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Research Article

A Comprehensive Evaluation of Environmental Quality for Health Ecotourism in Huangshan National Forest Park

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In recent years, people's life rhythm is fast due to which life pressure is increasing, and the ecological environment is seriously polluted. All these factors contribute to serious physical and mental health issues, posing a direct threat to people's health. Due to these factors, health tourism and recreational tourism of traditional Chinese medicine pay more attention. In this paper, Huangshan National Forest Park is selected as the actual research object, and the environmental quality of healthy ecotourism is analyzed according to the current situation of the forest park. It employs the analytic hierarchy process (AHP) to identify 12 different indicators of ecotourism's environmental quality. It establishes a comprehensive evaluation index system for the ecotourism environmental quality, as well as an evaluation model based on this system. Furthermore, a comprehensive evaluation model is established using the fuzzy math analysis method, and five levels of standards are established to judge the level of ecodevelopment of the Huangshan National Forest Health and Maintenance. By calculating the weight of each index in the evaluation system, the result of a comprehensive evaluation is 75.92 points, which is in the good grade. The experimental results show that the eco-environmental resources in Huangshan National Forest Park are of higher quality. The planned landscape is more attractive, the eco-environmental area is larger, the cleanliness of the air in the forest park is higher, and the service personnel have higher cultural literacy.

1. Introduction

Ecotourism is the representation of the principles of sustainable development inside the tourism sector, attempting to achieve stability between environmental, financial, and social elements [1]. Ecotourism, in particular, is well represented in developing economies owing to its special benefits of not only trying to promote environmental protection but also enhancing urban progress [2]. As of now, various organizations and researchers have described ecotourism from various perspectives. Whatever the description, the material has always been concerned with three aspects: ecotourism action, environmental preservation, and the maintainable promotion of local society [3]. One of the best early widely accepted ideas was suggested by Ceballos-Lascurain. It emphasizes the action of traveling to undisturbed natural or unpolluted nature reserves with the particular goal of learning, appreciating, and enjoying nature, as well as any current cultural elements discovered in these regions [4]. Ceballos-Lascurain offered this description from the point of view of the end user [5].

In reality, the definition of ecotourism reveals the interpretation of ecotourism development. Ecotourism is focused on nature-oriented and unique traditions, such as seeing wildlife, seeing wild plants, strolling on a forest path, mountain tribe hiking, and experiencing local customs [6]. Due to their all-centric trends, ecotourists, who tend to be more knowledgeable and have higher earnings, prefer staying, investing more each day than traditional tourists, and seeking out goods and services for their use. Ecotourists want a more environmentally responsible travel experience and are frequently concerned about conservation [7, 8]. Their age range and sex ratio vary depending on the type of ecotourism action they participate in and their preferences

[9]. Besides, the connotation of healthy ecotourism is health-oriented and health-preserving tourism, which is called healthcare tourism internationally. Therefore, it can be regarded as health-based tourism derived from health-oriented tourism to form healthy ecotourism [10, 11]. At present, people's quality of life has been greatly improved, the leisure economy has been developing rapidly, and the proportion of the tourism industry in the regional economy has been increasing year by year. This development promotes the rapid integration of tourism into other industries and further is subdivided into a variety of types of tourism, namely, health tourism and health ecotourism, which have become a new trend in tourism development [12, 13].

Ecotourism requires more planning and decision-making than other types of tourism [14]. To begin with, ecotourism is not uniform [3]. The same management can be applied to areas with varying characteristics and circumstances. Second, ecotourism's influence may not always be favorable [15]. In summary, the effect of ecotourism actions can be measured in terms of environmental, financial, and social outcomes. It will have several negative effects on local regions if unsuitable control mechanisms are used [16, 17]. Furthermore, ecotourism is complicated, reflecting the diversity of interested parties, including residents, local government, visitors, and related businesses [18]. As a result, the critical issue for ecotourism managers and executives is determining which technique should be used to successfully assess and manage the destination. The strategy analytic hierarchy process (AHP) method is suggested for ecotourism planning since it allows for the incorporation of clear statements of interested parties' preferences and the determination of relative weights of criteria [8]. Based on the aforementioned, the AHP is used in this paper to assess the environmental quality of Huangshan National Forest Park. It establishes a comprehensive evaluation index system for the ecotourism environmental quality of Huangshan National Forest Park and determines twelve ways to measure the quality of ecotourism. Furthermore, it establishes a comprehensive evaluation model based on this system, as well as a comprehensive evaluation model using the fuzzy math analysis method, and it establishes five levels of standards to judge the level of ecodevelopment of the Huangshan National Forest Health and Maintenance.

