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An Evaluation of National Park System Pilot Area Using the AHP-Delphi Approach: A Case Study of the Qianjiangyuan National Park System Pilot Area, China

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Abstract: With the national park as an important measure of ecological protection, China has started 10 national park system pilot areas. However, the research on the comprehensive evaluation of national park construction and development is insufficient. The main purpose of this study was to establish a comprehensive evaluation index system for the pilot area of the national park system. The method of the Analytic Hierarchy Process combined with the Delphi method by ten relevant experts was used. The comprehensive evaluation index system for the national park system pilot areas was composed of the objective level and the criteria level which includes three items: natural resource conditions; research, education and recreation functions; and protection and management conditions. The indicator level involved seven items and the factor level included 31 items. Furthermore, the weight of each item in these levels was obtained through the Delphi method by the judgement of selected experts. The Qianjiangyuan National Park System Pilot Area (QNPSPA) was selected as the study case for empirical research. The score of the comprehensive evaluation of the QNPSPA was 90.801, which belongs to Grade I in the five catalogues, indicating its comprehensive construction level was very high and its protection and management measures were efficient. However, significant deficiencies also existed in the area suitability, recreation facilities and production, natural resource property rights, human landscape value and ecosystem integrity. To address these problems, five suggestions were proposed. For example, strengthening cross-administrative cooperation and communication, improving the construction of recreational facilities, etc. The evaluation framework proposed in this study could play a positive role in the construction evaluation of the pilot areas of national parks in China and is conducive to promoting the evaluation research of national parks in China and promoting the development of conservation and construction.

Keywords: national park; AHP-Delphi; evaluation; Qiangjiangyuan; natural resource; management and protection

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1. Introduction

The rapid economic growth in China since the reform and opening-up has created increasingly serious environmental problems. The national park, as the main body of the nature reserve system, has gradually become a core policy of ecological protection in China [1,2], and has been regarded as one of the major initiatives to meet the growing demand of the people for a better ecological environment.

National parks originated from the idea of preserving the beautiful natural landscapes of the West in the 19th century in the United States [3]. The national park movement has gradually grown to more than 100 countries and regions around the world since

1872, and the International Union for Conservation of Nature (IUCN) classifies "national parks" into the category of "protected area" [4,5]. The development of the national park movement in the world over the past hundred years has led to great progress in terms of ideological understanding and technical methods [6–9]. China established the first nature reserve in 1956, and gradually formed a system of nature reserves including the nature reserve area and the scenic area. However, at present, China's nature reserve areas face problems of multiple management, overlapping and fragmentation, and important ecosystems and landscape resources have not been systematically protected [7,8,10–12].

The connotation of the national park varies in different countries. In 1916, the US National Park Service Organic Act was created, which defined the functions of national parks [13] and stated in its definition that the purpose of national parks is to preserve natural resources and culture and provide areas for recreation for the population, while emphasising that national parks are the public property of the state. Australia was the second country in the world to establish a national park, and its concept of a national park focuses on large terrestrial areas that are protected, have unspoiled landscapes and are home to a large diversity of native species [14]. Japan, the first Asian country to establish a national park, defines the national park in its natural park law with a focus on beautiful landscapes and their outstanding ecosystems [12]. Although the definition of a national park varies from country to country, the IUCN definition of a national park is the one that has gained international recognition [15]. The IUCN's definition emphasises the aspect of size and considers that a large-scale ecosystem requires a large natural area to be protected to ensure that the wildlife in the area can survive normally, while at the same time being able to provide opportunities for recreation and education without damaging the environment [16]. From these concepts, it can be found that they all embody the sustainable development vision of protecting and making rational use of natural and cultural resources, namely the scientific ecological concept [17]. Similarly, the definition of national parks in China also emphasises that the purpose of establishing national parks is to protect large areas of natural ecosystems that are representative of the country [18].

It is clear from the connotation and development of national parks that they were originally established to protect the natural environment, for the citizens to enjoy nature, to be educated in natural sciences and to preserve natural resources as a legacy for future generations. Many scholars have studied these characteristics of national parks, which revolve around their basic attributes of nature conservation. Chen, Huang and Yan (2014) propose that the three fundamental characteristics of national parks are public welfare, state-steering and scientific character [19]. Compared to the common characteristics of international national parks, the Chinese national park focuses more on the protection of natural ecosystems and the restoration of national ecological security barriers. More emphasis is placed on holistic and strict protection, building a system of nature reserves from the perspective of an ecological civilisation through strong administrative regulation, as well as the combination of ecological protection and the elimination of community poverty [5,11]. China's national parks take ecological protection as the priority, while insisting on national representation and public welfare for all citizens. The priority given to ecological protection means that our national parks should be strictly protected, and all management measures should be aimed at protecting the ecosystem. National representativeness and public interest for all people means that the natural resources in national parks belong to all people and that the public has the right to enter the national parks, receive nature education and participate in the management and protection of the national parks [18].

In 2015, the Pilot Scheme for establishing the national park system was introduced in China, and 10 pilot areas for the national park system were established accordingly across the country [18]. The purpose of the pilot areas is to lay the foundation for the formal establishment of national parks in China and to explore the protection and management mechanism of national parks. Based on China's situation of dense population and vast territory, it's necessary to develop a national park system with Chinese characteristics, resolving the conflict between the development of local communities and ecological protection, and the need to coordinate and balance the interests of all parties. Therefore, it is vital to conduct comprehensive and scientific evaluation research, for example, the study of an evaluation index system, that can reflect the current state of conservation and management in the pilot areas.

In terms of research on the evaluation of national parks, more studies have been conducted in foreign counties as their national parks have been developed for a long time. However, the development of national parks in China is still in its infancy, and there is relatively little research on the evaluation of national parks. The evaluation research of national parks in foreign countries is mostly focused on their ecosystems, flora and fauna resources, landscape quality and the degree of human intervention. The emphasis on the evaluation criteria of national parks varies from country to country based on their different areas, populations and environmental conditions [2,7,10–15,17,19–22]. As the national park system in China has just been established in October,2021, many scholars focus on the entry criteria of national parks in China [10,23,24]. However, the research on the comprehensive evaluation of national parks is relatively limited, and most of them are to establish the evaluation system based on the evaluation criteria of other nature protected areas in China, such as nature reserves, national forest parks and national scenic areas [2,11,12], instead of the connotation of national parks and the current construction situation of the pilot areas in China. Therefore, in this context, for the national park system currently under construction in China, it is important to summarise the construction experience in national park system pilot areas and evaluate their resource status and construction level for the further establishment of national parks and the development of the national park in China in the future.

The Qianjiangyuan National Park System Pilot Area (QNPSPA), one of the 10 national park pilot areas established in 2016, is located in the west of Zhejiang Province, China. It has the feature of the low-altitude subtropical evergreen broad-leaved forest that is rare in the world. It has an area of approximately 252 km^2 and a total population of 9744. The main purpose of the pilot area is to protect the important ecosystem of the Qianjiangyuan as well as their ecological services. The territory of QNPSPA is based on the watershed of the Qianjiang river source including the Gutianshan National Nature Reserve, the Qianjiangyuan National Forest Park and the Qianjiangyuan Provincial Scenic Area [20,25,26]. The goal of the pilot project is to achieve "unified, standardized and efficient" protection and management of natural resources in the pilot area through the integration and establishment of substantive management institutions, thus forming a replicable and scalable experience in the construction of the national park system. This would provide an innovative demonstration for the construction of ecological civilisation preservation in surrounding areas, especially in the river source areas [18]. However, the comprehensive evaluation of QNPSPA is still lacking to extract its successful construction experience.

Therefore, this paper aims to determine a comprehensive, scientific and practical evaluation system for national park system pilot areas. Specifically, the objective is to construct a comprehensive evaluation index system for the national park system pilot area through the Delphi method with an expert panel and quantitatively evaluate the construction level of QNPSPA using the Analytic Hierarchy Process approach. In this study, the quantitative results of the current level of QNPSPA can be obtained to comprehensively evaluate the construction quality and protection management. What's more, the establishment of the comprehensive evaluation system is conducive to discovering and fulfilling the shortcomings of the pilot area in the process of construction and development, providing some reference for its future development and making efforts for the further improvement of the theoretical framework of Chinese national park study.

2. Materials and Methods

2.1. Study Area

The Qianjiangyuan National Park System Pilot Area (QNPSPA) is located in Kaihua County, Quzhou City, Zhejiang Province, China (Figure 1). It covers an area of about 252 km^2. It is located in the west of Zhejiang Province and shares a border with Jiangxi Province and Anhui Province. It is adjacent to the Wuyuan County Forest Bird Nature Reserve, Jiangxi Province in the west and the Lingnan Provincial Nature Reserve in Huining County, Anhui Province in the north. QNPSPA is located in the source of the Qiantang River, the mother river of Zhejiang Province, which is a national key ecological function area and an important connecting node for the ecological environment in the east-central region. The QNPSPA is surrounded by rich tourism resources in its one-hour traffic circle including the scenic area of Huangshan Mountain, Qiandao Lake and Jiangxi Wuyuan as well as the World Natural Heritage Site of Sanqing Mountain.

