmental impacts from tourism[25]. But a systematic framework to assess the social impacts is still to be formed. Moreover, evidence from the Qinghai-Tibet Plateau National Park Cluster has proved that there were varying impacts on the sustainable development of communities in different spatial locations[26]. Furthermore, research on gateway communities of national parks has predominantly focused on the impacts of tourism development[30][31], with less consideration of non-economic impacts such as local culture, social equality and rights. Concurrently, more discussions underscore the significance of the spatial connection between communities



1. Locations of the three types of communities

and tourist destinations as a critical determinant of the community sustainability. For example, variations have been found in tourism perceptions among residents of adjacent communities to Huangshan scenic spots and Sanhe Town[30]~[32].

In this context, basing on the TRNPMP and the GPENPS, this study first categorized surrounding communities of national parks into three types—inside, gateway, and fringe communities—according to their spatial characteristics (Fig. 1, Table 1). From a community-based perspective, we assessed the social impacts of the Tangjiahe area of the Giant Panda National Park (GPNP) on these three typical types of local communities, utilizing methods of questionnaire surveys, semi-structured interviews, and principal

Table 1: Classification of communities in/around the national park

	Inside community	Gateway community	Fringe community
Definition	Located within the boundaries of a national park, where residents' livelihoods are closely intertwined with the ecological conservation of the park	Located around the gateway of a national park, which can serve as the access to traffic circulation and provide tourism services for the park	Located outside a national park, taking certain responsibilities for ecological conservation
Dominant development policy	Limited by strict conservation policies	Limited by construction style requirements	Limited by certain conservation requirements
Community regulatory strategy	Aggregation and promotion; general control; resettlement; characteristic protection	Aggregation and promotion	Not mentioned
Pillar industry	Traditional argriculture; tourism	Tourism	Traditional agriculture

component analysis to conduct qualitative and quantitative analyses. In this process, the framework and methodology of SIA adaptable to the construction of Chinese national parks was established to propose coordinating conservation initiatives and development recommendations for local communities.

2 Research Design

2.1 Social Impact Assessment Framework for National Parks

In a broad sense, social impact means "the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another"[33]. SIA involves the process of assessing the social consequences of planned events or actions and formulating strategies for continuous monitoring and management of these impacts, covering the assessment of how local communities interact with their social, cultural, economic, and environmental contexts[11]. The roots of SIA can be traced back to scientific analyses of the impact of World War II on Western societies in the 20th century[34]. In the 1970s, SIA first appeared as a legal requirement in the National Environmental Policy Act (NEPA) of the USA and has since been progressively embraced on a global scale[35]. In the field of ecological conservation, SIA is used to measure the social changes and impacts resulting from the establishment of PAs, encompassing aspects such as wellbeing, livelihoods, and rights[36]. For PAs, SIA places its primary focus on evaluating the impacts on the communities around these areas, especially regarding the extent of local support[37], burdens and benefits distribution[38], providing bases for empowerment promotion, capacity building, and social capital development[11]. Concerning indicators of the assessment framework, Frank Vanclay developed seven categories and over 80 social impact indicators for the broad definition of social impact[39]. For European PAs, Nikoleta Jones et al. summarized social impacts into seven broad categories, including wellbeing, livelihoods, local culture, human rights, social relations, social equity, and knowledge, and 33 subcategories[36].

Based on the established frameworks and considering the distinctive characteristics of China's national park system development, this research proposes a framework for assessing the social impacts of national parks on the surrounding communities, which includes six potential categories of social impacts along with 19 indicators[5][7][36][39]~[45] (Table 2, Fig. 2). In this framework, firstly, due to the top-down nature of China's national park system reform, significant attention is placed on assessing the employment opportunities provided by national park management agencies and their consequent effects on local livelihoods. Secondly, to ensure the preservation of integrity and authenticity of the ecosystem, indicators such as "traditional knowledge" and "cultural landscape" have been included[40]. Thirdly, in response to the requirement of the national park system for the establishment of community co-management, indicators such as "participation in management" have been added within the equity and rights category[41]. Overall, excepting the economy and livelihoods category, all other categories are related to non-economic social impacts.

2. Categories and interpretation of the social impacts

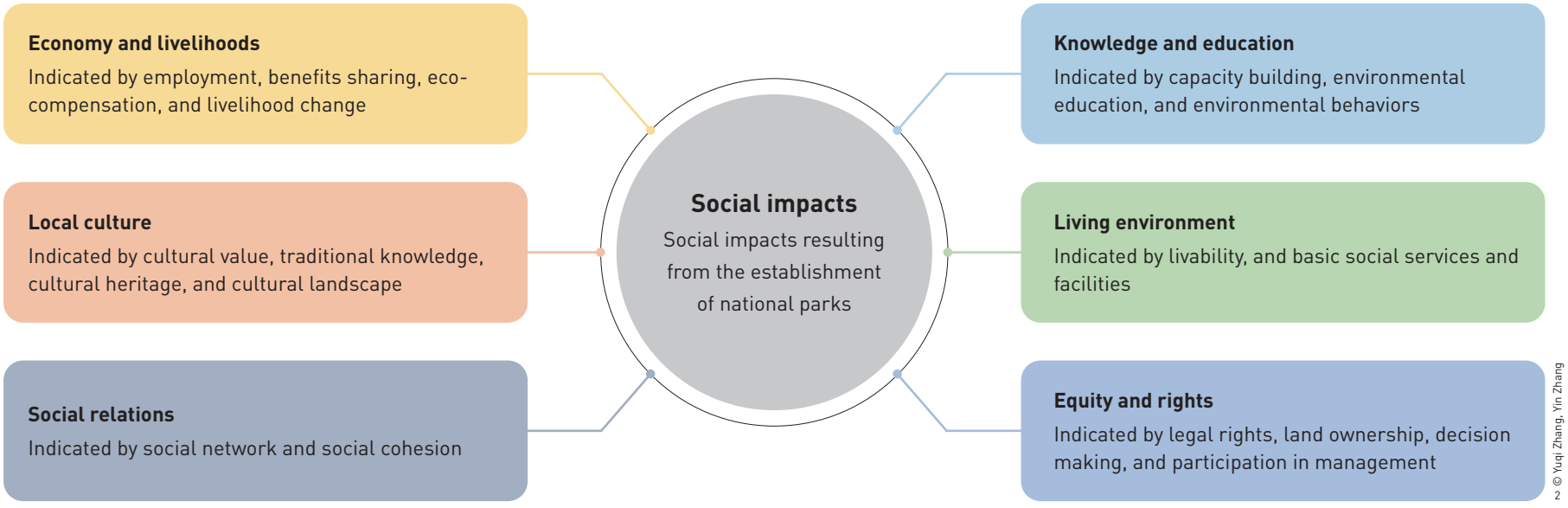


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Table 2: Indicators for the social impact assessment of communities in/around national park

Category	Indicator	Description	Source
Economy and livelihoods (E)	E1: employment	Local people have access to job opportunities provided by the Giant Panda National Park Administration (GPNPA)	Refs. [8][39]
	E2: benefits sharing	Local people get economic and other benefits from the management of GPNP	Ref. [6]
	E3: eco-compensation	Local people receive fair compensation for their contribution to ecological conservation	Ref. [8]
	E4: livelihood change	The management and conservation of GPNP do not impact traditional livelihoods of local people	Refs. [39][40]
Local culture (C)	C1: cultural value	The construction of GPNP is conducive to enhancing locals' sense of identity and pride to their hometown	Ref. [36]
	C2: traditional knowledge	Local traditional knowledge is recognized by the conservation management of GPNP	Refs. [40][44]
	C3: cultural heritage	The construction of GPNP is conducive to the preservation of the local agricultural and cultural heritage	Refs. [36][40]
	C4: cultural landscape	The construction of GPNP is conducive to the preservation of the local traditional residence and cultural landscape	Refs. [40][45]
Social relations (S)	S1: social network	Local people trust their relatives and neighbors	Refs. [36][42]
	S2: social cohesion	Local people are closely connected without conflicts	Refs. [36][42]
Kowledge and education (K)	K1: capacity building	Local people can participate in skill training and industry-support programs organized by GPNP	Ref. [43]
	K2: environmental education	Local people can participate in educational activities related to ecological conservation	Refs. [36][43]
	K3: environmental behaviors	Local people can participate in ecological conservation work such as forest fire prevention and patrol	Refs. [36][42]
Living environment (L)	L1: livability	The construction of GPNP has effectively protected the natural environment surrounding the communities	Refs. [39][42]
	L2: basic social services and facilities	The construction of GPNP has improved the basic social services and facilities in the surrounding communities	Refs. [39][42]
Equity and rights (R)	R1: legal rights	The construction of GPNP respects locals' legal and traditional rights	Refs. [36][39]
	R2: land ownership	GPNP has no conflict with local people on land ownership, usage or management right	Refs. [39][41]
	R3: decision making	The decision-making process of GPNPA fully respects local people's opinions	Refs. [39][41]
	R4: participation in management	GPNP provides convenient channels and fair procedures to encourage public participation in management	Refs. [8][41]

2.2 Background Information about the Case

The Tangjiahe area of GPNP is located within Guangyuan City, Sichuan Province of China, covering an area of approximately 40,000 hectares. Tangjiahe area is adjacent to seven administrative villages in Qingxi Town and Sanguo Town, including one inside community, one gateway community, and five fringe communities, with roughly 9,500 residents[19]. Since the establishment of the Tangjiahe National Nature Reserve (TNNR) in 1978, the management office has employed various practices in surrounding communities, such as industrial support programs, capacity-building activities, and technical support[46]. With the establishment of the national park, Tangjiahe has received more financial support and increased investment in rural tourism, infrastructure improvement, public-service employment, community capacity building, and compensation for human-wildlife conflicts. Meanwhile, stricter management measures have been implemented for activities that are potentially harmful to biological conservation such as burning crop residues, incense, and ghost money. These actions have triggered broader social impacts①. The establishment of the national park does not change the spatial relationship between local communities and the PA. To avoid impacts on the research results due to differences in community management and policy implementation among different towns, this study selected the villages of Luoyigou, Yinping, and Dongqiao in Qingxi Town as research objects. Among them, Luoyigou Village is the only inside community located in the general control zone of GPNP, which suffers from severe human-wildlife conflicts but can be compensated for damage to crops from wildlife after the establishment of the national park. Yinping Village is the only gateway community that has received various support in tourism development such as policy support, tourism service training, and tourism facilities construction. Dongqiao Village represents the fringe communities and depends mainly on traditional agriculture, from where the management office hires local forest rangers (Table 3)[19].