The innovations of this paper are as follows:

(1) To accurately pick the optimal action during health ecotourism, a multicriteria decision-making technique analytic hierarchy process (AHP) is used. Key influential characteristics known as criteria and subcriteria are recognized to assist in correct decision-making concerning the recommendation of best and suitable action in health ecotourism for tourists.

(2) The goal of creating a comprehensive assessment of Huangshan National Forest Park's ecotourism environmental quality is to accurately evaluate the ecotourism environmental quality in this area. It determines whether the region has the potential for tourism development and assists the region in identifying its weaknesses.

(3) By building a comprehensive evaluation model of the ecotourism environmental quality of Huangshan National Forest Park, 12 indicators are selected to evaluate the eco-environmental quality of the local health and maintenance, and the contribution degree of each indicator to the ecotourism environment is compared and analyzed, to provide a basis for the planning and development of the ecotourism of Huangshan National Forest Park.

The rest of this research work is listed as follows: Section 2 is based on the related work of national and international researchers; Section 3 highlights the methodology for the suggested model and the materials that employ for the model creation of this study; Section 4 is based on the comprehensive evaluation model of ecotourism environmental quality; Section 5 discusses the experimental work of the study and its results; and Section 6 concludes the work.

2. Related Work

Ecotourism is defined as a subset of sustainability that focuses on the natural surroundings [19]. A group of investigators has identified Ceballos-Lascurain's definition as among the most widely accepted [20]. Ecotourism is defined as traveling to relatively untouched or unpolluted natural areas with the specific goals of learning and appreciating the beautiful landscape and wildlife, as well as any traditional social representations found in these regions [21]. Forest recreation tourism originated from forest bathing and forest therapy. It is based on forest resources and the theoretical basis of Western medicine. It combines medical and recreational service facilities to carry out modern tourism activities such as forest recuperation, health care, old-age support, health maintenance, and vacation [22, 23]. It was the first forest bath base in the world founded in Germany in the 1940s. It started in Asia and developed in the construction of natural sanatorium forests in 1982, and in Korea. The booming development in the world was after the rise of Forest Recreation Tourism in European and American countries in the 21st century.

The healthy ecotourism develops rapidly, but the academic field is still in the preliminary research stage in the study of healthy ecotourism; especially, the content and results in the study of the environmental quality of the healthy ecotourism are relatively few. Foreign scholars started early on the study of forest recuperation tourism and related concepts, and theoretical basic research is mature. More research findings focus on the impact of forest recuperation tourism on human recovery. They mostly talk about how the forest environment affects human physiology and psychology. At the same time, a variety of health-preserving tourism modes have been developed, such as medical tourism and health-preserving leisure tourism [24, 25]. In 1998, some experts compared the types of hot springs and forest recreation from the perspective of recreation, pointing out that people walking in the woods and

soaking in hot springs play the same role. In 2007, the concept of forest therapy was put forward, and it was pointed out that the health attributes of forest health foods have higher development value. In 2009, experts analyzed all aspects of health maintenance and health maintenance from the perspective of the activity process, indicating that healthy ecotourism was formed by combining the modern leisure view with the health maintenance view [26, 27]. China has also started the wave of building a healthy tourism base. Each region should set up a characteristic health tourism industry based on its local advantages, of which the most complete supporting facilities are Shandong's healthy tourism base [28]. Starting from the current situation of health and well-being, Chinese scholars began to study and explore the mode of health and well-being ecotourism by fully drawing on the achievements of developed countries. In 2005, Chinese scholars initially defined the healthy ecology and pointed out that the future healthy ecotourism has broad prospects for development [29]. Ecotourism is a kind of tourism mode that plans the landscape according to the characteristic eco-environment of each region. Consequently, healthcare tourism depends strongly on their human and natural eco-environment [30]. The drawback in the above is that the landscape design is uniform and unable to reflect the local characteristics, and medical security facilities are difficult to meet the basic requirements of tourists. The purpose of this study is to provide a data basis for Huangshan National Forest to adjust the measures of healthy ecotourism and break the original solidification mode.