The QNPSPA belongs to the central subtropical humid monsoon zone with relatively high rainfall and sufficient light throughout the year. There are two river systems in this area, which are the Gutian Mountain water system and the Qiantang River water system. Moreover, the mountains here are part of the Baiji Mountain Range, which is bordered by the Tianmu Mountains to the north and the Huaiyu Mountains to the south. These mountains are mainly composed of granite and have a complex topography. The QNPSPA is rich in flora and fauna with more than 1991 species of higher plants and 480 species of animals. The luxuriant forest vegetation creates a good ecological environment for animals to inhabit and breed and is an important habitat for the white-necked long-tailed pheasant, the black muntjac, the clouded leopard and the leopard, which are protected at the national level. What's more, there are also 34 species of key protected animals of the second level of the country living in this area.

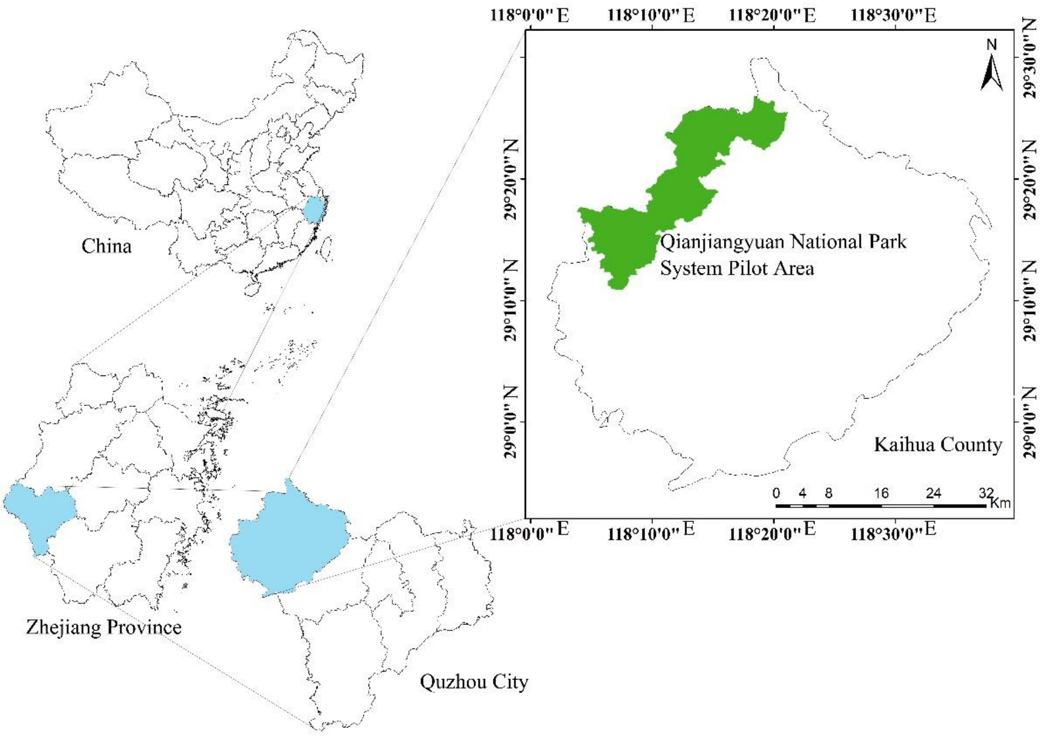

Figure 1. The location of the Qianjiangyuan National Park System Pilot Area.

The QNPSPA involves four townships in Kaihua County, namely Su Zhuang, Chang Hong, He Tian and Qi Xi, including 19 administrative villages with a population of 9744. Residents in this pilot area make their living by growing cash crops such as maize, rice, Colza oil and oil tea. Moreover, this region has a long history and a rich cultural heritage. Historically, as mountain farming and forestry were the main sources of livelihood for local people, a rich variety of oral literature, folk music, folk dances, folk operas and folk crafts were created in the process of agricultural and forestry production; Mangshan singing, Hengzhong jumping horse lantern, Majin carrying a lantern and other folk performing arts.

Currently, the QNPSPA is divided into four zones (Figure 2), including the core protection area, ecological conservation area, recreation display area and traditional use area, according to the different degrees of exploitation and the needs of residents [27,28].

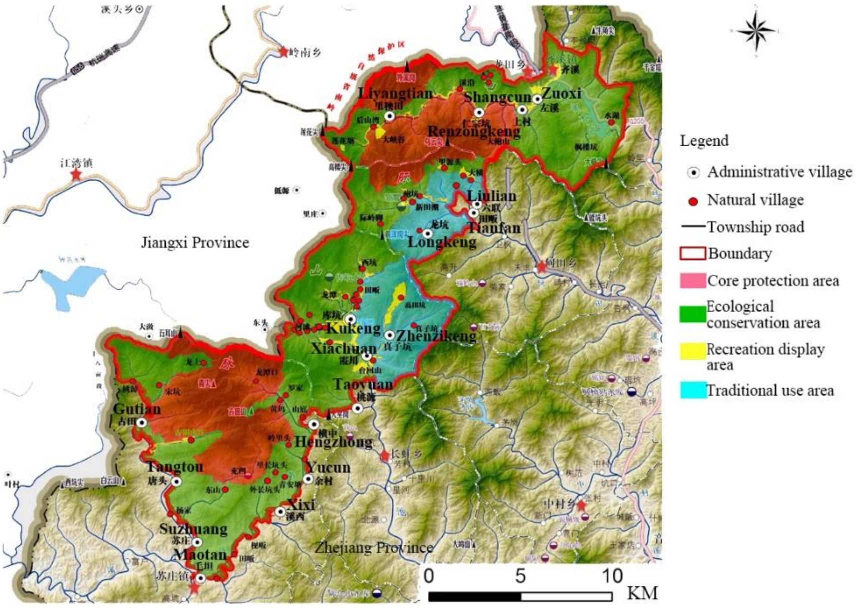

Figure 2. The functional zones of the Qianjiangyuan National Park System Pilot Area [27].

2.2. Research Method

The study was conducted in three stages. The first stage was conducted using the Delphi method to establish a comprehensive evaluation system. The second stage was to ascertain the level of the weightings for each item in the evaluation system using the Analytic Hierarchy Process (AHP) and the Delphi method. The last stage was the calculation of the weightings level and values of each evaluation system item in the QNPSPA; therefore, the overall score for the evaluation of the QNPSPA as well as the score of other items can be concluded.

2.2.1. Delphi Method

The Delphi method is a well-known communication technique that depends on a panel of experts in the specific field to determine the tough problem [29]. These experts gave their decisions based on their understanding of national parks and their research background. In this study, we selected 10 experts who have expertise in landscape architecture, urban planning, tourism management or forestry. These disciplines are the most relevant with national parks [30]. These chosen experts all worked in Zhejiang Province, China and are familiar with the QNPSPA. Their detailed information is shown in Table 1.

Table 1. The expertise and sphere of selected 10 experts.

Respondent	Expertise	Sphere
R1	Landscape architecture	Researcher in Zhejiang Agriculture and Forestry University
R2	Landscape architecture	Planner in planning institute
R3	Landscape architecture	A member of staff in the QNPSPA
R4	Forestry	Researcher in Zhejiang Agriculture and Forestry University
R5	Forestry	Researcher in Zhejiang Agriculture and Forestry University
R6	Forestry	A member of staff in the QNPSPA
R7	Tourism management	Researcher in Zhejiang Agriculture and Forestry University
R8	Tourism management	Planner in planning institute
R9	Urban planning	Researcher in Zhejiang Agriculture and Forestry University
R10	Urban planning	Planner in planning institute

There are three steps for the Delphi method in this study. The first was to determine the suitable indicators for evaluating the national park system pilot areas based on the screening of existing literature at home and abroad. In this process, the indicator was adjusted when the number of experts over the threshold of 1/3 retained the indicator or considered that the indicator should be deleted. After several rounds of judgement, the final evaluation system for the national park system pilot area could be obtained. The second step for the Delphi method was to acquire the level of weightings of each item established above. As it is an important part of the AHP, it will be explicated in Section 2.2.2. Lastly, the expert panel also needs to provide the score of indicators that cannot be collected directly through existing statics about the QNPSPA.

2.2.2. Analytic Hierarchy Process (AHP) Method

The Analytic Hierarchy Process (AHP) method is a level analysis method [31] and was developed by Thomas L. Saaty [32]. This method seeks to deconstruct a complex problem into a hierarchical structure level and more influence factors are included. It is based on humans' experience and knowledge to generate relative magnitudes through pairwise comparison [33]. It also has the advantage to capture the judgement of expert individual decisions and combine these into a consensus [34]. The weight of each item in the hierarchy system can be obtained after the consistency test through experts' judgement and comparisons between each other. The process of the AHP method adopted in this study includes:

(1) Building a hierarchical model

The hierarchical model is built by dividing the problem that needs to be solved into different levels, such as top level, middle level or bottom level. The top level means the purpose of the problem, while the middle level means what needs to be divided to achieve the goal. The bottom level refers to the underlying elements to achieve the goals. It is necessary to take various factors to be considered at the appropriate level and clearly express the relationship of these factors in a hierarchical diagram to achieve the main purpose.

In this study, according to the expert judgements and the final evaluation system, the hierarchical model was divided into four levels, including the objective level, the criteria level, the indicator level and the factor level.

(2) Construction of judgment matrix

According to the AHP method, if there are n elements A1, A2, A3, A4, ..., An, whose values are M1, M2, M3, M4, ..., Mn, respectively, the magnitude of their two-by-two ratio values can be obtained as the following matrix (Table 2):

Table 2. Matrix table.