2.3 Data Collection

The fieldwork was conducted from June 30 to July 6, 2022, with a pre-research done in the afternoon of June 30 to adjust questionnaire questions and the formal survey started from July 1. The research team comprised 2 teachers experienced in PA studies and 8 trained graduate students majoring in Landscape Architecture or related disciplines. The survey was conducted at the household level, more than 10% of the households in each administrative village were investigated randomly. Questionnaires were distributed to each surveyed household and a family member who possessed the most comprehensive knowledge of the community was recommended to complete the survey. In total, 303 questionnaires were collected. After excluding 7 questionnaires with erroneous or missing data, a total of 296 valid questionnaires were obtained, with an effective response rate of 97.69%.

The questionnaire consisted of two sections. The first includes demographic information such as gender, age, education level,

① Sourced from interviews with the community department of the management office of TNNR.

Table 3: Basic information of the three sample communities

Community type	Name	Number of households	Area of land	Pillar industry	Main community management strategies
Inside community	Luoyigou Village	470	62.0 km^2	Tourism, agriculture, and cultivation	Human-wildlife conflict compensation, rural-tourism support, beekeeping training, infrastructure construction, forest ranger employment, etc.
Gateway community	Yinping Village	642	39.7 km^2	Tourism and agriculture	Rural-tourism support, beekeeping training, infrastructure construction, forest ranger employment, etc.
Fringe community	Dongqiao Village	445	27.92 km^2	Agriculture and cultivation	Beekeeping training, forest ranger employment, etc.

NOTE: The information was sourced from the official data provided by Qingxi Town and the interviews with the communities and Tangjiahe Area Authority.

occupation, and annual household income. The second section drew on social impact perception, including 6 categories and 19 indicators (Table 2) using a five-point Likert Scale ranging from 1 (strongly disagree) to 5 (strongly agree). Besides, 13 semi-structured interviews were conducted to the community and protection departments of the management office of TNNR, the local government of Qinxi Town, villagers' committee members in each surveyed village, and local people, covering topics such as management and policies for communities and protection, perceptions of impacts and the underlying reasons, in order to analyze specific social impacts.

2.4 Data Analyses

2.4.1 Demographic Data

As depicted in Table 4, the percentage of female respondents (53.7%) was slightly larger than that of males (46.3%). Most of the respondents were in the middle or older age, with more than 80% aged over 50 years old. Their education levels were relatively low, only 36.1% had attended junior middle school or higher education. Moreover, 78.4% of respondents were farmers, and their annual family incomes were generally low, with more than 65% of households earning less than 30,000 yuan per year. Nearly 90% of respondents had lived in Tangjiahe for over 20 years. The surrounding communities of Tangjiahe are typical rural communities, facing significant problems of low education levels and population outflow. Therefore, the sample is representative.

2.4.2 Validity and Reliability Testing

SPSS 28.0 was used to perform the reliability analysis. The results indicated that three dimensions, namely economy and livelihoods, equity and rights, and living environment, did not pass the reliability test. Based on the Cronbach's alpha coefficient (α coefficient) values, livelihood change (E4) and land ownership (R2) were removed. After this step, the two dimensions, economy and livelihoods and equity and rights got coefficients of 0.747 and 0.703, respectively (both >0.7), indicating that the items exhibited satisfactory internal consistency. However, the living environment dimension which included only two indicators failed the reliability test and was subsequently excluded. The overall α coefficient was 0.819, exceeding 0.7, suggesting a satisfactory level of the reliability. The adjusted assessment framework is presented in Table 5.

In the validity test, the KMO value was 0.779 and the Bartlett test showed a significant result of $P < 0.001$, which indicated that the items were suitable for exploratory factor analysis. Principal component analysis was used to explore the internal relationship of

Table 4: Demographics of the interviewees

Demographic characteristics		Number of interviewees (n = 296)	Percentage
Gender	Male	137	46.3
	Female	159	53.7
Age	< 40	32	10.8
	40 ~ 49	19	6.4
	50 ~ 59	102	34.5
	60 ~ 69	64	21.6
	> 69	79	26.7
Education level	Uneducated	67	22.6
	Primary school	122	41.2
	Middle school	74	25.0
	High school	21	7.1
	Bachelor's degree or higher	12	4.0
Occupation	Famer	232	78.4
	Others	64	21.6
Annual household income (yuan)	< 10,000	104	35.1
	10,000 ~ 30,000	90	30.4
	30,001 ~ 50,000	45	15.2
	50,001 ~ 100,000	38	12.8
	> 100,000	19	6.4
Registered residence	Luoyigou Village	104	35.1
	Yinping Village	132	44.6
	Dongqiao Village	60	20.3
Residence years	< 10	12	4.1
	10 ~ 20	22	7.4
	> 20	262	88.5

the 15 variables, and 5 principal components were determined by maximum variance rotation (Table 5), which is consistent with the original hypothesis. The contribution rate of cumulative variance is 66.4%, higher than 60%, indicating that the scale has good structural validity.

2.4.3 Calculation of Social Impact Perceptions

The Principal Component Analysis method was performed to transform the original indicators' scores to scores based on weights, in order to avoid the mutual influence of the original indicators. Firstly, the component coefficient of each component was multiplied by the perception values of each indicator. Then the values were summed up to obtain the values of the five principal components[48]. It is formulated as follows:

$$y_j = \sum_{j=1}^{15} M_m L_{jm}, \quad (1)$$

where y_j is the value of principal component j (j = 1, ..., 5); M is the perception value of indicator m (m = 1, ..., 15); and L is the component coefficient of indicator m in principal component j.

The comprehensive value of social perception was then multiplied by each component's weight in social impact and summed up to obtain the comprehensive value of social impact perception[48], which is formulated as follows:

$$Z = \sum_{j=1}^{5} y_j b_j, \quad (2)$$

where b_j is the weight of principal component j and Z is the comprehensive value of social impact perception.

Values for the principal component and comprehensive values of social impact perception range from 1 to 5, [1, 2) representing very negative, [2, 3) indicating relatively negative, [3, 4) denoting relatively positive, and [4, 5) for very positive.

The factor analysis method was applied to calculate indicators' weights[49] (Table 6) to explain the shared variation among variables and determine weights based on their contribution. This method is also conducive to gaining insights into the perceptions and attitudes of communities towards each social impact dimension.

Finally, One-way Analysis of Variance (One-way ANOVA) was used to explore differences in social impact perceptions among residents across different communities. With the statistically significant differences observed, post hoc multiple comparisons such as the Bonferroni method (for equal variance) or Tamhane

Table 5: Rotated component matrix of the principal component analysis

	E	C	S	K	R
E1: employment	0.755	—	—	—	—
E2: benefits sharing	0.818	—	—	—	—
E3: eco-compensation	0.746	—	—	—	—
C1: cultural value	—	0.732	—	—	—
C2: traditional knowledge	—	0.537	—	—	—
C3: cultural heritage	—	0.812	—	—	—
C4: cultural landscape	—	0.691	—	—	—
S1: social network	—	—	0.915	—	—
S2: social cohesion	—	—	0.868	—	—
K1: capacity building	—	—	—	0.784	—
K2: environmental education	—	—	—	0.804	—
K3: environmental behaviors	—	—	—	0.694	—
R1: legal rights	—	—	—	—	0.720
R3: decision making	—	—	—	—	0.805
R4: participation in management	—	—	—	—	0.678

Table 6: Social impact assessment indicators and weights

Category	Indicator	Weight	Total weight
Economy and livlihoods (E)	E1: employment	7.34%	20.75%
	E2: benefits sharing	7.43%	
	E3: eco-compensation	5.98%	
Local culture (C)	C1: cultural value	6.48%	26.81%
	C2: traditional knowledge	6.34%	
	C3: cultural heritage	6.40%	
	C4: cultural landscape	7.59%	
Social relations (S)	S1: social network	5.63%	12.29%
	S2: social cohesion	6.66%	
Knowledge and education (K)	K1: capacity building	6.70%	19.47%
	K2: environmental education	6.16%	
	K3: environmental behaviors	6.61%	
Equity and rights (R)	R1: legal rights	4.77%	20.66%
	R3: decision making	7.60%	
	R4: participation in mangement	8.29%	