3. Material and Method

3.1. Ecological Value. Ecological value is the ability of the ecosystem to meet human direct or indirect needs. This capability derives from the functioning of ecosystems, such as the provision of products and services by natural processes and their components. When ecosystem function is endowed with the connotation of human value, it becomes the value of ecosystem products and services, that is, the ecological value [31].

The United Nations Millennium Assessment of ecological value refers to the benefits people derive from the ecosystem, which can be assessed and predicted based on real data. In further research, Fang K believes that ecological value can be divided into use value and nonuse value. Eco-use value refers to the value that humans can obtain economic benefits from this ecosystem service function in the current or future period. On the one hand, it includes the direct use value, that is, to directly meet the current production or consumption needs of human beings [32]. On the other hand, it includes the indirect use value, which provides necessary guarantee conditions for human production and consumption, such as water circulation, soil protection, and microclimate regulation. It also includes potential (alternative) value, which may be used in the future and provide economic benefits to humans. Water conservation, recreation, and entertainment are examples of future benefits realized by the direct or indirect application of value [33].

3.2. Ecosystem Functions. Since the 1990s, due to the dramatic increase in population and the exploitation and utilization of natural resources, the global ecological environment has changed dramatically. Based on classical biological individuals, populations, communities, and so on, the subjects of ecology are constantly upgrading their levels and expanding their space. With the natural-economic-social composite ecosystem as the research focus, ecology has become one of the most dynamic and fast-growing disciplines in the current disciplines.

Some scholars believe that the ecosystem has four main functions, namely, regulation function, carrying function, production function, and information function [34]. The scholars of [35] hold that the functions of the ecosystem are mainly manifested in the provision of life and product quality, the maintenance of a life support system, and the enjoyment of spiritual life. There are 17 main types of ecosystem functions, including gas regulation, climate regulation, disturbance regulation, water regulation, water supply, erosion control and sediment maintenance, soil formation, nutrient cycling, waste disposal, pollination, biological control, shelter, food production, raw materials, genetic resources, recreation, and culture. Researchers classify ecosystem functions as shown in Table 1.

3.3. Ecotourism. Ecotourism is a type of tourism that involves visiting vulnerable, pure, and largely unspoiled natural regions. It provides a low-impact, sometimes a small-scale, alternative to traditional economic mass tourism. It involves the protection of natural regions, environmental conservation, and increasing the local population. Its goals may be to educate the traveler, raise cash for environmental protection, directly help local economic growth and political empowerment, or promote respect for diverse civilizations and human rights. Ecotourism has been seen as an important undertaking by environmentalists ever since the 1980s, for coming generations to visit locations generally undisturbed by human involvement. A crucial factor in the ecotourism business is variety in terms of visitor kinds and actions. The typology nature of ecotourism may be seen in Figure 1.

The hardcore comprises scientific researchers or participants on tours created expressly for teaching, ecological sustainability, or similar goals. People who go deliberately to view protected places and learn about local natural and cultural heritage are among the devoted. Ordinary people are individuals who travel to the Amazon, Rwanda's gorilla park, or even other odd locations purely for the experience. Unplanned visitors are individuals that visit nature on the spur of the moment, such as on a day excursion or a longer vacation.

3.4. Ecotourism and Analytic Hierarchy Process (AHP). The AHP is a systematic procedure for organizing and analyzing complex decisions suggested by Thomas Saaty in 1980 for decision-making [36]. Even though AHP can define the main goal concerning a sequence of alternative solutions that are analyzed on the different criteria, it assists decision-

Table 1: Ecosystem function classification.