	A1	A2	A3	...	An
A1	M1/M1	M1/M2	M1/M3	...	M1/Mn
A2	M2/M1	M2/M2	M2M3	...	M2/Mn
A3	M3/M1	M3/M2	M3/M3	...	M3/Mn
...	...	...	...	...	...
An	Mn/M1	Mn/M2	Mn/M3	3	Mn/Mn

After the hierarchical model has been constructed, the elements under each criterion or attribute need to be compared two by two to form a judgement matrix. The judgement matrix is a two-by-two comparison of the elements in the matrix, with the numbers 1–9 indicating how much more important one of the two elements is than the other (Table 3). For example, the number 1 indicates that the two elements are equally important, and the number 3 indicates that the former is slightly more important than the latter.

Table 3. Scale and meaning of judgement matrix.

Scale	Meaning
1	Two elements are of equal importance compared to each other
3	The former is slightly more important than the latter when compared to the two elements
5	The former is significantly more important than the latter when compared to the two elements
7	The former is more strongly important than the latter when compared to the two elements
9	The former is of absolute importance than the latter when compared to the two elements
2,4,6,8	The intermediate value between the two adjacent judgements
Reciprocals of above nonzero	If the importance of element i to element j is a_{ij}, then the importance of element j to element i is $a_{ji} = \frac{1}{a_{ij}}$

Judging the importance between two elements mainly relies on an expert's judgement based on their knowledge and experience. To ensure its objectivity when judging the weight of indicators, this study employed experts' opinions in the process of constructing the judgment matrix and used the averages of the values of the judgment matrix as the basis for calculating the weight of the evaluation system items. At the same time, relevant literature about the calculation methods and results of the weights were referred for appropriate corrections. Thus, these primary judgment matrixes were derived.

In the process of collecting experts' opinions, 10 experts were consulted, who were experts and scholars in the fields of landscape architecture, urban and rural planning, tourism management and forestry from Zhejiang Agriculture and Forestry University, the QNPSPA and planning institute in Zhejiang Province.

(3) Consistency test

The weight value (Wi) was calculated through the primary judgement, as well as the maximum eigenvalue of the matrix (λmax) and the consistency index (*C.I.)*. Subsequently, the consistency ratio (*C.R.*) was obtained with the average random index (*R.I.*) and the consistency index (*C.I.*). Finally, the judgment matrix was obtained after the consistency test.

The maximum eigenvalue λmax of the judgment matrix is calculated as the following formula:

$$\lambda max = \frac{1}{n} \sum_{n=1}^{n} \frac{AWi}{Wi}$$

Consistency index (*C.I.*) is calculated by:

$$C.I. = \frac{\lambda max - n}{n-1}$$

The Random Index (*R.I.*) is a constant used in consistency rate calculation which is assigned different values based on the number of criteria (Table 4).

Table 4. Random Index (*R.I.*).

n	1	2	3	4	5	6	7	8	9	10
R.I.	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49

Therefore, the consistency ratio (*C.R.*) can be obtained by the following formula:

$$C.R. = \frac{C.I.}{R.I.}$$

When *C.R.* < 0.10, the consistency of the judgment matrix is considered acceptable; otherwise, appropriate corrections should be made to the judgment matrix.

(4) Evaluation category

To quantify the evaluation of the QNPSPA, a fuzzy scoring method was used to assign values to factors in the evaluation system, with values ranging from 1 to 100 and divided into different ranges. For example, ecosystem representativeness C1 is assigned a value of (80–100) if it is typical and representative at the international level, (60–79) if it is highly representative and representative at the national level, and (0–59) if it is generally representative and representative at the provincial level. Other indicators were assigned similarly. The ten experts above were invited to score the factors. The final score was derived from the average of these ten scores. When some factors can be directly quantified, these scores determined the existing statistic in the relevant literature. If there are large differences in expert scores for some factors, further reference to relevant literature or relevant standards is required to determine the scores.

After giving all the factors suitable scores, the score of indicators can be acquired by multiplying their factors with their corresponding weights, respectively. The final score of the objective level can be obtained through the sum of scores in the criteria level. The calculation formula is as follows:

$$S = \sum_{i=1}^{n} X_i W_i$$

where X_i is the evaluation score of items in each level in the evaluation index system, W_i is the weight calculated above for the items, and S is the evaluation score of the superior level.

Concerning previous studies [31,35–37], this study divides the comprehensive evaluation results of the national park system pilot area into five categories (as shown in Table 5), representing a different level of assessment of the national park pilot areas.

Table 5. National Park Pilot Evaluation Category.

Category	Score	Evaluation Level	Description
I	90–100	Excellent	Its construction level is very high, and its protection and management are very standard and efficient.
II	80–89	Very good	Its construction level is high, and its protection and management are standard and efficient.
III	70–79	Good	Its construction level is intermediate, and its protection and management are basically standard and efficient.
IV	60–69	Qualified	Its construction level is average, and its protection and management are of ordinary status.
V	0–59	Failure	Its construction level is low, and its protection and management are of low status.

3. Results and Discussion

3.1. The Evaluation Index System of National Park System Pilot Areas

Through the initial screening of the comprehensive evaluation index for the national park system pilot areas, indicators and factors that meet China's basic requirements for the construction of national parks and international evaluation criteria of national parks were screened [2,5–7,9–11,17–21,23,25,38–40] (Table A1 in Appendix A). The screening process is based on the importance and relevance of these indicators and factors. After the Delphi method with experts' judgement, the final evaluation system was concluded (Table 6).

Based on the research aims and selection process of the index, the overall evaluation index system is composed of four levels, including the objective level, the criteria level, the indicators level, and the factor level. The criteria level can be divided into three parts: the natural resource condition; research, recreation and education function; and the management condition. These three criteria are further described by the items in the indicator level, which are finally reflected by the specific factors in the factor level.

Table 6. The comprehensive evaluation index system for the national park system pilot area.

The Objective Level	The Criteria Level	The Indicator Level	The Factor Level
National Park System Pilot Area Evaluation Index System S	Natural resource condition A1	Ecological condition B1	Ecosystem representative C1 Ecosystem integrity C2 Ecosystem authenticity C3 Biodiversity C4
		Landscape value B2	Natural landscape value C5 Human landscape value C6
		Environmental attribute B3	Area suitability C7 Soil quality C8 Hydrological quality C9 Climate quality C10
	Research, education and recreation function A2	Research function B4	Scientific institutions C11 Research project C12 Research facility C13 Database building C14
		Recreation and education function B5	Completeness of interpretation/display facilities C15 Richness of educational display content C16 Environmental capacity C17 Adequacy of recreational facilities C18 Destination accessibility C19

		Recreation product richness C20
Management condition A3	Management foundation B6	Land tenure C21
		Natural resources property right C22
		Boundary range C23
		Governing institution C24
		Management System C25
		Managing financial security C26
	Management action B7	Research monitoring capacity C27
		Management equipment C28
		Patrol enforcement C29
		Community co-management C30
		Public engagement C31

The natural resource condition refers to the intrinsic resources and values of the national park itself. The natural environmental values of the national park are the main object of conservation and use and reflect the nature and purpose of the national park. Natural resource conditions can be divided into three areas: ecological condition, landscape value and environmental attribute. The ecological condition refers to the value of the ecosystem, which consists of four evaluation factors: ecosystem representative, ecosystem integrity, ecosystem authenticity and biodiversity. An ecosystem is a unified whole in which organisms, biomes and the inorganic environment interact through energy flows and material cycles within a certain spatial and temporal context. Ecological conditions are the most important indicator in the process of measuring the value of a national park, and ecological functions are also a core function of a national park, while all other functions must be conducted based on not damaging the ecological environment. The landscape value in the evaluation index level mainly refers to the landscape resources of national parks, including natural landscape resources and human landscape resources. The landscape of our national parks needs to have natural beauty or a human landscape that is rare in China and the world. Environmental attributes are evaluated from the natural basic environment, through the quality of the soil, hydrology and climate environment in the national park, as well as the suitability of the area to evaluate its value.

To reflect the attributes of national parks that are shared by all people, China's national parks need to provide opportunities for people to get close to nature and get in touch with it and provide high-quality and high-standard recreation and science education experiences during the construction process. At the same time, as an important ecological resource and human resource conservation site, the value it contains also provides a valuable place for scientific research, and the scientific research function of national parks is also an important indicator of their value. This criterion is divided into two main sections, including the scientific research function and recreational and educational function.

The comprehensive evaluation of a national park not only includes the value of its natural environmental resources and the scientific research, education and recreational functions it provides, but also the rationality of its various systems and measures in terms of conservation, management and operation. Effective and scientific management and protection are the basis on which a national park can preserve its ecological value and realise its different functions.