Table 7: Social impact assessment results

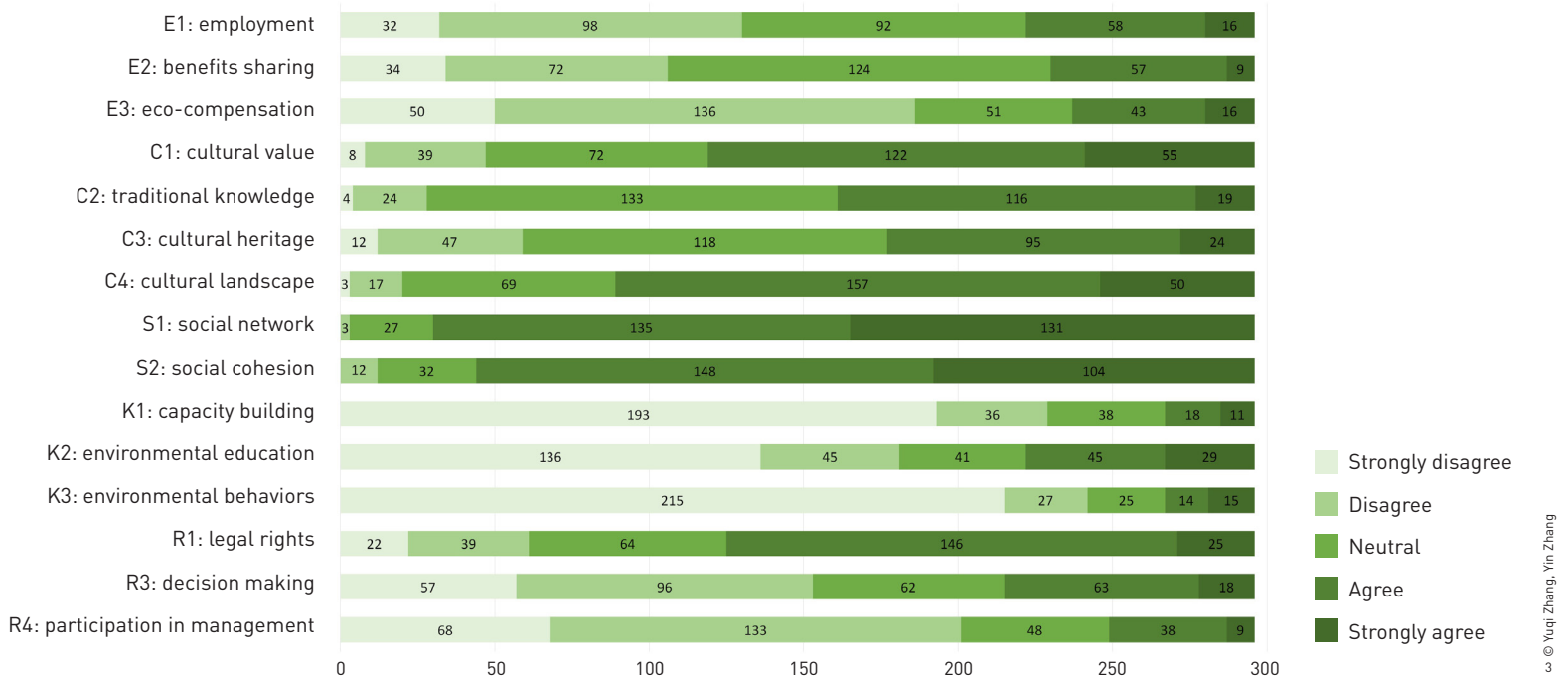
Category	Indicator	Principal component value	Mean value	Standard deviation
Economy and livlihoods (E)	E1: employment	2.098	2.757	1.057
	E2: benefits sharing		2.780	0.984
	E3: eco-compensation		2.456	1.096
Local culture (C)	C1: cultural value	3.571	3.598	1.019
	C2: traditional knowledge		3.412	0.784
	C3: cultural heritage		3.243	0.952
	C4: cultural landscape		3.791	0.824
Social relations (S)	S1: social network	3.983	4.331	0.682
	S2: social cohesion		4.162	0.772
Knowledge and education (K)	K1: capacity building	0.811	1.709	1.129
	K2: environmental education		2.277	1.418
	K3: environmental behaviors		1.605	1.140
Equity and rights (R)	R1: legal rights	3.011	3.382	1.056
	R3: decision making		2.625	1.187
	R4: participation in management		2.280	1.049
Comprehensive value of social impact perception		**2.654**	**2.961**	

method (for unequal variance) were applied based on the results of Tests of Homogeneity of Variances, in order to determine the aspect and degree of differences.

3 Results and Differences in Community Residents' Perceptions of Social Impacts

3.1 Results of the Social Impact Assessment

Table 7 and Figure 3 show that the overall social impact perception value of Tangjiahe is 2.654 (lower than 3), indicating a relatively negative response. The impact perception values of all the dimensions, ranked from the highest to the lowest, are social relations, local culture, equity and rights, economy and livelihoods,



3. Results of the social impact assessment

and knowledge and education.

Among the five dimensions, the comprehensive value of social impact perception of social relationships was the highest (3.983), where the respondents generally trusted their relatives and neighbors (S1, 4.331) and were closely connected (S2, 4.162). Following that, the impact of local culture (3.571) was also positively perceived by respondents, because the national park construction respects traditional knowledge (C2, 3.412) and protects local cultural heritage and landscape (C3, 3.243; C4, 3.791). However, respondents' perception of the impact of equity and rights was moderate (3.011)—although they agreed that the management office of TNNR respected their legal and traditional rights (R1, 3.382) to some extent, there remained a lack of participation in management (R4, 2.280) and decision making (R3, 2.625).

In addition, respondents' perception of the impact of economy and livelihoods (2.098) was relatively negative, with all indicators scoring relatively low (lower than 3), indicating that they were less satisfied with the management office's efforts in promoting economic development and benefits sharing. Finally, respondents had the most negative perception of the impact of knowledge and education (0.811), especially in aspects of capacity building (K1, 1.709) and environmental behaviors (K3, 1.605), suggesting that respondents' demands in this dimension have yet to be met.

3.2 Differences Among Communities in Social Impact Perceptions

Comparing the mean and principal component values of the 15 indicators across different communities (Table 8), it was found that the comprehensive value of social impact perception ranked from high to low as follows: the gateway community, the inside community, and the fringe community. A one-way analysis of variance was performed to determine the correlation between respondents' social impact perceptions and their place of residence. The result shows that except for economy and livelihoods, respondents from different communities had significantly different perceptions of the other four dimensions (Table 9).

Then, multiple comparative analysis was conducted to determine the aspect and degree of differences between communities (Tables 8, 10). For the dimension of local culture, the impact perception values of respondents ranked from high to low as follows: the gateway community (Yinping Village), the inside community (Luoyigou Village), and the fringe community (Dongqiao Village). As can be seen from Table 8, Yinping Village scored the highest on all indicators of this dimension, while Luoyigou Village had the most negative perception of the culture value (C1, 3.35) and traditional knowledge(C2, 3.37), and Dongqiao Village perceived the culture heritage (C3, 3.00) and cultural landscape (C4, 3.48) the most negatively. Results of the dimension of social relations are

Table 8: Social impact assessment result of communities

Indicator and category	Inside community (Luoyigou Village)	Gateway community (Yinping Village)	Fringe community (Dongqiao Village)
E1: employment	2.71	2.83	2.68
E2: benefits sharing	2.83	2.83	2.58
E3: eco-compensation	2.48	2.52	2.27
Component value of economy and livelihoods	**2.13**	**2.09**	**2.05**
C1: cultural value	3.35	3.83	3.52
C2: traditional knowledge	3.37	3.45	3.42
C3: cultural heritage	3.14	3.43	3.00
C4: cultural landscape	3.80	3.92	3.48
Component value of local culture	**3.37**	**3.79**	**3.45**
S1: social network	4.36	4.39	4.17
S2: social cohesion	4.13	4.29	3.93
Component value of social relations	**3.98**	**4.06**	**3.82**
K1: capacity building	1.89	1.75	1.30
K2: environmental education	2.49	2.30	1.85
K3: environmental behaviors	2.07	1.41	1.23
Component value of knowledge and education	**1.21**	**0.72**	**0.33**
R1: legal rights	3.09	3.63	3.35
R3: decision making	2.54	2.83	2.32
R4: participation in management	2.29	2.38	2.05
Component value of equity and rights	**1.96**	**2.27**	**1.96**
Comprehensive value of social impact perception	**2.50**	**2.55**	**2.29**

NOTE: The results for each indicator are calculated as averages; the component values and comprehensive values are calculated as weighted values.

similar to that of local culture, where respondents from Dongqiao Village perceived the impacts of social network (S1, 4.17) and social cohesion (S2, 3.93) the most negatively. In the dimension of knowledge and education, the impact perception values ranked from high to low as follows: the inside, the gateway, and the fringe communities. Respondents from the fringe community had significantly worse perceptions of capacity building (K1, 1.30), environmental education (K2, 1.85), and environmental behaviors (K3, 1.23) than the other two communities. For the dimension of equity and rights, the ranking is also the same with local culture, where respondents from the inside community perceived legal rights (R1, 3.09) the most negatively and respondents from the fringe community had the most negative perception of decision making (R3, 2.32) and participation in management (R4, 2.05).

3.3 Reasons for Differences in Social Impact Perceptions

Based on quantitative data analysis and interview results, we summarized three reasons for the formation of social

Table 9: Results of ANOVA analysis between villages and social impact perceptions

Dependent variable	Sum of squares	Degree of freedom	Mean square	*F*	Sig.
Economy and livelihoods	1.939	2	0.970	1.332	0.266
Local culture	5.36	2	2.680	6.224	0.002**
Social relations	3.401	2	1.700	3.967	0.020**
Knowledge and education	18.532	2	9.266	10.052	< 0.001***
Equity and rights	8.281	2	4.140	5.616	0.004**
Comprehensive value of social impact perception	**3.967**	**2**	**1.983**	**6.886**	**0.001****

NOTE: * means $P < 0.05$, ** means $P < 0.01$, and *** means $P < 0.001$.