Service function			
Supply function	Adjustment function		Cultural function
Food	Climate regulation		Spiritual and religious
Freshwater	Disease control		Spiritual and religious
Fuelwood	Water regulation		Entertainment and ecotourism
Fibre	Water purification		Esthetics
Medicinal materials	Pollination		Inspiration
Genetic resources			Education
		Sense of place	
		Cultural inheritance	
Support functions			
Soil formation	Nutrient cycle		Primary production

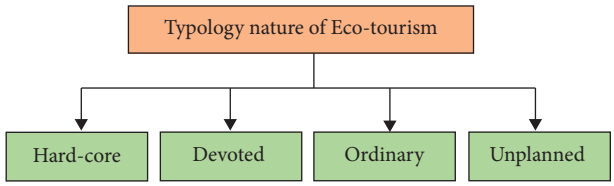

Figure 1: Typology nature of ecotourism.

making in finding the response that better serves their objective instead of the appropriate judgment. In other words, the results given by AHP will alter in line with changes in the criteria or the weight of the assessment criteria [37]. The multicriteria problem, according to AHP, is visually organized into a value tree of goals by building a hierarchy of characteristics [38].

The goal of this study is to use the analytic hierarchy process to pick the best ecotourism operation in Huangshan National Forest Park. To achieve this goal, it should first establish an alternate solution and criteria sets. Initially, the criteria and alternative solutions are developed with four aspects and twelve subcriteria based on previous theory evaluations and local real incidents. Following that, fuzzy mathematics is used to quantify the suggestions of the experts questioned, and the framework is eventually recognized with four criteria and twelve subcriteria. They are B1 healthy landscape environment (landscape ornamental C1, landscape diversity C2, and landscape uniqueness C3 to locals and tourists); B2 natural ecological environment (greening degree C4, air cleanliness C5, and negative oxygen ion concentration C6); B3 healthy social culture (healthy atmosphere C7, health culture C8, and construction of healthy talents C9); and B4 healthcare service facilities (accommodation and catering facilities C10, medical security facilities C11, and tourism public facilities C12 to locate the facilities of tourists).

4. Comprehensive Evaluation Model of Ecotourism Environmental Quality

4.1. Establishing a Comprehensive Evaluation Index System. This paper establishes the criterion layer when studying the comprehensive evaluation of the ecotourism environmental quality of Huangshan National Forest Park. The criterion layer is mainly used to evaluate the ecotourism environmental quality and ensures that the selected criterion layer index can cover all the factors of the ecotourism environmental quality of Huangshan National Forest Park and has a logical relationship between them. This paper uses the analytic hierarchy process (AHP) to divide the comprehensive evaluation model of the ecotourism environmental quality of Huangshan National Forest Park into three levels. The target layer is the comprehensive evaluation index system of the ecotourism environmental quality of Huangshan National Forest Park. The criterion layer is the landscape environment, the natural ecological environment, the social culture, and the health and maintenance service facilities. After subdividing the criterion layer, the content of the index layer is determined. Based on the data analysis and expert scoring method, 12 indexes were selected, including landscape ornamental, landscape diversity, landscape uniqueness, greenness, air cleanliness, negative oxygen ion concentration, recreational atmosphere, recreational cultural literacy, recreational personnel construction, accommodation and catering facilities, medical security facilities, and tourist public facilities. Figure 2 below is a comprehensive evaluation index system.

4.2. Fuzzy Mathematics. This paper uses the method of fuzzy math analysis, which uses the fuzzy principle and relationship based on fuzzy math, and evaluates the factors synthetically by quantifying the boundary, which is fuzzy and cannot be quantified. Based on each index of the evaluation object, a corresponding a hierarchical fuzzy subset is constructed, and the degree of superiority of the index is selected as the fuzzy hierarchical value, that is, the index membership. Fuzzy comprehensive evaluation quantifies the fuzzy indexes of evaluating things by using the method of constructing a hierarchical fuzzy subset, and then uses the principle of fuzzy transformation to comprehensively analyze each index. The flowchart of fuzzy mathematics adopted by this research for the environmental quality of health ecotourism in Huangshan National Forest Park can be seen in Figure 3.