There are two aspects in terms of the national park management in the evaluation system: management foundation and management actions. The management foundation is the prerequisite for the implementation of management and conservation plans and measures [11], and only under the premise of clear land tenure, clear natural property rights, reasonable management institutions, standardised management systems and adequate management funds can conservation and management actions be fully implemented [11,20,39,41]. For example, the land tenure refers to the land ownership in the national parks area, which needs to be guaranteed by standardised systems without land ownership disputes [18,24]. The natural resources mainly include water, forest land, mountain, grassland, mineral and biological resources within the area of the national park, while the natural resources property rights should be owned by the whole people and directly managed by the central government [18]. However, at the initial stage of the pilot areas of national park, not all natural resources ownership within the scope of these pilot areas' boundaries is state-owned. Therefore, unified registration of ownership needs to be implemented to demarcate the boundaries between different owners, so as to ensure clear ownership and clear rights and responsibilities without damaging the interests of owners [11]. The boundary range as the evaluation factor mainly was to verify whether the boundary of the national park is clear, whether the facilities such as boundary monument and markers are well set up, and whether boundary disputes exist.

Management actions are also crucial to the construction of national parks, and modern technology should be used to strengthen the ecological monitoring capacity in the region [6], improve management and conservation facilities, improve patrol and enforcement, and improve the system of community co-management and public participation [7] to ensure the normal operation of national parks. Among these factors in management action, the research monitoring capacity means the capacity of monitoring the ecological environment as well as the reasonable measures taking in time to ensure the protection of all kinds of resources in national parks when abnormal conditions are detected. The community co-management refers to the co-management mechanism between community and national park and residents' participation. Local communities are an integral part of the jurisdiction of national parks [18]. It is important to coordinate community development with national park conservation and construction [25]. Thus, community co-management is a necessary way to realise the protection and development needs of the pilot area. The establishment of a community co-management mechanism in the pilot area requires an overall grasp of the natural, economic and social structure system of the community, and the use of community advantages. The community residents are invited to participate in the planning, protection and management of the pilot area, so as to lay a foundation for the realisation of the management goal of the pilot area.

3.2. Weights of the Items in the Evaluation Index System of National Park System Pilot Areas

According to the AHP method with expert judgement mentioned before, the judgement matrix for each item in the evaluation index system could be calculated (Tables A2–A12 in Appendix A). All the consistency ratios (*C.R.)* were under 0.10, which means the consistency of all the judgment matrixes was acceptable in this study (Table 7). Therefore, the weight of each item in the evaluation system is concluded finally (Table 8).

Table 7. Judgment matrix consistency test.

Judgement Matrix	Maximum Eigenvalue λmax	Consistency Index C.I.	Consistency Ratio C.R.	Criteria for C.R.
A1.A2.A3	3.054	0.027	0.052	<0.1
B1.B2.B3	3.086	0.043	0.082	<0.1
B4.B5	2.000	0.000	0.000	<0.1
B6.B7	2.000	0.000	0.000	<0.1
C1.C2.C3.C4	4.071	0.024	0.027	<0.1
C5.C6	2.000	0.000	0.000	<0.1
C7.C8.C9.C10	4.115	0.038	0.043	<0.1
C11.C12.C13.C14	4.240	0.080	0.090	<0.1
C15.C16.C17.C18.C19.C20	6.361	0.072	0.057	<0.1
C21.C22.C23.C24.C25.C26	6.177	0.035	0.028	<0.1
C27.C28.C29.C30.C31	5.133	0.033	0.030	<0.1

Table 8. Comprehensive evaluation index weights of national park system pilot areas.

Criteria Level	Weighting	Indicator Level	Weighting	Factor Level	Weighting
Natural resource condition A1	0.493	Ecological condition B1	0.624	Ecosystem representative C1	0.448
				Ecosystem Integrity C2	0.164
				Ecosystem authenticity C3	0.282
				Biodiversity C4	0.106
		Landscape value B2	0.280	Natural landscape value C5	0.750
				Human landscape value C6	0.250
		Environmental attribute B3	0.096	Area suitability C7	0.571
				Soil quality C8	0.116
				Hydrological quality C9	0.227
				Climate quality C10	0.086
Research, education and recreation function A2	0.196	Research function B4	0.250	Scientific institutions C11	0.531
				Research project C12	0.240
				Research facility C13	0.085
				Database building C14	0.144
		Recreation and education function B5	0.750	Completeness of interpretation/display facilities C15	0.381
				Richness of educational display C16	0.243
				Environmental capacity C17	0.064
				Adequacy of recreational facilities C18	0.147
				Destination accessibility C19	0.044
				Recreation product richness C20	0.121
Management condition A3	0.311	Management foundation B6	0.667	Land tenure C21	0.059
				Natural resources property rights C22	0.092
				Boundary range C23	0.041
				Governing body C24	0.449
				Management system C25	0.215
				Managing financial security C26	0.144
		Management action B7	0.333	Research monitoring capacity C27	0.298
				Management equipment C28	0.089
				Patrol enforcement C29	0.408
				Community co-management C30	0.061
				Public engagement C31	0.144

3.2.1. The Weights of Items in the Criteria Level

As shown in Figure 3, in the criteria level, the item with the highest weight is the natural resource conditions, followed by the management and protection conditions, and finally the research, education and recreation function. The natural resource is the most important part of the national park with a weight of 0.493, which complies with the purposes of national parks. Followed by the management condition, which is also an important criterion, with a weight of 0.311, indicating that the protection and management of national parks is a key part of the construction process. Finally, the weight of the research, education and recreation function is only 0.196, which is relatively low.

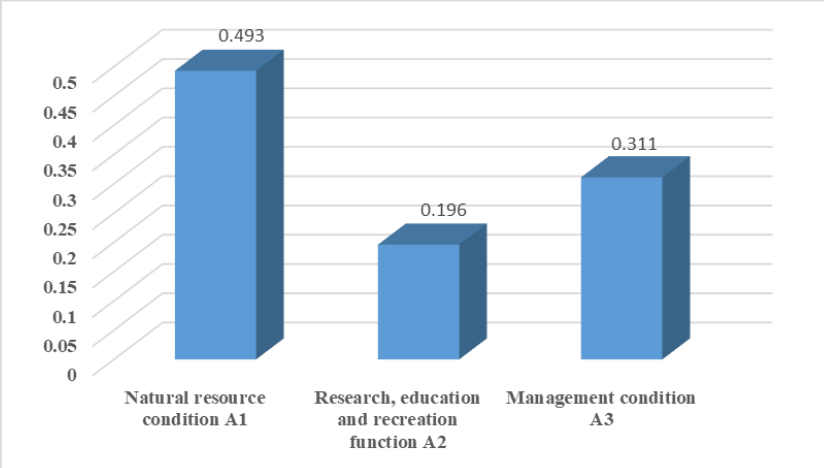

Figure 3. The weight of items in criteria level.

3.2.2. The Weights of Items in the Indicator Level

The weight of the various items in the indicator level can be obtained from Figure 4. Among the three evaluation indicators under the natural resources condition, the most important indicator is ecological condition, followed by landscape value and finally environmental attributes. Among the two indicators under the research, education and recreation function, the weight of the educational recreation function is obviously greater than that of the scientific research function. Among the two indicators under the management condition, the management foundation is higher than the management action. Of the seven indicators in the indicator level, the recreation education function has the highest weight of 0.750, the management foundation is the second most important, at 0.667, and the third is the ecological condition indicator, with a weight of 0.624. The indicators of management action, landscape value and scientific research function are closer, at 0.333, 0.28 and 0.25, respectively. It can be found that the recreation education function, management foundation and ecological condition are the most important indicators in the exploration and construction of national park pilot areas.

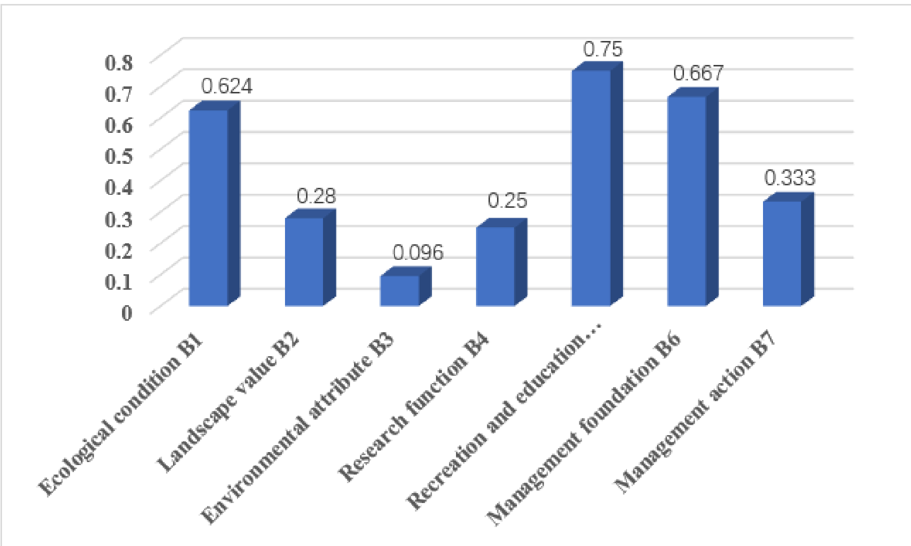

Figure 4. The weight of items in the indicator level.

Among the management conditions, management foundation is more important than management action, indicating that in the construction of a pilot national park, it is more important to establish the property rights of natural resources, establish management institutions and management systems and secure management funds before taking management action.

3.2.3. The Weights of Items in the Factor Level

According to Figure 5, among the evaluation factors under ecological conditions, the weight of ecosystem representative is the highest, indicating that the representative of the ecosystem is the most important among ecological conditions; among landscape value indicators, natural landscape value is significantly higher than human landscape value.