Table 10: Post hoc test results of the three types of communities

Dependent variable	Method	(I) Community	(J) Community	Mean difference (I–J)	Standard error
Local culture	Tamhane	Inside	Gateway	–0.24563*	0.0906
		Inside	Fringe	0.05929	0.09872
		Gateway	Fringe	0.30492**	0.08954
Social relations	Bonferroni	Inside	Gateway	–0.09193	0.08584
		Inside	Fringe	0.19519	0.10614
		Gateway	Fringe	0.28712*	0.10194
Knowledge and education	Tamhane	Inside	Gateway	0.32993*	0.13607
		Inside	Fringe	0.68953***	0.13325
		Gateway	Fringe	0.35960**	0.11812
Equity and rights	Tamhane	Inside	Gateway	–0.30915*	0.11721
		Inside	Fringe	0.06560	0.13437
		Gateway	Fringe	0.37475**	0.12208
Comprehensive social impact	**Tamhane**	**Inside**	**Gateway**	**–0.08444**	**0.07492**
		Inside	**Fringe**	**0.22526****	**0.07869**
		Gateway	**Fringe**	**0.30970*****	**0.07049**

NOTE: * means $P < 0.05$, ** means $P < 0.01$, and *** means $P < 0.001$.

impact differences, including conservation policies, economic development, as well as location and transportation. Among these, conservation policy directly affects all dimensions of social impact, the local economic development enhances the impacts, while the location and transportation of villages is the primary cause.

Firstly, the differences in conservation policies among different communities are the direct reason for social impact variations. For the inside community, setting of the community co-management committee, various activities such as skill training, ecological conservation education, and even more public employment opportunities make it easier for villagers to participate in ecological conservation and community management, thereby promoting a positive perception of the impact on knowledge and education dimension[50]. Additionally, the human-wildlife conflict compensation policy is only implemented in the inside community, promoting a positive perception of the impact on economy and livelihoods. However, being located within the boundaries of the PA, their land use, housing, and infrastructure construction are strictly regulated by the Regulations on Nature Reserves Management, leading to a negative perception of the impact on local culture, as well as equity and rights[51]. For the gateway community, the local government and the management authority of the national park strongly support and invest in the community development, such as facade renovation and infrastructure construction. The government also provides preferential loans to promote the establishment of family inns, thereby fostering a positive perception of the impact on the local culture and equity and rights[19]. As for the fringe community, villagers have the fewest available public employment opportunities and lack opportunities for capacity building and environmental education. This leads to their most negative perception of the impact on knowledge and education, as well as equity and rights. In interviews, statements like "they never seek our opinions" and "there's no opportunity to participate in management" were frequently mentioned. Additionally, the fringe community suffers from severe human-wildlife conflicts but lacks a compensation program, resulting in an even more negative perception of the impact on the economy and livelihoods[19].

Secondly, the differences in community economic development directions have resulted in variations in local culture and social relationships[30][52]. The Tangjiahe area of GPNP is characterized by its dominance of the primary industries (agriculture and forestry, and animal husbandry) and the tertiary industries (tourism services). Incidents of wildlife depredation on crops and livestock have significantly disrupted agriculture and forestry, and animal husbandry in both the fringe community and the inside community, as some respondents mentioned during interviews that "there are almost no harvest throughout the year." This has led to some negative social impacts such as population outflow, cultural loss, and social alienation. Furthermore, the establishment of the national park system has seen increased investment in tourism infrastructure, tourism service training, and the shaping of cultural brands, which have actively promoted the development of local culture in the gateway community, widening the gap between communities. Also, the formation of operators' organizations such as rural inns alliances and breakfast & bedding associations along with the tourism development has also enhanced social relationships in the gateway community.

Lastly, differences in the location and transportation conditions of the communities primarily result in variations in social impacts. Especially in tourism[30][31], the gateway community and the inside community are located along the essential route to access recreational resources within the national park. They possess advantages for tourism development, such as better allocation of tourism resources and policy support, resulting in their more positive perception of social impacts than the fringe community. Research on national parks such as Huangshan National Park and Jiuzhaigou National Park has also found that residents in main tourism communities have more positive perceptions of social impacts[30][31][53]. Furthermore, although subject to stricter ecological conservation requirements and limitations, the inside community benefits from preferential policies during the national park system development. In contrast, the fringe community, due to its remote location, receives very limited policy support.

Overall, the impacts of national park policies on communities varied due to their different locations, leading to increased disparities in the development of these communities and, subsequently, the emergence of significant differences in the perception of social impacts. The inside community had the most significant perceptions across different impact dimensions (either more positive or negative). For instance, the wildlife-conflict compensation and more public employment opportunities have fostered the relatively positive perceptions of social impacts, while stricter conservation management policies have resulted in more negative impact perceptions. In contrast, the fringe community has received almost no policy support and is limited to fewer conservation restrictions, resulting in less perceptions of social impacts related to the national park. However, due to wildlife conflicts and the sense of marginalization among the villagers, some negative perceptions persist.

4 Discussion

4.1 Attach Importance to Non-economic Social Impacts

This research proposed a framework for assessing the social impacts of national parks in China and extracted five impact dimensions—economy and livelihoods, local culture, social relations, knowledge and education, and equity and rights—through principal component analysis. The weighted results of indicators for the social impact assessment of Tangjiahe area of GPNP show that some non-economic indicators, such as participation in management (R4, 8.29%), decision making (R3, 7.60%), and cultural landscape (C4, 7.59%), were regarded more important by community respondents than the economic indicators (E1, 7.34%; E2, 7.43%; E3, 5.98%). This suggests that economy and livelihoods is not necessarily the most critical social impact. Local residents value their own culture and hope to participate in national park construction and decision making, as well as acquiring knowledge and skills in the ecological protection process[54]. However, much discussion focuses mainly on economic social impacts[55], such as tourism development[56], community co-management, and the impact of PA protection policies on livelihoods[57]~[59], indicating insufficient attention on non-economic social impacts. Thus, future community management related to national parks should provide more opportunities of capacity building and environmental education for community residents, so as to have more qualified community members and to promote them to effectively participate in the construction of national parks[54].

4.2 Attach Importance to Fringe Communities

The study results showed that the communities' perceived levels of social impacts of national park construction were gateway communities, inside communities, and fringe communities, from the highest to the lowest. This is mainly because most fringe communities have no access to either tourism development opportunities for gateway communities or preferential protection policies for inside communities. As a result, their social impact perceptions of social economy and knowledge education were relatively more negative. A similar situation occurs in Shennongjia National Park, where the fringe communities had a more negative perception of the social impacts in their economy and livelihoods due to the lack of tourism development[25]. Ben Ma et al. also found that communities outside the Giant Panda Nature Reserve suffer more direct burdens while obtained less direct benefits[60]. Therefore, we suggest that future construction of national parks pay more attention to the development of fringe communities and provide them more policy support. One reference is the concept of "Aire d'adhésion" (partnership zone) proposed in French national parks, which encourages fringe communities of PAs to join the conservation alliances, for which they would be guaranteed by the rights and interests in terms of funding, technology, and taxation, so as to promote their own infrastructure construction and the sustainable economic development[61].

4.3 Policy Recommendations for GPNP

Considering that the negative perceptions of the social impacts of the Tangjiahe area of GPNP on surrounding communities were mainly reflected in aspects of knowledge and education, equity and rights, and economy and livelihoods, it is vital to increase the positive impacts of these dimensions at the policy level in the future. First, develop characteristic industries in fringe communities. Different from the gateway communities with geographic advantages, fringe communities can hardly benefit from ecological protection. Thus, these communities should promote industrial transformation by developing ecological agricultural and forestry products and small- and micro-tourism products[4][59]. Second, optimize the community policy system. The enhancement of social impacts requires a more equitable process of policy-making and allocation. On the one hand, a fair compensation program for human-wildlife conflicts should be established to avoid the dilemmas of fringe communities discussed in Tangjiahe; on the other hand, the production and livelihood needs of inside communities should be guaranteed to avoid one-size-fits-all policies in the name of ecological conservation[62]. Third, improve the community participation. The capacity building and environmental education of local communities should be emphasized because they are fundamental for residents' effective participation in conservation[50]. Meanwhile, it is vital to promote a higher level of community empowerment, and engage more communities and residents to be involved in[63].

4.4 Research Limitations and Future Recommendations

The GPNP is located in a remote and underdeveloped region of China, where human-wildlife conflicts are significant. Thus, its social impact assessment results is referential for national parks with similar characteristics, such as the National Park of Hainan Tropical Rainforest and the Northeast China Tiger and Leopard National Park. Although several social impact assessment indicators suitable for China's national parks have been extracted, those for the dimension of living environment (like livability and basic social services and facilities) are lacking due to the failure of the reliability

test. One reason might be that changes in this dimension driven by the construction of GPNP have not been notable, resulting in great differences in the perceptions of respondents. Future research should better consider the assessment indicators regarding the living environment dimension based on the case. In addition, the results of this research might not be universally applicable as it selected only one typical village for each of the three types of communities. Future research can be conducted to categorize and compare more communities to enhance the general applicability of the findings.

5 Conclusions

Taking the Tangjiahe area of GPNP for example, this research compared the differences in perceptions of social impacts among residents of inside, gateway, and fringe communities during the construction of the national park. Previous studies focused more on economic benefits and ecological impacts, while neglecting the social impacts. To fill the gap, this research introduced the discussion on non-economic social impact factors, so as to provide new perspectives for national park management and sustainable community development. It also emphasizes the sustainable development of fringe communities, which may be confronted with challenges of resource scarcity and economic backwardness. More attention and support should be put to this type of community to promote its benefit from the construction and development of national parks. Moreover, we propose strategies for policy improvement for these communities, including more rational allocation of resources, community infrastructure and service promotion, and closer cooperation with the national park authorities, to promote sustainable community development.