The following are the specific steps of Figure 3:

Step 1: explicit factor scope of evaluation object: $X = \{X_1, X_2, \ldots X_n\}$, used to represent n different evaluation indexes.

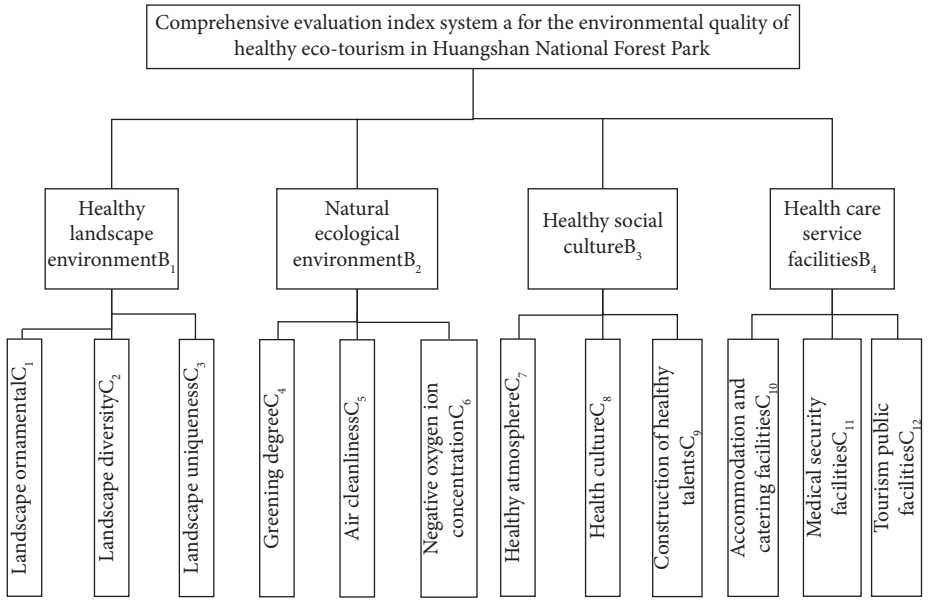

Figure 2: Comprehensive evaluation index system for environmental quality of health ecotourism in Huangshan National Forest Park.

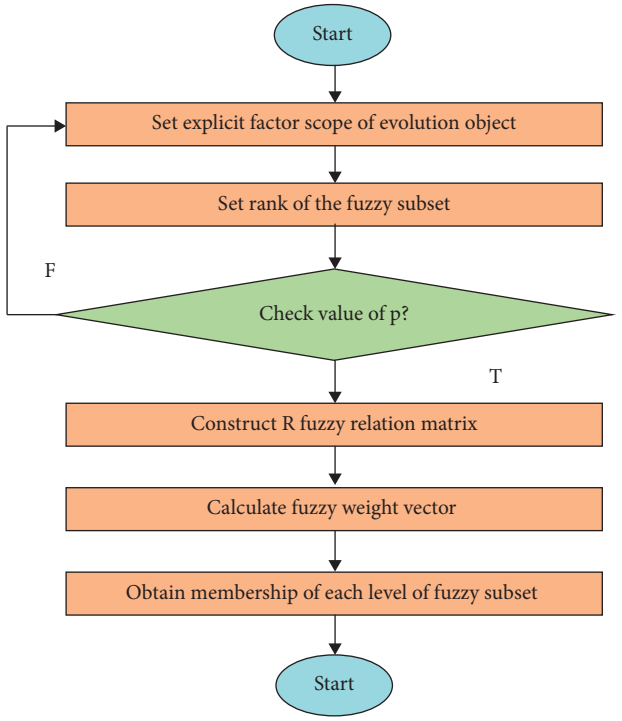

Figure 3: Flowchart of fuzzy mathematics adopted by this research for the environmental quality of health ecotourism.