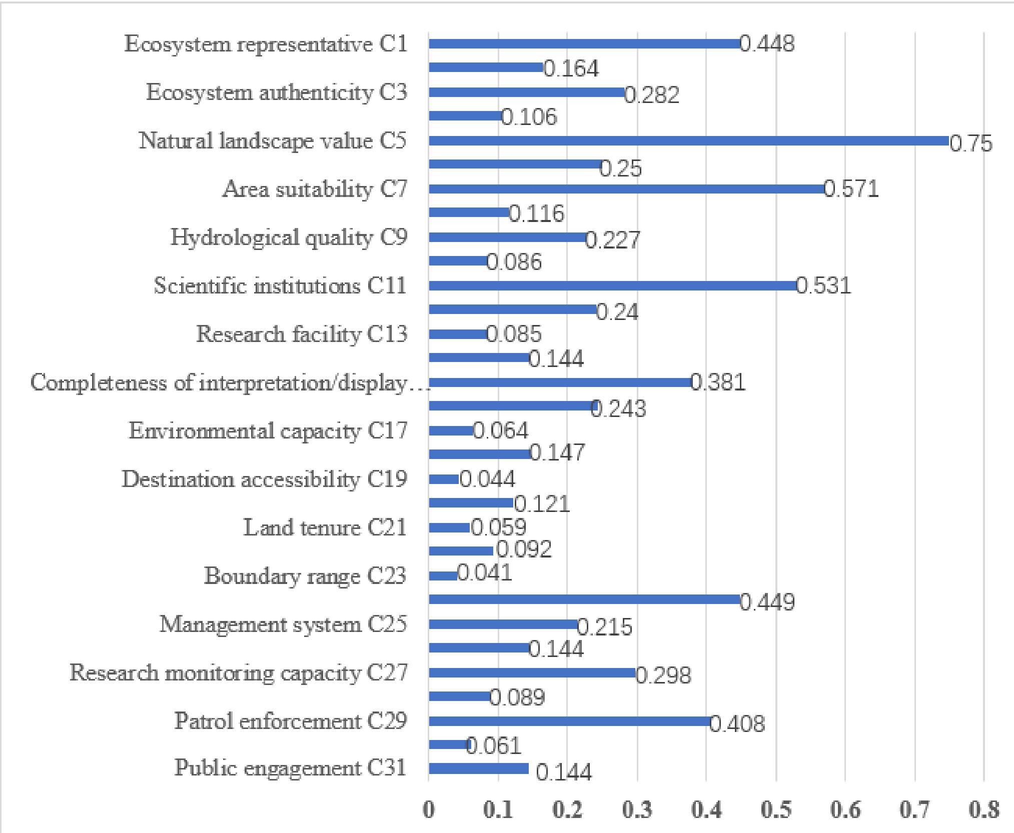

Figure 5. The weight of items in the factor level.

Among environmental attributes, area suitability has the highest weight. Among scientific research function indicators, scientific research institutions have the highest weight. Among educational recreation indicators, the highest weight is given to interpretation/exhibition facilities, indicating that the function of displaying and promoting the park to the public is more considered in the facilities in the construction of national parks. In the indicator of management foundation, the highest weight is given to management institutions among the management infrastructure indicators, indicating the importance of scientifically established management institutions in the process of building national parks. The relatively high weight of patrol enforcement among the management actions suggests the importance of patrol enforcement in protecting the natural ecological resources of national parks, and the importance of good patrol and law enforcement measures.

From the perspective of the overall 31 evaluation factors in this level, it can be found that the highest weighting factor is the natural landscape value with a weight of 0.75, followed by the suitability of the area with a weighting of 0.571, and the third is the research institution with a weighting of 0.531. Other factors with higher weights include the integrity of the ecosystem, the management institution, the patrolling enforcement, the completeness of interpretation/display facilities and the research monitoring capacity. The results show that among all the evaluation factors, natural landscape value is the most important factor in evaluating a national park, while area suitability and scientific research institutions also account for an important weight. These three evaluation factors are vital to measuring the intrinsic inherent value of a national park and are normally regarded as the admission criteria for national parks at home and abroad. At the same time, due to the special nature of the pilot area, which aims mainly to explore the mode of conservation and management during the construction of the national park, the management system, interpretation/display facilities and financial security, also become important evaluation factors of the evaluation system.

3.3. Comprehensive Evaluation of the Qianjiangyuan National Park System Pilot Area

It is clear from the result of the calculation (Table 9) that, the score for the natural resource condition is 90.464, the score for research, education and recreation functions is 90.281, and the score for management conditions is 91.666 in the comprehensive evaluation of the QNPSPA. Its overall score is 90.801, which belongs to Grade I according to the previous evaluation and grading standards. The individual index scores are all higher than 60% of the total score. This indicates that the overall level of the QNPSPA is very high, and the conservation management is very standard and efficient. However, at the same time it can be seen that although the overall score is in the I level, the score is very close to the II level, indicating that there are still shortcomings in the pilot area.

3.3.1. The Analysis of the Scores of Items in Factor Level

Figure 6 shows the status of each of the 31 evaluation factors in the comprehensive evaluation index system of the QNPSPA. It can be found that the scores of all factors are above 80, and 24 of the 31 evaluation factors have scores of 90 or above, indicating that the individual evaluation scores are excellent, and the overall evaluation is high. The evaluation factors with high scores include hydrological quality, research monitoring capacity, research facilities, land tenure, management financial security, soil quality, scientific institutions, database building, boundary range, natural landscape value, richness of educational display, public engagement, etc., indicating that the QNPSPA's good performance achieved in these fields.

Meanwhile, the evaluation factors of ecosystem integrity, human landscape value, area suitability, adequacy of recreational facilities, the richness of recreational products and natural resource property rights have relatively low scores, all scoring below 90. The lowest item is the area suitability, with a score of only 83, followed by the adequacy of recreation facilities, the richness of recreation products and the property rights of natural resources, all with a score of 84. These aspects need to be paid more consideration in the development of the QNPSPA.

3.3.2. The Analysis of the Scores of Items in the Indicator Level

Based on the calculation roles of the AHP method, the results of items in the indicator level can be obtained, respectively by multiplying the score value of corresponding factors by their weight (Table 10).

Table 9. Comprehensive Evaluation Results of the Qianjiangyuan National Park System Pilot Area.

Objective Level	Score	Criteria Level	Weight	Score	Indicator Level	Weight	Score	Factor Level	Weight	Score
Comprehensive Evaluation of the Qianjiangyuan National Park System Pilot Area S	90.801	Natural resource condition A1	0.493	90.464	Ecological condition B1	0.624	90.436	Ecosystem representation C1	0.448	92
								Ecosystem Integrity C2	0.164	86
								Ecosystem Authenticity C3	0.283	90
								Biodiversity C4	0.106	91
					Landscape value B2	0.28	91.25	Natural landscape value C5	0.75	93
								Human landscape value C6	0.25	86
					Environmental attribute B3	0.096	88.355	Area suitability C7	0.571	83
								Soil quality C8	0.116	95
								Hydrological quality C9	0.228	97
								Climate quality C10	0.086	91
		Research, education and recreation function A2	0.196	90.281	Research function B4	0.25	93.69	Scientific institutions C11	0.531	94
								Research Project C12	0.24	92
								Research facility C13	0.085	96
								Database building C14	0.144	94
					Recreation and education function B5	0.75	89.145	Completeness of interpretation/display facilities C15	0.381	90
								Richness of educational display C16	0.243	93
								Environmental capacity C17	0.064	89
								Adequacy of recreational facilities C18	0.147	84
								Destination accessibility C19	0.044	92
								Recreation Product Richness C20	0.121	84
		Management condition A3	0.311	91.666	Management foundation B6	0.667	90.596	Land tenure C21	0.059	96
								Natural resources property rights C22	0.092	84
								Boundary range C23	0.041	94
								Governing body C24	0.449	89
								Management system C25	0.215	91
								Managing financial security C26	0.144	96
					Management Action B7	0.333	93.778	Research monitoring capacity C27	0.298	97
								Management equipment C28	0.089	96
								Patrol enforcement C29	0.408	92
								Community co-management C30	0.06	90
								Public engagement C31	0.144	93

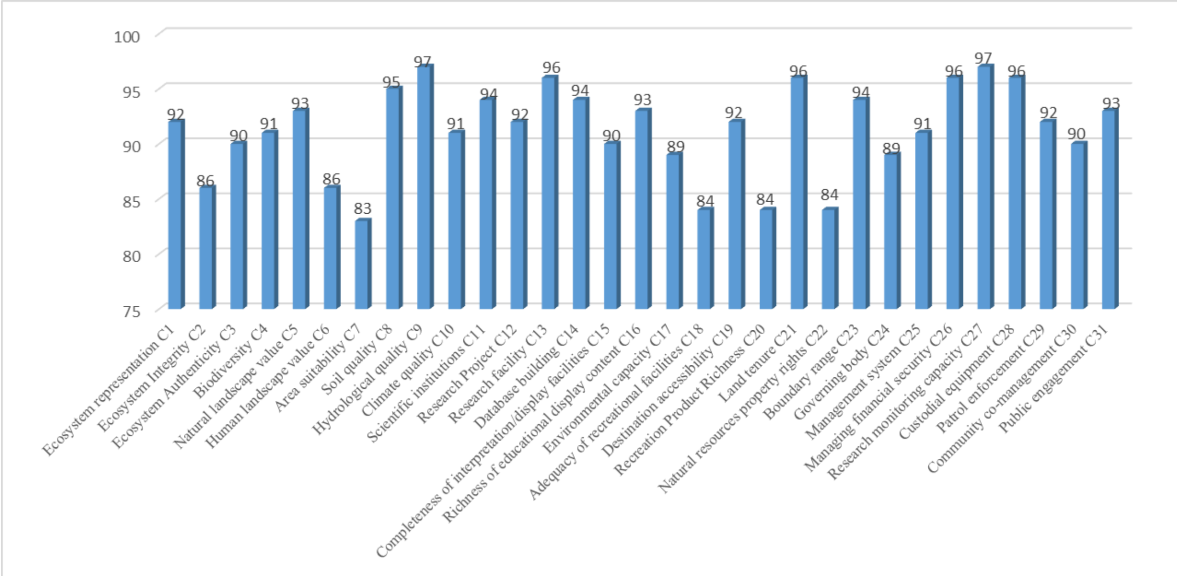

Figure 6. Scores of items in the factor level.