The social impact assessment of national parks in China is still in its initial stage. At the theoretical level, it is necessary to systematically establish an indicator system suitable for China's national conditions, scientifically formulate the phases and cycles of social impact assessment, and horizontally compare the differences in social impact perception among different national parks and communities. At the practical level, principles and guidelines for the adjustment of community management policies after social impact assessment should be established, while adopting diversified strategies to reduce the negative social impacts brought by national park construction, aiming at promoting the local realization of "public welfare for all."

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中国大熊猫国家公园社会影响评估研究——基于界内、门户和边缘社区的比较分析

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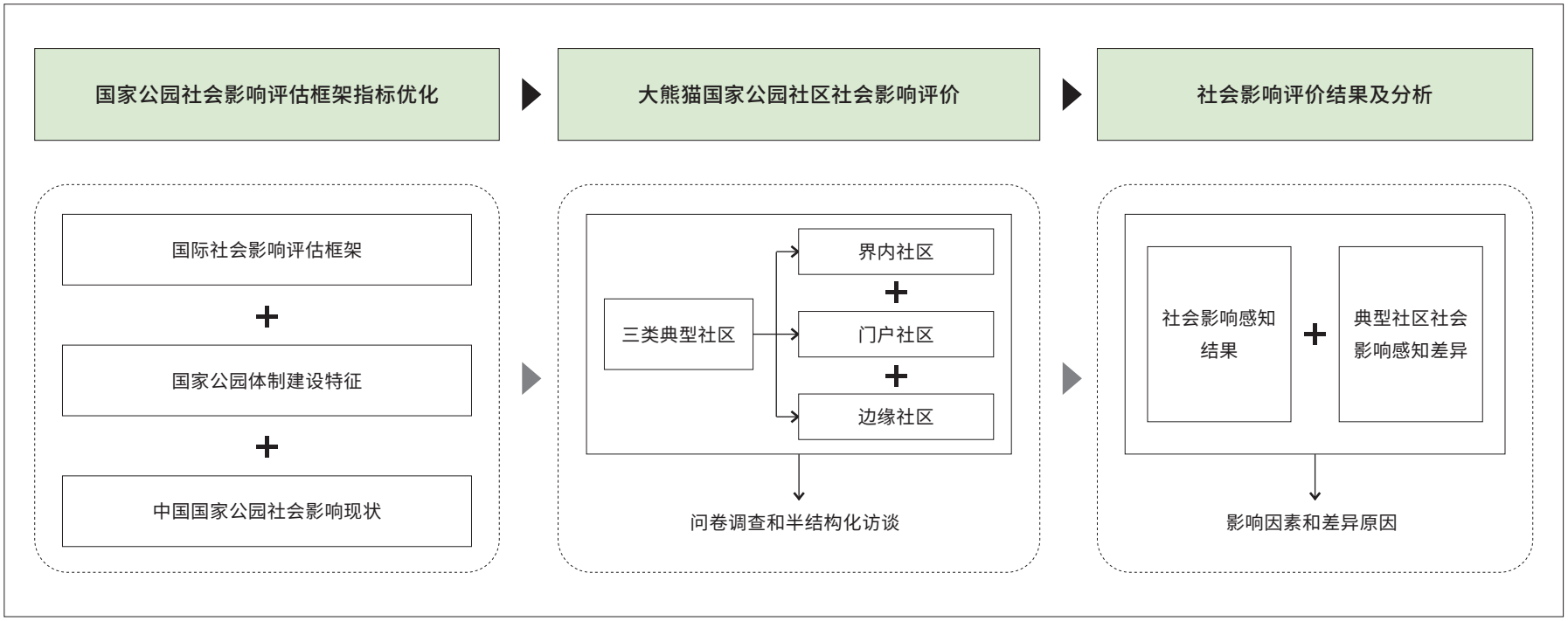
图文摘要



文章亮点

- 提出适宜中国国情的国家公园社会影响评估框架和指标体系
- 国家公园对界内社区、门户社区和边缘社区的社会影响存在显著差异
- 保护政策、产业经济、区位交通等是导致国家公园社会影响差异的主要因素
- 国家公园的建立应加强对边缘社区及非经济类社会影响的关注

关键词

国家公园；
自然保护地；
社会影响评估；
感知；
界内社区；
门户社区；
边缘社区；
唐家河国家级自然保护区

摘要

社会影响评估是国家公园体制建设的现实需求，但相关概念框架、理论认识和系统评估仍不足。基于中国国家公园体制建设的特征，本文优化了社会影响评估框架和指标体系，选择中国大熊猫国家公园（唐家河园区）周边的三类典型社区——界内社区、门户社区和边缘社区进行比较分析。通过问卷调查、半结构化访谈、

因子分析和单因素方差分析，研究发现：1）大熊猫国家公园综合社会影响感知偏消极，村民对各项维度影响的感知程度由高到低依次为：社会关系、地方文化、平等权利、经济生计和知识教育维度；2）三类社区对经济生计维度以外维度影响的感知存在显著差异：门户社区对社会关系、地方文化、平等权利维度的感知最为积极，界内社区对知识教育维度的感知最为积极，边缘社区在四个维度都最为消极；3）社会影响分异主要受保护政策、产业经济、区位交通等因素影响。研究认为，在关注经济发展的同时，应当增加对平等权利、知识教育等非经济类社会影响的关注；需要对边缘社区给予特别关注和支持，以确保其在国家公园建设和发展过程中能够持续受益。本研究可为相关自然保护地社会影响的优化提供理论借鉴和案例依据。

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1 引言

国家公园体制建设是促进生态文明建设、实现人与自然和谐共生的必要举措。中国国家公园体制建设以“生态保护第一”“国家代表性”“全民公益性”为基本理念[1]，而国家公园周边局部地区存在社区人口基数大、土地权属复杂、社会经济贫困等人地冲突[2]~[4]。事实上，国家公园和周边社区是一个整体化的“社会生态系统”（Social-Ecological System）[5][6]，地方社区是实现国家公园共有、共建、共享的重要主体[7]。如果不能构建和谐的国家公园周边关系，形成当地居民和地方社区的正面感知、态度和行为，将可能阻碍国家公园的生态系统完整性及原真性保护[8]；唯有妥善处理国家公园的社会影响，才能实现生态保护和当地社区可持续发展的双赢[7][9]。

社会影响评估（Social Impact Assessment）的目标是创造一个可持续和公平的生物和人类环境[10][11]。这种评估方法目前已经得到国际社会关注和重视，推动了相关国际标准、政策法规的制定，在环境保护和可持续发展领域发挥了重要作用[10]。我国《国家公园总体规划技术规范》（LY/T 3188—2020）（以下简称《总规规范》）明确提出要进行社会影响评价，分析国家公园建设对社会、社区及所在区域的有利和不利影响，并提出相应的优化对策[12]。然而，我国的保护地社会影响评价研究还停留在起步阶段[13][14]，多为对经济[15][16]、福祉[9][17]、平等权利[18]~[20]、地方文化[21][22]等单一维度的评价，尚未形成系统性研究。虽然陈君帜等学者尝试从宏观视角构建基于国家公园社会影响的评价体系[13]，但未从当地社区“自下而上”的角度进行考量。此外，由于在评估内容、方向和数据分析方面的局限性，国际学界目前也尚未形成被广泛接受的评估框架[23][24]。

与此同时，仅有少数既有研究关注国家公园对周边不同地理区位社区的社会影响差异[25][26]。在政策层面，《建立国家公园体制总体方案》（以下简称《总体方案》）明确指出，“根据国家公园功能定位，明确国家公园区域内居民的生产生活边界……周边社区要与国家公园整体保护目标相协调……引导当地政府在国家公园周边合理规划建设入口社区和特色小镇”[27]，体现了对不同社区的政策差异。在研究层面，现有研究发现国家公园社区感知存在明显的空间差异[19][28][29]——例如，神农架国家公园周边属于旅游集散地的社区对旅游产生的经济影响感知最强烈，而距离核心景点较远的边缘社区对旅游产生的环境影响感知最强烈[25]——但仍未形成较系统的社会影响评估框架。也有研究证明，青藏高原国家公园群建设对周边不同空间耦合类型社区的可持续发展有差异化影响[26]。此外，对国家公园门户社区的研究集中于旅游发展影响[30][31]，较少有结合地方文化、平等权利等多方面的综合评价。与此同时，其他证据也强调了社区与景区的空间关系是影响社区可持续发展的关键要素，比如黄山和三河镇毗邻社区居民的旅游感知差异研究[30]~[32]。

在此背景下，本研究首先根据《总规规范》和《总体方案》，依据社区与国家公园的空间关系将周边社区分为界内社区、门户社区和边缘社区三类（图1，表1）。而后以大熊猫国家公园（唐家河园区）为例，从当地社区视角出发，采用问卷调研、半结构化访谈、主成分分析等方法，结合定性和定量评估，构建了适应我国国家公园建设的社会影响评估框架和方法，进而评估了国家公园体制建设对界内、门户和边缘社区的影响差异，并依此提出协调保护行动和社区发展建议。

2 研究设计

2.1 国家公园社会影响评估框架

广义的社会影响指“任何公共或私人行为对人类生活、工作、娱乐、相互关系等方面产生的影响”[33]。社会影响评估指评估计划实施事件的社会影响，并制定能够持续监测和管理这些影响的策略，它涵盖了

表 1：国家公园周边社区分类

	界内社区	门户社区	边缘社区
定义	位于国家公园边界以内，居民的生产生活与生态保护密切相关	位于国家公园的入口周边，承担入口交通组织、旅游服务等功能	位于国家公园边界以外，与生态保护有一定关联
基本开发政策	受限于严格的保护政策	受限于建设风貌要求	受限于具体的保护需求
社区调控类型	聚集提升；一般控制；搬迁撤并；特色保护	聚集提升	未明确提及
主导产业	传统农业、旅游业为主	旅游业为主	传统农业为主