Step 2: explicit comment-level field: $V = \{V1, V2, \ldots, Vp\}$ rank set; each rank corresponds to a fuzzy subset; usually, the value interval of P evaluation level is [3, 7]; and its value is an integer. If the value of P is large, it indicates that the description is difficult and the attribution of its grade cannot be judged. If the P value is small, the quality requirement of fuzzy comprehensive evaluation cannot be met.

Step 3: the R fuzzy relation matrix is constructed by univariate evaluation. After the hierarchical fuzzy subset is established, the evaluated things are quantified on each factor X_i and the following fuzzy relation matrices can be obtained by analyzing the membership (R/X_i) of the evaluated things to different hierarchical subsets based on one-factor analysis:

$$R = \begin{bmatrix} \frac{R}{X_1} \\ \frac{R}{X_2} \\ \cdots \\ \frac{R}{X_n} \end{bmatrix} = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1p} \\ r_{21} & r_{22} & \cdots & r_{2p} \\ \cdots & \cdots & \cdots & \cdots \\ r_{x1} & r_{x2} & \cdots & r_{np} \end{bmatrix}_{n \times p}. \quad (1)$$

In the above matrix, r_{ij} is the j^{th} column element in row i, that is, the membership of the fuzzy subset of the V_j rank of the transaction being evaluated by the Xi element analysis using $(R/X_i) = (r_{i1}, r_{i2}, \ldots, r_{ip})$ fuzzy vector to represent the evaluated thing in any factor X_i.

Step 4: the fuzzy weight vector $W = (\omega_1, \omega_2, \ldots, \omega_n)$, not all the evaluation factors, is of the same importance to the evaluated things, so the exact fuzzy weight vector should be calculated before synthesis. The weight vector in fuzzy comprehensive evaluation is represented by W, and ω_i is the membership of the X_i factor to the fuzzy subset, which can be calculated using the fuzzy method.

Step 5: by synthesizing all things based on fuzzy vector W, the membership of each level of fuzzy subset of the thing can be obtained. The following is a fuzzy comprehensive evaluation model:

$$W \circ R = (\omega_1, \omega_2, ..., \omega_n) \circ \begin{bmatrix} r_{11} & r_{12} & ... & r_{1p} \\ r_{21} & r_{22} & ... & r_{2p} \\ ... & ... & ... & ... \\ r_{n1} & r_{n2} & ... & r_{np} \end{bmatrix} = (b_1, b_2, ..., b_p)B. \quad (2)$$

4.3. Establishing Comprehensive Evaluation Model of the Environmental Quality of Well-Being Ecotourism. The comprehensive evaluation of the environmental quality of ecotourism in Huangshan National Forest Park belongs to comprehensive evaluation work. For the established evaluation index system, any one of them must visually reflect the current situation of the ecotourism environment. This paper uses the weighted function method to fundamentally improve the quality of the ecohealth tourism environment. The basic formula can be shown in the following equation:

$$Y = \sum_{i=1}^{Nb} Bi \left(\sum_{j=1}^{Nc} Cj * Xk \right). \quad (3)$$

In the above equation, X is the standardized value of different single indicators. B and C are the weights of indicators at each level, Nb is the number of category B indicators, NC is the number of category C indicators to which category B indicators belong, Bi is the weight of the i^{th} category B indicator, and CJ is the weight of the j^{th} category C indicator.

According to the domestic and foreign ecotourism environmental classification methods, referring to this model, the ecotourism environmental quality of Huangshan National Forest Park is divided into five grades, and the score interval of each grade is described in detail in Table 2.

5. Experimental Results and Analysis

5.1. Current Situation of Tourism Resources in Huangshan National Forest Park. Huangshan National Forest Park is located in Huangshan District, Huangshan City, Anhui Province. It was officially established with the approval of China's forestry department in 1987. Its area is 12612.3 hm^2. Its components include the Yanghu National Forest Farm, the former Huangshan, Youshan, Lushan, and Xiancun. The detailed tourism resources of Huangshan National Forest Park are listed in Table 3.