Table 10. Scores of items in the indicator level.

Evaluation Indicator Level	Score Value
Ecological condition B1	90.436
Landscape value B2	91.250
Environmental attribute B3	88.355
Research function B4	93.690
Recreation and education function B5	89.145
Management foundation B6	90.596
Management action B7	93.778

As can be seen from Table 10, all the evaluation indicators have a score of over 88, indicating that all the indicators have a relatively good performance. However, except for the score of 88.355 for the environmental attributes and 89.145 for the recreation and education function, all the other indicators have reached over 90%, especially the management action, which has the highest score of 93.778. This indicates that the QNPSPA is relatively well established in terms of national park management actions, while the score of the research function also researched 93.69, which suggests a high performance in this field.

3.3.3. The Overall Evaluation of the QNPSPA

According to Table 9, the overall score of the QNPSPA is 90.801, which belongs to Grade I according to the evaluation and grading standards. However, some items in each level still need more attention paid to them. From the scores of 3 evaluation criteria, 7 indicators and 31 factors in the comprehensive evaluation index system, the main problems that need to be addressed in the QNPSPA are summarised as follows.

(1) The area suitability score is low. The QNPSPA is the smallest among the 10 national park system pilot areas established by the government, with only 252 km^2. It is also a densely populated area in eastern China, and there are many indigenous inhabitants within the boundaries of the national park, making it relatively difficult to ensure the suitability of its area and the integrity and authenticity of the ecosystem.

(2) The low scores for the completeness of recreation facilities and the richness of recreation products indicate that the QNPSPA needs to improve its recreation functions.

The QNPSPA originally consisted of the Gutianshan Nature Reserve, the Qianjiangyuan National Forest Park and the connecting part in between. The main function of the Gutianshan Nature Reserve is to protect the ecological environment, and few recreational facilities have been built in it. What's more, the planned projects in the QNPSPA, including the science museum, botanical garden, museum and special park, have not yet been completed. Thus, the recreation facilities are not yet complete in the whole QNPSPA and the recreation experience is relatively homogeneous.

(3) The score of natural resource property rights is low. Since nearly 80% of the forest land in the QNPSPA is collective forest land, it is relatively difficult to achieve the goal of ensuring that natural resource property rights are owned by all people, as mentioned in the Overall Plan for the Establishment of the National Park System [27]. At present, the proportion of natural resource assets owned by all people in the QNPSPA is 19.3%, which is far from ensuring that natural resource assets owned by all people take up the main position as required by the overall planning.

(4) The human landscape value score is low. The QNPSPA is mainly characterised by low-altitude subtropical broadleaf evergreen forest ecosystems, and its historical and human attractions are relatively less well known.

(5) Ecosystem integrity score is low. Due to the limited size of the pilot area and the relatively high population density, as well as its location at the border of three provinces, the parts of Anhui and Jiangxi provinces that are connected to the pilot area and within the pilot area still belong to one ecosystem, and cross-provincial cooperation is difficult to achieve unified and efficient conservation due to different administrative regions.

3.3.4. Recommendations for the QNPSPA

Referring to the five problems revealed in the comprehensive evaluation process above, and the construction and development of the QNPSPA, five recommendations are proposed as follows.

(1) More cross-administrative cooperation and communication should be strengthened with the adjacent cities in Anhui and Jiangxi Province for overall conservation.

The boundary of the pilot area of the QNPSPA falls within Kaihua County, Quzhou Zhejiang Province, but the area borders Anhui and Jiangxi Provinces, with a total of 151 km of adjacent areas. These areas belong to the same ecosystem, with the same type of plants and animals that travel back and forth frequently. Thus, in the process of protecting and managing the natural ecological environment of the national park, these areas need to be protected together as a whole. The same conservation mechanism ensures the integrity and originality of the ecosystem.

Although a lot of exploration has been made on cross-provincial cooperation, for example, the inter-provincial cooperation protection agreement signed with adjacent villages and towns to clarify the co-construction mechanism of cooperation protection since 2018. The scope, mode, depth and strength of cross-administrative integration are yet to be researched in depth to achieve a substantial breakthrough. Moreover, there is no clear path to elevate cross-provincial cooperation above the provincial level.

Therefore, it is recommended to liaise with neighbouring cities in Anhui and Jiangxi actively based on the experience of the conservation of the QNPSPA and the reform of collective forest land. More cooperation with the two neighbouring protected areas of Lingnan Provincial Nature Reserve in Anhui Province and Wuyuan National Forest Bird Nature Reserve in Jiangxi Province should be implemented to develop a common conservation and management mechanism across regions and introduce an inter-regional ecological compensation scheme, thus promoting more systematic and extensive protection of the ecosystem in the QNPSPA.

(2) Improving the construction of recreational facilities and accelerating the important projects in the QNPSPA

The QNPSPA was proposed to make itself "a window to the world of evergreen broad-leaved forests" with environmental education as the outstanding highlight and advantage [41]. However, the key projects for the public have not yet been completed, and the public is not fully aware of this pilot area. Thus, the educational and recreational experience of visitors in the park is relatively humdrum.

It is recommended that the construction of a science museum in the QNPSPA is promoted, and that the museum be built around the theme of "A Window on the World of Evergreen Broadleaf Forests". At the same time, the construction of a rare botanical garden should be implemented, and it should be built as a multifunctional research base for scientific research, education and display. The ecological corridor for wildlife will be constructed to strengthen the connection of wildlife habitats, allowing for an expansion of their habitat and the protection of biodiversity. What's more, the construction of the National Park Avenue should be implemented to improve the landscape along the roads and enhance the recreational experience.

(3) The beautiful countryside and rural revitalisation strategies should be combined to enhance the quality of the community environment and community improvement.

The protection of natural resources will inevitably affect the production and livelihood of the indigenous people in the pilot area, while the ban on the use of pesticides and chemical fertilisers will also affect farmers' planting yields. The reconciliation of community development and ecological protection requires a reasonable management system to ensure this, as well as a good community building and sharing mechanism.

To improve the construction of rural infrastructure, the communities within the QNPSPA should strengthen the treatment of rural sewage, separate and recycle waste, build ecological parking stations, ecological public toilets and other infrastructure, and strengthen environmental improvement to enhance the rural living landscape. By applying intelligent information technology to the lives of the indigenous people in the pilot area and building the "village of the future", the residents will be able to consciously identify with the concept of "green water and green mountains are the silver mountain of gold" and protect the ecological environment, thus influencing visitors to the national park. The QNPSPA should promote the development of community industries, enhance the economy, and build a leisure agriculture industry with high-quality tea, camellia oil and clear water fish as the main features.

(4) More research cooperation should be actively deepened as the highlights and characteristics

The QNPSPA's most feature is the rare low-altitude subtropical broadleaf evergreen forest ecosystem in the world, which has important scientific research value. Making it an important highlight of the QNPSPA, deepening research cooperation and actively launching publicity and education activities can give full play to its important value and enhance its visibility.

Firstly, it should strengthen cooperation with research institutions and other scientific research platforms. For example, the advantages of the academician workstation should be used to build scientific research platforms. Secondly, the QNPSPA should conduct a comprehensive study of the natural environment in the pilot area, monitor the condition of the forests, air pollution index, noise indicators and surface water quality in the national park, and research the structure of forest communities and biodiversity. Thirdly, the QNPSPA can build a system of intelligent facilities, improve the network of information and communication facilities, build mobile signal base stations, achieve full coverage of the network within the national park and use satellite remote sensing and other technologies to dynamically monitor the protection of resources on the ground.

(5) It is necessary to strengthen management and conservation measures and strictly protect the ecological environment in this area, thus ensuring the integrity and authenticity of the ecosystem.

As the most densely populated of the 10 pilot areas of the national park system, the QNPSPA has a large number of indigenous people and reclaimed farmland within its boundaries. The use of pesticides and fertilizer for the farmland can pollute the soil and water in this area. The area between the Gutanshan National Nature Reserve and Qianjiangyuan National Forest Park is mostly secondary forest and plantation forest, whose ecosystem is more fragile than the two protected areas. At the same time, due to historical reasons, the proportion of collective forest land is as high as 80% and the property rights of forest land is more complex. All these factors suggest the importance and necessity of implementing strict conservation measures in the QNPSPA to restore the natural environment and ensure the authenticity and integrity of the ecosystem. Moreover, it accords with the original purpose of establishing a national park to strengthen the conservation management of the nature reserve.