对地方社区与其社会、文化、经济和环境之间互动方式的评估[11]。其起源可追溯到20世纪西方社会对第二次世界大战产生影响的科学分析[34]；20世纪70年代，社会影响评估首次作为法定要求出现在美国《国家环境政策法》中，自此逐渐在世界范围得到应用[35]。在生态保护领域，它被用于衡量保护区建立所产生的社会变化及其影响，涉及福祉、生计和权利等方面[36]。自然保护地社会影响评估关注的重点是受影响社区，可用于评估当地社区支持水平[37]、成本和利益分配情况[38]，是促进社区赋权、能力建设和社会资本的基础[11]。就评估框架分类指标而言，弗兰克·范克莱针对广义的社会影响提出了的七个分类和80余个指标[39]；针对欧洲自然保护地，尼古拉塔·琼斯等人将其社会影响总结为七大类——福祉、生计、地方文化、人权、社会关系、社会平等和知识，以及33个小类[36]。

在此基础上，本文结合中国国家公园体制建设的特征，提出包含六个潜在社会影响类型和19个指标[5][7][36][39]~[45]（图2，表2）的国家公园周边社区社会影响评估框架。其中，值得说明的是：第一，由于我国国家公园“自上而下”体制改革特征，在经济生计方面重点考虑国家公园管理机构为社区提供的就业机会及其对生计的影响；第二，出于对生态系统完整性和原真性的保护，在指标遴选时增加了传统知识、文化景观等要素[40]；第三，由于体制建设对“建立社区共管机制”的要求，在平等权利中增设了“参与管理”指标[41]。整体而言，除生计经济外，其他指标均为非经济类的社会影响。

2.2 案例概况

大熊猫国家公园（唐家河园区）位于四川省广元市境内，总面积约4万公顷。唐家河园区与青川县清溪镇、三锅镇所辖7个行政村接壤，包括1个界内社区、1个门户社区和5个边缘社区，总人口9 500余人[19]。自1978年唐家河国家级自然保护区建立以来，管理处在周边社区开展了产业扶持、宣教培训、技术支持等项目[46]。随着国家公园的设立，唐家河获得了更多的资金支持，在旅游产业、基础设施建设和维护、公益岗位、社区能力建设、野生动物肇事补偿等方面增加了投入；与此同时，对焚香烧纸、焚烧秸秆等行为进行了规范，产生了较为广泛的社会影响①。设立国家公园并没有改变当地社区与保护区的地理位置关系。为避免不同镇域在社区管理和政策方面存在的差异影响结果，本研究在清溪镇中选择落衣沟、阴平和东桥三个村作为研究对象。其中，落衣沟是唯一的界内社区，位于国家公园一般控制区，面临较严重的人兽冲突，也在国家公园建立后享受特殊的野生动物肇事补偿政策；阴平村是唯一的门户社区，在旅游产业发展上得到了农家乐发展政策支持、旅游培训、基础设施建设等诸多扶持；而东桥村是边缘社区的代表，以传统农业为主，选聘了社区护林员开展保护（表3）[19]。

2.3 数据收集

研究团队于2022年6月30日至7月6日开展实地调研。预调研于6月30日下午进行，调整问卷题目后，自7月1日开始正式调查。调研团队由2位具有丰富保护地研究经验的教师和8位风景园林及相关专业经过社区调研培训的研究生组成。调查以农户为基本单位，调研人员采取随机抽样的方式进行入户调查，并根据各行政村的农户规模收集超过总数10%数量的问卷。发放问卷至被调研的每户，由家庭成员中一名对社区情况最了解的成员完成。最终收集问卷303份，在剔除7份数据有误或缺失的问卷后，共获得296份有效问卷，有效回收率达97.69%。

① 整理自对唐家河管理处社区科访谈。

表 2：国家公园周边社区社会影响评估指标

类别	指标	指标描述	来源
经济生计（E）	E1：就业机会	社区居民有机会获得大熊猫国家公园管理局提供的就业机会	参考文献 [8][39]
	E2：利益共享	社区居民能够从大熊猫国家公园的管理中获取经济和其他利益	参考文献 [6]
	E3：成本分配	大熊猫国家公园管理局对社区居民做出的保护贡献进行适当补偿	参考文献 [8]
	E4：生计变化	大熊猫国家公园的保护管理不影响当地居民的传统生计和谋生方式	参考文献 [39][40]
地方文化（C）	C1：文化观念	大熊猫国家公园的建设有利于提升社区居民对家乡的认同感和自豪感	参考文献 [36]
	C2：传统知识	当地的传统知识被纳入大熊猫国家公园的保护管理中	参考文献 [40][44]
	C3：文化遗产	大熊猫国家公园的建设有效保护了当地的农业和文化遗产	参考文献 [36][40]
	C4：文化景观	大熊猫国家公园的建设保护了当地的传统民居及其他文化景观	参考文献 [40][45]
社会关系（S）	S1：社会网络	社区居民信任亲朋邻里	参考文献 [36][42]
	S2：社会凝聚力	社区居民之间没有冲突，联系紧密	参考文献 [36][42]
知识教育（K）	K1：能力建设	社区居民能够参与大熊猫国家公园组织的技能培训、产业扶持等项目	参考文献 [43]
	K2：环境教育	社区居民能够参与大熊猫国家公园组织的有关自然保护的宣传教育活动	参考文献 [36][43]
	K3：环境行为	社区居民能够参与大熊猫国家公园的森林防火、巡护等环境保护工作	参考文献 [36][42]
生活环境（L）	L1：生活环境宜居性	大熊猫国家公园的建设有效保护了社区周边的自然环境	参考文献 [39][42]
	L2：基础社会服务和设施	大熊猫国家公园的建设优化了周边社区的基础社会服务和设施	参考文献 [39][42]
平等权利（R）	R1：法定权利	大熊猫国家公园体制建设尊重社区居民的法定和传统权利	参考文献 [36][39]
	R2：土地权属	大熊猫国家公园与当地居民无土地所有、使用和经营权属纠纷	参考文献 [39][41]
	R3：参与决策	大熊猫国家公园管理局的决策制定能充分尊重社区居民的意见	参考文献 [39][41]
	R4：参与管理	社区居民能够实际参与大熊猫国家公园的规划和管理	参考文献 [8][41]

表 3：社区基本信息

社区类型	行政村	户数	土地面积	主要产业	社区管理措施
界内社区	落衣沟村	470	62.0 km^2	旅游业、种植业、养殖业	野生动物肇事补偿、农家乐产业扶持、中蜂养殖培训、基础设施建设、护林员聘用等
门户社区	阴平村	642	39.7 km^2	旅游业、种植业	农家乐产业扶持、中蜂养殖培训、基础设施建设、护林员聘用等
边缘社区	东桥村	445	27.92 km^2	种植业、养殖业	中蜂养殖培训、护林员聘用等

注
本表中的信息来自青溪镇人民政府公开数据，以及与社区和管理局的访谈内容。

调查问卷由人口统计学信息和社会影响感知两个部分组成。人口统计学信息包含性别、年龄、教育程度、职业、家庭收入等；社会影响感知包括六个方面共19个题项 / 指标（表2），通过五级李克特量表进行评价（其中1为非常不同意，5为非常同意）。此外，调研团队还对唐家河国家级自然保护区管理处社区科、保护科，青溪镇人民政府、各村委会干部、社区居民代表进行了13次半结构化访谈，内容涵盖社区管理现状、保护管理政策、对影响的感知及其原因等，以分析具体的社会影响。

2.4 数据分析

2.4.1 人口统计学信息

由表4结果可见，女性受访者比例（53.7%）略多于男性（46.3%）。受访者年龄普遍偏大，超过80%的受访者大于50岁。受教育程度普遍较低，只有约36.1%的受访者受过初中及以上教育。受访者中78.4%为农民，年收入也普遍较低，超过65%的家庭年收入不到3万元。近90%的受访者在唐家河园区居住超过20年。唐家河园区周边社区是典型的农村社区，存在显著的受教育程度低和人口外流问题[47]，因此该样本具有代表性。

2.4.2 信效度检验

采用SPSS 28.0统计软件进行信度分析，发现经济生计、平等权利及生活环境三个维度未通过信度检验。根据删除项后的克隆巴赫系数（α系数）值，分别剔除生计变化（E4）和土地权属（R2）后，经济生计、平等权利维度系数分别为0.747和0.703（＞0.7），通过信度检验；而生活环境维度只包含两个指标，因无法通过信度检验而被剔除。总体α系

表 4：受访者人口统计学特征

人口特征		受访人数（*n*=296）	占比（%）
性别	男	137	46.3
	女	159	53.7
年龄（岁）	＜ 40	32	10.8
	40~49	19	6.4
	50~59	102	34.5
	60~69	64	21.6
	＞ 69	79	26.7
受教育程度	未受教育	67	22.6
	小学	122	41.2
	初中	74	25.0
	高中	21	7.1
	本科及以上	12	4.0

续表见下页

表 4：受访者人口统计学特征

人口特征		受访人数（*n*=296）	占比（%）
职业	农民	64	78.4
	其他	104	21.6
家庭收入水平（元）	＜ 10 000	90	35.1
	10 000~30 000	45	30.4
	30 001~50 000	38	15.2
	50 001~100 000	19	12.8
	＞ 100 000	104	6.4
户籍	落衣沟村	132	35.1
	阴平村	60	44.6
	东桥村	12	20.3
居住时长	＜ 10	22	4.1
	10~20	262	7.4
	＞ 20		88.5