5.2. Weight Calculation Results of the Comprehensive Evaluation Index System. The environmental quality evaluation criteria of healthcare ecotourism in Huangshan National Forest Park are classified into quantitative and qualitative components based on the nature of the various variables. The quantitative parameters may be tracked to identify the index level, whereas the qualitative factors must be evaluated by field investigation and analysis.

Based on the comments $V = \{V1, V2, V3, V4, V5\} =$ {preferably, good, commonly, difference, poor}, we establish the fuzzy mapping of Huangshan National Forest Park Health ecotourism environmental quality indicator layer, and then conduct a field investigation to clarify the membership of different indicators. We build a first-class judgment matrix R(Bi), further fuzzy operation R(Bi), and the response indicator layer weight set W(Bi). Based on these parameters, we obtain the first-class comprehensive evaluation such as Bi, shown in the following equation.

$$B_i = W(B_i) \times R(B_i). \quad (4)$$

This article examines the relevance of each criterion and determines the weight of the environmental quality evaluation index of healthcare ecotourism in Huangshan National Forest Park using the analytic hierarchy method and the Yaahp software, as shown in Table 4.

5.3. Analysis of the Comprehensive Evaluation Results of the Environmental Quality of Kangyang Ecotourism. Based on the constructed comprehensive evaluation model of healthcare ecotourism environmental quality and the above-calculated index weights, the weighted function method is used to evaluate the healthcare ecotourism environmental quality of Huangshan National Forest Park. The results of the first-order fuzzy evaluation on the environmental quality of the healthy ecotourism in Huangshan National Forest Park are as follows:

$B_1 =$ 0.273, 0.326, 0.184, 0.192, 0.035),
B2 = (0.000, 0.851, 0.123, 0.037, 0.000),
B3 = (0.133, 0.301, 0.352, 0.172, 0.054),
B4 = (0.098, 0.273, 0.275, 0.274, 0.112).

The first level of fuzzy comprehensive assessment outcomes is derived using the maximum membership degree of fuzzy comprehensive judgment. The data from each level are then standardized, and the assessment factors and grades are mapped one by one to provide the evaluation results for various variables, as shown in Table 5.

Based on the principle of membership, there are 7 good indicators, 2 average indicators, and 3 poor indicators in the indicator layer. Because no indications are rated good, there seem to be 7 indicators that are rated good, accounting for 0.583 of all indicators. It indicates that these indicators account for a significant proportion of the evaluation of the environmental quality of healthy ecotourism in Huangshan National Forest Park, which has a decisive impact on the final results. According to the data in Table 5, the comprehensive evaluation score of the environmental quality of the healthy ecotourism in Huangshan National Forest Park is 75.92, which belongs to the good grade.

By comparing the evaluation results of each index one by one, the histogram method is utilized to associate and examine the criteria-level indicators, and the actual evaluation outcomes are reflected from many aspects. These may be seen in Figure 4. According to this figure, the index weight is expressed by the height of the histogram. The higher the histogram is, the higher the importance of this index in the environmental quality of healthy ecotourism in Huangshan National Forest Park is. The advantages and disadvantages of indicators are depicted by using color blocks of varying

Table 2: Scoring standard for comprehensive evaluation of ecological health.

Score y	90–100	75–90	60–75	30–60	0–30
Healthy ecological development level	Preferably	Good	Commonly	Difference	Poor

Table 3: Current situation of tourism resources in Huangshan National Forest Park.

Type	Tourist resources
Geocultural landscape	Wushan Mountain, Youshan Mountain, Tianhu Mountain, Lushan Mountain, Luotuofeng Mountain, Toad Mountain, Xiangling Mountain, Ruoling Mountain, Longtan Canyon, Guangdong Canyon, etc.
Biological landscape	Deciduous broad-leaved forest, evergreen broad-leaved forest, alpine dwarf forest, Chinese fir forest, alpine meadow, Shili Bamboo Sea, nanmu forest, azalea sea
Hydrological landscape	Tianhu Lake, Taiping Lake, Dayang Lake, Xiaoyang Lake, Longtan, Wulong Waterfall, Pearl Lake
Celestial phenomena and climate landscape	Appreciating the moon in Tianhu lake, sunrise in Ruoling, misty rain in Pinghu Lake
Cultural activities	Huangshan mountaineering festival, closing the mountain with gongs, Huangshan tea ceremony
Tourism commodities	Bamboo carving, Huangshan Maofeng, Huangshan Shier, Huangshan Torreya grandis, bamboo shoots

Table 4: Evaluation index weight of ecological health tourism.