The implementation of strict management and conservation measures can be conducted in three steps. Firstly, further improvement in terms of rules and regulations to provide a guarantee for the implementation of management and conservation measures, for example, the overall regulations or policy in funds utilisation.

The second is to strengthen the management and protection actions and implement the ecological management and protection assessment mechanism. Further protection stations and points are needed for building a four-tier network of "management committee, protection centre, station and point". At the same time, it is necessary to speed up the establishment of scientific management systems and improve the construction of protection stations in five townships, including Suzhuang and Changhong. The patrol routes and patrol systems should be constructed, meanwhile, the patrol facilities should be upgraded. The assessment of responsibility at different levels should be conducted to ensure supervision of management is normalised. Therefore, the quality of the ecological environment in the QNPSPA can be effectively safeguarded.

Finally, the construction projects within the national park should be strictly controlled. The projects that do not meet the construction standards should be prohibited, and those that do not meet the norms already exist should be rectified and dissuaded. Furthermore, mining, sand mining and other activities that destroy ecological resources should be strictly prohibited. The exit mechanism should be established for hydropower stations, timber processing plants and water plants.

4. Conclusions

This study aimed to determine a comprehensive, scientific and practical evaluation system for national park system pilot areas. This explored the evaluation index system in China in context using the methods of Delphi—based on the development of national parks at home and abroad—and the analysis of literature, such as the criteria for setting up national parks abroad and the relevant policy programmes released on the construction of a national park. The established evaluation index system is composed of three evaluation criteria including natural resource conditions; research, education and recreation function; and management condition; seven evaluation indicators; and 31 evaluation factors.

Based on the evaluation index system, the weight of each item in the evaluation index system was obtained by using methods of the AHP and Delphi. The values of items in the factor level can be assigned by experts or obtained through statistics. The value of items in up level and the final score can be calculated by the weights and values. Five catalogues were proposed for evaluating the calculated results, indicating a different level of assessment of the national park pilot areas.

The evaluation index system and weights were employed in the QNPSPA in this study. The final score of the QNPSPA is 90.801, which belongs to catalogue I, indicating that the comprehensive level is very high, and its protection and management are very standard and efficient. However, some problems were also exposed in the evaluation process. For example, the deficiency in cross-administrative protection mechanisms and recreational service facilities. Five recommendations were put forward to address these exposed problems.

The comprehensive evaluation index system built in this study could provide a reference for the comprehensive and scientific evaluation of national park and the national park system pilot area in Chinese context. The AHP-Delphi approach used in this research also offers an essential and complete methodology for national park evaluation field innovatively. From this study, it can be found that the construction of national parks in China is still in its infancy, and the research on national parks is lacking. The selection mechanism of national parks is not yet mature, and the protection and management are in improving the process with the pilot of national parks, thus, the evaluation of national parks is also a process that needs to be explored and improved in practice. Furthermore, with the development of the construction of China's national park system, the evaluation indicators and factors need to be supplemented and amended in practice.

However, some limitations exist in this study. Firstly, the selection and determination of evaluation indicators and factors highly depend on subjective understanding and professional expertise. Therefore, more studies should be conducted for strengthening the selection of indicators.

Secondly, in the process of determining the weight of each item in the evaluation index system, judgement of importance comparison from experts and scholars was used. These experts with different academic backgrounds and practical experience could surely provide expert judgements based on their knowledge and experience. However, in the future it will be important to involve more experts from wide backgrounds, such as ecology, ecological economic and ecotourism. Lastly, as the QNPSPA is still in the process of construction and development, for example, its management system is constantly being reformed, and various management and protection facilities are still in construction, the QNPSPA is therefore in a state of constant change.

However, the overall evaluation results of its current construction status in this study—especially in the aspect of research, education and recreation function and the management condition—are to a certain extent in a dynamic process of change, as well as influenced by the difficulty of data collection and the subjectivity of experts' scoring. Thus, the accuracy of the overall evaluation needs further consideration.

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Appendix A

Table A1. Preliminary screening indicators for the comprehensive evaluation index system of the national park system pilot.

Composite Indicator	Indicator	Indicator Type
Ecological condition	Ecosystem representative, Ecosystem typicality, Ecosystem authenticity, Ecosystem integrity, Biodiversity, Quantity of rare animals and plants	Natural resource
Landscape value	Natural landscape value, Human landscape value	Natural resource
Environmental attribute	Area suitability, Geological condition, Hydrological quality, Climate quality, Soil quality, Noise condition	Natural resource
Scientific and education function	Scientific institutions, Research project, Cooperation and communication condition, Research facility, Database building, Completeness of interpretation/display facilities, Richness of educational display content	Service Function
Recreation function	Environmental capacity, Adequacy of recreational facilities, Destination accessibility, Market potential, Completeness of infrastructure, Recreation product richness, Tourism revenue	Service Function
Management system	Land tenure, Natural resources property right, Boundary range, Governing institution, Management System, Managing financial security	Management condition
Management action	Research monitoring capacity, Patrol enforcement, Management equipment, Community co-management, Public engagement	Management condition

Table A2. S-A judgment matrix.

S	A1	A2	A3	Wi
A1	1	2	2	0.493
A2	1/2	1	1/2	0.196
A3	1/2	2	1	0.311

Table A3. A1-B judgment matrix.

A1	B1	B2	B3	Wi
B1	1	3	5	0.624
B2	1/3	1	4	0.280
B3	1/5	1/4	1	0.096

Table A4. A2-B judgment matrix.

A2	B4	B5	Wi
B4	1	1/3	0.250
B5	3	1	0.750

Table A5. A3-B judgment matrix.

A3	B6	B7	Wi
B6	1	2	0.667
B7	1/2	1	0.333

Table A6. B1-C judgment matrix.

B1	C1	C2	C3	C4	Wi
C1	1	3	2	3	0.448
C2	1/3	1	1/2	2	0.164
C3	½	2	1	3	0.282
C4	1/3	1/2	1/3	1	0.106

Table A7. B2-C judgment matrix.

B2	C5	C6	Wi
C5	1	3	0.750
C6	1/3	1	0.250

Table A8. B3-C judgment matrix.

B3	C7	C8	C9	C10	Wi
C7	1	5	3	6	0.571
C8	1/5	1	1/3	2	0.116
C9	1/3	3	1	2	0.227
C10	1/6	1/2	1/2	1	0.086

Table A9. B4-C judgment matrix.

B4	C11	C12	C13	C14	Wi
C11	1	3	5	4	0.531
C12	1/3	1	2	3	0.240
C13	1/5	1/2	1	1/3	0.085
C14	¼	1/3	3	1	0.144

Table A10. B5-C judgment matrix.

B5	C15	C16	C17	C18	C19	C20	Wi
C15	1	2	6	4	5	3	0.381
C16	1/2	1	4	3	4	2	0.243
C17	1/6	1/4	1	1/3	3	1/3	0.064
C18	1/4	1/3	3	1	4	2	0.147
C19	1/5	1/4	1/3	1/4	1	1/3	0.044
C20	1/3	1/2	3	1/2	3	1	0.121

Table A11. B6-C judgment matrix.

B6	C21	C22	C23	C24	C25	C26	Wi
C21	1	1/2	2	1/6	1/4	1/3	0.059
C22	2	1	3	1/5	1/3	1/2	0.092
C23	1/2	1/3	1	1/7	1/4	1/4	0.041
C24	6	5	7	1	3	4	0.449
C25	4	3	4	1/3	1	2	0.215
C26	3	2	4	1/4	1/2	1	0.144

Table A12. B7-C judgment matrix.

B6	C27	C28	C29	C30	C31	Wi
C27	1	4	1/2	4	3	0.298
C28	¼	1	1/4	2	1/2	0.089
C29	2	4	1	5	3	0.408
C30	¼	1/2	1/5	1	1/3	0.061
C31	1/3	2	1/3	3	1	0.144

References

1. Cao, H. The Significance Perspective and Modes of the Construction of National Park. *J. Qinghai Norm. Univ. (Philos. Soc. Sci.)* **2017**, *39*, 7–10.
2. Wu, Chengzhao; Liu, G. The significance of establishing national parks in China. *Tour. Trib.* **2015**, *30*, 14–16.
3. Alfred, R. The National Park Idea: Origins and Paradox of the American Experience. *J. For. Hist.* **1977**, *21*, 64–75. https://doi.org/10.2307/3983461.
4. Lee, E. Protected Areas, Country and Value: The Nature-Culture Tyranny of the IUCN's Protected Area Guidelines for Indigenous Australians. *Antipode* **2016**, *48*, 355–374. https://doi.org/10.1111/anti.12180.
5. Tang, F. The Desired National Park in China. *For. Constr.* **2014**, *5*, 1–7.