表 5：正交旋转后的主成分矩阵

	E	C	S	K	R
E1：就业机会	0.755	—	—	—	—
E2：利益共享	0.818	—	—	—	—
E3：成本分配	0.746	—	—	—	—
C1：文化观念	—	0.732	—	—	—
C2：传统知识	—	0.537	—	—	—
C3：文化遗产	—	0.812	—	—	—
C4：文化景观	—	0.691	—	—	—
S1：社会网络	—	—	0.915	—	—
S2：社会凝聚力	—	—	0.868	—	—
K1：能力建设	—	—	—	0.784	—
K2：环境教育	—	—	—	0.804	—
K3：环境行为	—	—	—	0.694	—
R1：法定权利	—	—	—	—	0.720
R3：参与决策	—	—	—	—	0.805
R4：参与管理	—	—	—	—	0.678

数为0.819，高于0.7，说明题项设计有较好的可信度。调整后的评价框架如表5所示。

在效度检验中，KMO值为0.779，巴特利检验显著性结果为$P<0.001$，适宜进行探索性因子分析。主成分分析用于探索15项指标的内在联系，利用最大方差法旋转确定了五个主成分（表5），与原假设一致。累计方差贡献率为66.4%，高于60%，表明量表具有较好的结构效度。

2.4.3 社会影响感知计算

使用主成分分析的方法将原始指标根据权重转换为得分，以避免原始指标的相互影响。首先将各成分的成分系数乘以各指标的感知得分，然后将单个指标得分相加，分别得到五个主成分的得分[48]，计算公式为：

$$y_j = \sum_{j=1}^{15} M_m L_{jm} , \quad (1)$$

式中，y_j为第j个主成分的得分（j=1，...，5）；M为第m个指标的感知评分（m=1，...，15）；L为第j个主成分中第m个指标的成分系数。

表 6：社会影响评估指标及权重

类别	指标	权重	总权重
经济生计（E）	E1：就业机会	7.34%	20.75%
	E2：利益共享	7.43%	
	E3：成本分配	5.98%	
地方文化（C）	C1：文化观念	6.48%	26.81%
	C2：传统知识	6.34%	
	C3：文化遗产	6.40%	
	C4：文化景观	7.59%	
社会关系（S）	S1：社会网络	5.63%	12.29%
	S2：社会凝聚力	6.66%	
知识教育（K）	K1：能力建设	6.70%	19.47%
	K2：环境教育	6.16%	
	K3：环境行为	6.61%	
平等权利（R）	R1：法定权利	4.77%	20.66%
	R3：参与决策	7.60%	
	R4：参与管理	8.29%	

再将各主成分综合得分乘以该成分在社会影响中的权重并求和，得到社会影响感知的综合值[48]，计算公式为：

$$Z = \sum_{j=1}^{5} y_j b_j , \quad (2)$$

其中，b_j为第j个主成分的权重，Z为社会影响感知的综合评分。

主成分值和社会影响感知综合值的范围均为1 ~ 5，其中分值［1，2）表示非常消极，［2，3）表示较为消极，［3，4）表示较为积极，［4，5）表示非常积极。

本文使用因子分析法计算指标权重（表6）[49]，以解释变量之间的共同变异，并根据其贡献程度确定权重。同时，这也有利于了解社区本身对社会影响各维度的观念和态度。

最后，使用单方差分析探索社区居民的社会影响感知在不同社区之间的差异，并根据方差齐性检验结果对有显著差异的社会影响维度使用邦弗伦尼（方差等）或塔姆黑尼（方差不等）进行多重比较，以确定差异的方向和程度。

3 社区居民社会影响感知的评估结果及差异

3.1 社会影响的评估结果

如表7和图3结果所示，唐家河总体社会影响感知得分为2.654，低于3，略偏消极。各维度影响感知程度从高到低依次为：社会关系、地方文化、平等权利、经济生计和知识教育。

在五个维度中，社会关系维度的影响感知综合得分最高（3.983），村民普遍表示信任亲朋邻里（S1，4.331），与村社联系紧密（S2，4.162）。其次，地方文化维度的影响（3.571）也得到了村民的积极感知，因为国家公园建设尊重传统文化知识（C2，3.412），并保护当地文化遗产和景观（C3，3.243；C4，3.791)。而村民对平等权利维度的影响感知一般（3.011），村民在一定程度上认可管理处对法定和传统权利的尊重（R1，3.382），但普遍没有参与管理（R4，2.280）和决策（R3，2.625)。

此外，村民对经济生计维度影响的感知（2.098）较为消极，且所有指标得分都偏低（低于3），表明村民对管理处在促进经济发展和利益共享方面的工作不太满意。最后，村民对知识教育维度影响的感知最为消极（0.811），所有指标得分均较低，特别是在能力建设（K1，1.709）和环境行为（K3，1.605）方面，表明村民在知识教育维度的诉求尚未得到满足。

3.2 社会影响感知的社区差异

比较各行政村在15个指标上的均值和主成分值（表8），发现社会影响感知的综合得分从高到低依次为：门户社区、界内社区、边缘社区。通过单因素方差分析确定村民的社会影响感知与其所在村类型之前的关系，发现除“经济生计”维度外，不同行政村村民对其他四个维度的社会影响感知均有显著差异（表9）。

研究继而通过多重比较分析确定不同社区间的差异方向和程度（表8，10）。在地方文化维度，村民对影响感知的积极程度从高到低依次为：门户社区（阴平村）、界内社区（落衣沟村）、边缘社区（东桥

表 7：社会影响评估结果

类别	指标	主成分值	平均值	标准差
经济生计（E）	E1：就业机会	2.098	2.757	1.057
	E2：利益共享		2.780	0.984
	E3：成本分配		2.456	1.096
地方文化（C）	C1：文化观念	3.571	3.598	1.019
	C2：传统知识		3.412	0.784
	C3：文化遗产		3.243	0.952
	C4：文化景观		3.791	0.824
社会关系（S）	S1：社会网络	3.983	4.331	0.682
	S2：社会凝聚力		4.162	0.772
知识教育（K）	K1：能力建设	0.811	1.709	1.129
	K2：环境教育		2.277	1.418
	K3：环境行为		1.605	1.140
平等权利（R）	R1：法定权利	3.011	3.382	1.056
	R3：参与决策		2.625	1.187
	R4：参与管理		2.280	1.049
社会影响感知综合值		**2.654**	**2.961**	

村）。结合表8可知，阴平村在地方文化维度的所有指标上均得分最高，落衣沟村对文化观念（C1，3.35）和传统知识（C2，3.37）的感知最消极，东桥村村民则对文化遗产（C3，3.00）和景观保护（C4，3.48）的感知最消极。社会关系维度的影响感知积极程度排序与地方文化维度相同，其中东桥村对社会网络（S1，4.17）和社会凝聚力（S2，3.93）的感知均最消极。在知识教育维度，影响感知积极程度从高到低依次

表 8：各行政村社会影响评估结果

指标和类别	界内社区（落衣沟村）	门户社区（阴平村）	边缘社区（东桥村）
E1：就业机会	2.71	2.83	2.68
E2：利益共享	2.83	2.83	2.58
E3：成本分配	2.48	2.52	2.27
经济生计成分值	**2.13**	**2.09**	**2.05**
C1：文化观念	3.35	3.83	3.52
C2：传统知识	3.37	3.45	3.42
C3：文化遗产	3.14	3.43	3.00
C4：文化景观	3.80	3.92	3.48
地方文化成分值	**3.37**	**3.79**	**3.45**
S1：社会网络	4.36	4.39	4.17
S2：社会凝聚力	4.13	4.29	3.93
社会关系成分值	**3.98**	**4.06**	**3.82**
K1：能力建设	1.89	1.75	1.30
K2：环境教育	2.49	2.30	1.85
K3：环境行为	2.07	1.41	1.23
知识教育成分值	**1.21**	**0.72**	**0.33**
R1：法定权利	3.09	3.63	3.35
R3：参与决策	2.54	2.83	2.32
R4：参与管理	2.29	2.38	2.05
平等权利成分值	**1.96**	**2.27**	**1.96**
社会影响感知综合值	**2.50**	**2.55**	**2.29**

注
各指标结果为平均值，成分值和总值为权重计算值。

表 9：单因素方差分析结果

因变量	平方和	自由度	均方	*F*	显著性
经济生计	1.939	2	0.970	1.332	0.266
地方文化	5.36	2	2.680	6.224	0.002**
社会关系	3.401	2	1.700	3.967	0.020**
知识教育	18.532	2	9.266	10.052	< 0.001***
平等权利	8.281	2	4.140	5.616	0.004**
社会影响感知综合值	**3.967**	**2**	**1.983**	**6.886**	**0.001****

注
* 表示 $P < 0.05$，** 表示 $P < 0.01$，*** 表示 $P < 0.001$。

为：界内社区、门户社区、边缘社区。边缘社区居民的能力建设（K1，1.30）、环境教育（K2，1.85)和环境行为（K3，1.23）得分都显著低于另外两个社区。平等权利维度影响的感知积极程度从高到低依次为：门户社区、界内社区、边缘社区。其中，界内社区居民对尊重法定权利（R1，3.09）的感知最差，边缘社区居民在参与决策（R3，2.32）和管理（R4，2.05）方面感知最消极。

3.3 社会影响差异的形成原因

基于定量数据分析和访谈调研，研究归纳总结了三个社会影响差异的形成原因：保护政策、产业经济、区位交通。其中，保护政策因素会直接作用于所有的社会影响维度，产业经济会增加影响的程度，而区位交通的差异是根本原因。