6. Hagen, D.; Evju, M.; Skovli, P.; Solli, S.; Erikstad, L.; Bartlett, J. From military training area to National Park over 20 years : Indicators for outcome evaluation in a large-scale restoration project in alpine Norway. *J. Nat. Conserv.* **2022**, *66*, 126125. https://doi.org/10.1016/j.jnc.2021.126125.
7. Li, C.; Yu, J.; Wu, W.; Hou, R.; Yang, Z.; Owens, J.R.; Gu, X.; Xiang, Z.; Qi, D. Evaluating the efficacy of zoning designations for national park management. *Glob. Ecol. Conserv*. **2021**, *27*, e01562. https://doi.org/10.1016/j.gecco.2021.e01562.
8. Mwangi, F.; Zhang, Q.; Wang, H. International Journal of Geoheritage and Parks Development challenges and management strategies on the Kenyan National Park System : A case of Nairobi National Park. *Int. J. Geoheritage Parks* **2022**, *10*, 16–26. https://doi.org/10.1016/j.ijgeop.2022.02.003.
9. Tadeu, M.; Nolasco, R.; Hanazaki, N. How do Brazilian National Park managers evaluate the relationship between conservation and public use ? *Environ. Sci. Policy* **2022**, *131*, 1–9. https://doi.org/10.1016/j.envsci.2022.01.009.
10. Minghu, L.; Yaquan, D.; Shufa, H.; Ya, L.; Kesan, L. A Study of National Park Selection Mechanism and Construction Standards in Chinac Based on Inspirations from Foreign Experiences. *World For. Res.* **2019**, *32*, 3–9.
11. Yang, R. Thinking on the Six Characteristics of Chinese National Park System Construction. *Environ. Prot.* **2019**, *47*, 24–27. https://doi.org/10.14026/j.cnki.0253-9705.2019.z1.004.
12. Zheng, Q.; Shen, M. Mapping Knowledge Domain of National Park Management Research in China. *J. Beijing For. Univ. (Soc. Sci.)* **2020**, *19*, 55–61. https://doi.org/10.13931/j.cnki.bjfuss.2020016.
13. Dilsaver, L.M. *America's National Park System: The Critical Documents*. Washington, DC, USA:Rowman & Littlefield Publishers.
14. Goldingay, R.L. What Role Does Ecological Research Play in Managing Biodiversity in Protected Areas? Australia' s Oldest National Park as a Case Study. *Proc. Linn. Soc. New South Wales* **2012**, *134*, 119–134.
15. McNeely, J.A.; Miller, K.R. IUCN, National Parks, and Protected Areas: Priorities for Action. *Environ. Conserv.* **1983**, *10*, 13–21. https://doi.org/10.1017/S0376892900011826.
16. Borrini, G.; Dudley, N.; Jaeger, T.; Lassen, B.; Neema, P.; Phillips, A.; Sandwith, T. Governance of protected areas: From understanding to action. *Best Practice Protected Area Guidelines Series*, 20th ed.; IUCN: Gland, Switzerland, 2014; xvi + 124.
17. Chen, Y.; Chen, Y. The Ecological Views of National Parks—Case Studies of American National Parks. *Chin. Landsc. Archit.* **2016**, *32*, 57–61.
18. State Council, C. General Plan for Establishing National Park System. 2017. Available online: http://www.gov.cn/zhengce/2017-09/26/content_5227713.htm (accessed on 24 May 2022).
19. Chen, Y.; Huang, D.; Yan, S. Discussions on Public Welfare, State Dominance and Scientificity of National Park. *Sci. Geogr. Sin.* **2014**, *34*, 257–264.
20. Duan, Y.; Zhao, X.; Zou, W.; Yan, Y.; Xu, D.; Ye, B.; He, Y. Evaluation on Wetland Ecosystem Service Value in Qianjiangyuan National Park Pilot Area. *For. Econ.* **2019**, *4*, 50–57. https://doi.org/10.13843/j.cnki.lyjj.2019.04.008.
21. Ma, B.; Zeng, W.; Xie, Y.; Wang, Z.; Hu, G.; Li, Q.; Cao, R. Science of the Total Environment Boundary delineation and grading functional zoning of Sanjiangyuan National Park based on biodiversity importance evaluations. *Sci. Total Environ.* **2022**, *825*, 154068. https://doi.org/10.1016/j.scitotenv.2022.154068.
22. Wubalem, A.; Tesfaw, G.; Dawit, Z.; Getahun, B.; Mekuria, T.; Jothimani, M. Comparison of statistical and analytical hierarchy process methods on flood susceptibility mapping: In a case study of the Lake Tana sub-basin in northwestern Ethiopia. *Open Geosci.* **2021**, *13*, 1668–1688. https://doi.org/10.1515/geo-2020-0329.
23. Wu, Chenzhao; Zhou, S.; Tao, C. Research for Adaptive Administration System of National Park Based on Ecosystem Management—Yellowstone National Park of America as an Example. *Chin. Landsc. Archit.* **2014**, *30*, 21–25.
24. Zhang, Y.; Yang, R.; Zhao, Z. Preliminary Analysis on the Implementation Plans for the Chinese National Park Pilot Areas. *Chin. Landsc. Archit.* **2017**, *33*, 5–11.
25. Li, S.; Sun, X.; Fang, Y.; Zhang, Y.; Cao, M. Evaluation of the spatial characteristics of farmer livelihood assets in the qianjiangyuan national park pilot. *Biodivers. Sci.* **2019**, *27*, 64–75. https://doi.org/10.17520/biods.2018176.
26. Xu, D.; He, Y.; Zhao, X.; Ye, B. Adaptive governance of natural resources in Qianjiangyuan National Park. *World Agric.* **2019**, *12*, 36–43.
27. Qianjiangyuan, N.P. The Introduction of Qianjiangyuan Nation Park. 2019. Available online: http://www.qjynp.gov.cn/news/detail.aspx?newsid=308 (accessed on 30 May 2022).
28. Yu, W.; Chen, T.; Zhong, L.; Zhou, R. Functional zoning of the Qianjiangyuan National Park System Pilot Area. *Resour. Sci.* **2017**, *39*, 20–29.
29. García-Melón, M.; Gómez-Navarro, T.; Acuña-Dutra, S. A combined ANP-delphi approach to evaluate sustainable tourism. *Environ. Impact Assess. Rev.* **2012**, *34*, 41–50. https://doi.org/10.1016/j.eiar.2011.12.001.
30. Wang, Q.; Zhang, Y.; Yang, G. The Knowledge Mapping of China National Park Recation Utilization Research Based on the Citespace. *Tour. Res.* **2021**, *13*, 71–84. https://doi.org/1o.3969/j.issn.1674-5841.2021.02.006.
31. Chen, L.; Ng, E.; Huang, S.C.; Fang, W.T. A self-evaluation system of quality planning for tourist attractions in Taiwan: An integrated AHP-Delphi approach from career professionals. *Sustainability* **2017**, *9*, 1751. https://doi.org/10.3390/su9101751.
32. Saaty, T.L. A scaling method for priorities in hierarchical structures. *J. Math. Psychol.* **1977**, *15*, 234–281. https://doi.org/10.1016/0022-2496(77)90033-5.
33. Martín-Fernández, S.; Gómez-Serrano, A.; Martínez-Falero, E.; Pascual, C. Comparison of AHP and a utility-based theory method for selected vertical and horizontal forest structure indicators in the sustainability assessment of forest management in the sierra de Guadarrama National Park, Madrid Region. *Sustainability* **2018**, *10*, 4101. https://doi.org/10.3390/su10114101.

34. Pirdashti, M.; Omidi, M.; Pirdashti, H.; Hassim, M.H. An AHP-Delphi Multi-Criteria Decision Making Model with Application to Environmental Decision-Making. *Iran. J. Chem. Eng.* **2011**, *8*, 3–17.
35. Park, S.; Im, J.; Jang, E.; Rhee, J.; Basin, P.R. Fuzzy AHP Integrated with GIS Analyses for Drought Risk Assessment : A Case Study from Upper. *Agric. For. Meteorol.* **2019**, *216*, 157–169. https://doi.org/10.1016/j.agrformet.2015.10.011.
36. Sari, D. A method to determine the potential for flora tourism in mountainous regions: A case study of the Kackar Mountains National Park, Turkey. *J. Prot. Mt. Areas Res. Manag.* **2019**, *11*, 27–35. https://doi.org/10.1553/eco.mont-11-2s27.
37. Sharma, L.K.; Kanga, S.; Nathawat, M.S.; Sinha, S. Fuzzy-AHP for Forest Fire Risk Modeling. *Disaster Prev. Manag.***2012**, *21*, 160–171. https://doi.org/10.1108/09653561211219964.
38. Bunruamkaew, K.; Murayama, Y. Site suitability evaluation for ecotourism using GIS & AHP: A case study of surat Thani Province, Thailand. *Procedia Soc. Behav. Sci.* **2011**, *21*, 269–278. https://doi.org/10.1016/j.sbspro.2011.07.024.
39. Nyongesa, K.W.; Vacik, H. Evaluating management strategies for Mount Kenya Forest Reserve and National Park to reduce fire danger and address interests of various stakeholders. *Forests* **2019**, *10*, 426. https://doi.org/10.3390/f10050426.
40. Yang, R. Evolution And Experience of the National Park System of the United States. *Chin. Landsc. Archit.* **2001**, *70*, 62–64.
41. Yu, J.; Wang, J.; Xiao, H.; Chen, X.; Chen, S.; Li, S.; Shen, X. Camera-trapping survey of mammalian and avian biodiversity in qianjiangyuan national park, zhejiang province. *Biodivers. Sci.* **2019**, *27*, 1339–1344. https://doi.org/10.17520/biods.2019345.