首先，不同社区间保护政策的差异是导致社会影响差异的直接原因。对界内社区而言，该村设有社区共管委员会，开展技能培训、生态保护宣传等活动，并为村民提供了较多公益岗位，由此村民更容易参与生态保护和社区管理，从而促进知识教育维度影响的积极感知[50]。同时，野生动物肇事补偿政策只在界内社区试行，促进了经济生计维度影响的积极感知。然而，由于位于国家公园边界以内，其土地利用、房屋和基础设施建设受《自然保护区管理条例》严格限制，又致使其产生了对地方文化、平等权利维度影响的消极感知[51]。对于门户社区，镇政府和公园管理处大力支持并投资参与门户社区建设（包括风貌改造、基础设施建设等），提供优惠贷款促进家庭旅馆的发展，促进了门户社区对地方文化、平等权利维度影响的积极感知[19]，村民普遍表示“政府政策好”。对边缘社区而言，其公益岗位名额最少，村民缺乏能力建设和接受环境教育的机会，导致其对知识教育、平等权利维度影响的感知最为消极，访谈中也多次有居民表示“从来不征求我们的意见”“想参与管理也没有机会”等。此外，人兽冲突严重的边缘社区缺少野生动物肇事补偿机制，导致其对经济生计维度影响的感知更为消极[19]。

其次，社区产业类型的不同造成了地方文化、社会关系方面的影响差异[32][52]。大熊猫国家公园（唐家河园区）以第一产业（农林和畜牧业）和第三产业（旅游服务业）为主。野生动物掠夺庄稼、捕猎牲畜的现象导致边缘社区和界内社区的农林畜牧业受到较大干扰（在访谈中有村民表示“一年到头几乎没有收成”），导致人口外流、文化流失和社会关系疏离等负面社会影响。除此之外，国家公园体制建设在旅游基础设施、旅游服务培训、文化品牌塑造上加大投入，能够积极推动门户社区的地方文化发展，社区之间的差异也随之加大；另一方面，旅游产业中形成的农家乐联盟、民宿协会等经营者组织也增进了门户社区的社会关系。

最后，地理区位和交通条件的不同是造成社会影响差异的根本原因。尤其在旅游方面[30][31]，门户社区和界内社区位于进入国家公园游憩资源的必经之路，具备旅游发展优势，促进了旅游资源和政策向其倾斜，产生了比边缘社区更为积极的社会影响感知。针对黄山国家公园和九寨沟国家公园等的研究也发现，旅游核心社区居民的社会影响感知更积极[30][31][53]。此外，界内社区受到更多生态保护的要求和限制，同时也享受国家公园体制建设过程中优惠政策的倾斜；而边缘社区由于地处偏远，得到的政策支持非常有限。

总体而言，不同地理区位的社区受到国家公园政策不同程度的影响，导致各社区发展状况差异加大，进而形成了社会影响感知的显著差异。界内社区在不同维度影响上的感知都最为明显（更积极或更消极），比如野生动物肇事补偿、公益岗位的增加促进了较为积极的社会影响感知；而更严格的保护管理政策又导致较为消极的社会影响感知。相较而言，边缘社区几乎未享受政策倾斜，同时受到的保护限制也较少，因而对国家公园社会影响的感知较低。但由于野生动物冲突和村民“被边缘化”的感受，仍然导致了部分消极感知。

4 讨论

4.1 关注国家公园非经济类的社会影响

本文提出了适应于中国国家公园社会影响的评估框架，并通过主成分分析法提取了经济生计、地方文化、社会关系、知识教育、平等权利五个影响维度。大熊猫国家公园（唐家河园区）社会影响评估的指标权重结果显示，部分非经济的社会影响指标，如参与管理（R4，

表 10：三类社区社会影响感知评估事后检验结果

因变量	方法	（I）社区	（J）社区	平均值差值（I–J）	标准误差
地方文化	塔姆黑尼	界内社区	门户社区	–0.24563*	0.0906
		界内社区	边缘社区	0.05929	0.09872
		门户社区	边缘社区	0.30492**	0.08954
社会关系	邦弗伦尼	界内社区	门户社区	–0.09193	0.08584
		界内社区	边缘社区	0.19519	0.10614
		门户社区	边缘社区	0.28712*	0.10194
知识教育	塔姆黑尼	界内社区	门户社区	0.32993*	0.13607
		界内社区	边缘社区	0.68953***	0.13325
		门户社区	边缘社区	0.35960**	0.11812
平等权利	塔姆黑尼	界内社区	门户社区	–0.30915*	0.11721
		界内社区	边缘社区	0.06560	0.13437
		门户社区	边缘社区	0.37475**	0.12208
综合社会影响	**塔姆黑尼**	**界内社区**	**门户社区**	**–0.08444**	**0.07492**
		界内社区	**边缘社区**	**0.22526****	**0.07869**
		门户社区	**边缘社区**	**0.30970*****	**0.07049**

注
* 表示 $P < 0.05$，** 表示 $P < 0.01$，*** 表示 $P < 0.001$。

8.29%）、参与决策（R3，7.60%）及文化景观（C4，7.59%）均比经济类指标（E1：就业机会，7.34%；E2：利益共享，7.43%；E3：成本分配，5.98%）更受社区居民重视。这表明经济生计并不一定是最关键的社会影响因素：社区居民渴望自己的文化受到尊重，希望参与国家公园建设，重视自己“当家作主”的权利，同时也期待在生态保护过程中获得知识和技能[54]。然而，既有的研究通常更关注经济类社会影响因素[55]，如旅游业发展[56]、社区共管及保护政策对生计的影响[57]~[59]，对非经济类社会影响因素关注不足。因此，未来的国家公园社区管理有必要为社区居民提供更多与能力建设、环境教育相关的机会，促进居民提高自身综合素质，鼓励其有效参与国家公园建设[54]。

4.2 提升对国家公园边缘社区的重视程度

本研究发现三类社区对国家公园建设的社会影响感知程度从高到低依次为：门户社区、界内社区、边缘社区。这主要是因为大多数边缘社区既得不到如门户社区的旅游发展机遇，也得不到如界内社区的保护政策倾斜，导致了在社会经济、知识教育等方面更为消极的社会影响感

知。相似的情况出现在神农架国家公园，由于缺乏旅游发展条件，边缘社区在经济生计方面的影响感知更消极[25]；马奔等人也发现大熊猫自然保护区周边社区承担了更多的直接成本，直接收益却更少[60]。因此，本研究呼吁，未来的国家公园建设应更多地关注边缘社区的发展，采取相应政策倾斜。例如，法国国家公园提出“加盟区”（Aire d'adhésion）理念，鼓励保护区边缘社区加入保护联盟，并在资金、技术和税收等多方面保障加盟社区的权益，促进其基础设施建设和经济可持续发展[61]。

4.3 对大熊猫国家公园的政策建议

大熊猫国家公园（唐家河园区）对周边社区产生社会影响的消极感知主要体现在知识教育、平等权利和经济生计方面，未来应当在政策层面予以优化。第一，发展边缘社区特色产业。门户社区容易借地理区位快速发展，而边缘社区却较难从生态保护中获益。边缘社区可挖掘自身条件特点，发展生态农林品牌和小微旅游度假产品，实现产业结构转型[4][59]。第二，优化社区政策体系。社会影响的提升要求更公平的政策制定和分配过程，一方面要建立公平的人兽冲突补偿机制等，避免边缘社区“只承担保护成本、不享受保护收益”；另一方面要保障界内社区居民的日常生产生活需要，避免采用“一刀切”的过度限制政策[62]。第三，完善社区参与机制。要重视当地社区的能力建设和环境教育，这是社区居民有效参与的基础[50]；此外，要在参与层次上促进社区参与向更高赋权程度发展，并扩大参与范围以覆盖更多的周边社区和人群[63]。

4.4 研究局限和未来建议

大熊猫国家公园位于我国经济欠发达地区，人兽冲突显著，其社会影响评价对海南热带雨林国家公园、东北虎豹国家公园等特征相似的国家公园有借鉴意义。本文提取了适应我国国家公园的社会影响评估指标，但在生活环境宜居性、基础社会服务和设施等“生活环境”维度有所欠缺，指标未能通过信度检验。这可能是因为大熊猫国家公园建设对生活环境的改变尚未见成效，导致受访者对此感知差异大。建议未来研究在考虑生活环境维度时依据案例背景，仔细考量设计评估指标。此外，本研究在三类社区中仅各选择了一个典型村作为研究对象，可能在研究结果的普适性上存在不足。未来研究可对多个社区进行分类和比较研究，加强研究结论的普适性。

5 结论

本研究以大熊猫国家公园（唐家河园区）为案例，比较了在国家公园建设过程中，界内社区、门户社区和边缘社区居民对于社会影响的感知差异。既往研究更侧重于经济效益和生态影响，而社会影响往往被忽视。本研究填补了已有研究对非经济类社会影响因素讨论的不足，研究结果为国家公园管理和社区可持续发展提供了新的认知视角。此外，研究还强调重视边缘社区的可持续发展。这些社区可能面临资源匮乏、经济落后等更大的挑战，因此需要给予特别关注和支持，以确保其在国家公园建设和发展过程中能够持续受益。研究针对各个社区的政策提出了改善和优化建议，包括更合理地分配资源、提升社区基础设施和服务，以及加强与国家公园管理部门的合作，以促进社区的可持续发展。

我国国家公园的社会影响评价还处于起步阶段。在理论层面，有必要系统性构建适应我国国情的指标体系、科学制定社会影响评估的阶段和周期，横向对比不同国家公园 / 不同社区的社会影响感知差异。在实践层面，需要确立社会影响评估后社区管理政策调整的原则和方针，采用多元化策略降低国家公园建立的负面社会影响，促进国家公园“全民公益性”理念的在地实现。

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图 1. 三类社区位置分布
图 2. 社会影响的类别及其释义
图 3. 社会影响评估结果分布