Target layer A	Criterion layer B	Weight	Index layer C	Weight
Comprehensive evaluation index system for the environmental quality of healthcare ecotourism in Huangshan National Forest Park A	Healthy landscape environment B_1	0.426	Landscape ornamental C_1	0.136
			Landscape diversity C_2	0.245
			Landscape uniqueness C_3	0.045
	Natural ecological environment B_2	0.157	Greening degree C_4	0.163
			Air cleanliness C_5	0.201
			Negative oxygen ion concentration C_6	0.216
	Healthy social culture B_3	0.262	Healthy atmosphere C_7	0.124
			Health culture C_8	0.257
			Construction of healthy talents C_9	0.158
	Healthcare service facilities B_4	0.155	Accommodation and catering facilities C_{10}	0.264
			Medical security facilities C_{11}	0.237
			Tourism public facilities C_{12}	0.198

intensities. However, if the lightness of each histogram changes less, the viewpoints are more congruent. If the color is darker, then the opinion will be better.

5.3.1. Healthy Landscape Environment B1. Figure 5 depicts the results of a comparison of healthcare landscape environment indicators. According to this figure, the most critical indicator in the healthcare ecotourism environmental quality of Huangshan National Forest Park is landscape ornamental, which is rated as good, indicating that tourists are very positive about the landscape designed and planned by Huangshan National Forest Park, and the layout meets people's esthetic requirements. The C2 index of landscape diversity has an evaluation grade of average, indicating that the number of healthcare landscapes built in the park is limited and cannot meet people's basic healthcare needs. The evaluation grade of the C3 indicator of landscape uniqueness is poor. When tourists evaluate Huangshan National Forest Park, they believe that its landscape is similar to that of other regions and does not reflect the characteristics of this region. It does not integrate the local cultural atmosphere into the landscape setting and lacks a healthy ecological environment with local characteristics.

5.3.2. Natural Ecological Environment B2. Figure 6 shows the comparison results of natural ecological environment indicators. The indicators of greening degree C_4, air cleanliness C_5, and negative oxygen ion concentration C_6 in this standard layer are good. The evaluation results show that the air cleanliness and negative oxygen ion concentration of Huangshan National Forest Park have been improved after years of management. At the same time, the natural ecological environment is good and the greening degree is high.

5.3.3. Healthy Social Culture B3. Figure 7 shows the comparison results of the indicators of the social and cultural environment of health care. According to the figure, both the

Table 5: Assessment results of the environmental quality of healthy ecotourism in Huangshan National Forest Park.

Target layer A	Total score	Criterion layer B	Evaluation results	Index layer C	Score	Evaluation results
Comprehensive evaluation index system for the environmental quality of healthcare ecotourism in Huangshan National Forest Park A	75.92	Healthy landscape environment B_1	Preferably	Landscape ornamental C_1	99	Preferably
				Landscape diversity C_2	73	Commonly
				Landscape uniqueness C_3	28	Poor
		Natural ecological environment B_2	Preferably	Greening degree C_4	97	Preferably
				Air cleanliness C_5	95	Preferably
				Negative oxygen ion concentration C_6	96	Preferably
		Healthy social culture B_3	Commonly	Healthy atmosphere C_7	98	Preferably
				Health culture C_8	97	Preferably
				Construction of healthy talents C_9	74	Commonly
		Healthcare service facilities B_4	Commonly	Accommodation and catering facilities C_{10}	27	Poor
				Medical security facilities C_{11}	29	Poor
				Tourism public facilities C_{12}	98	Preferably

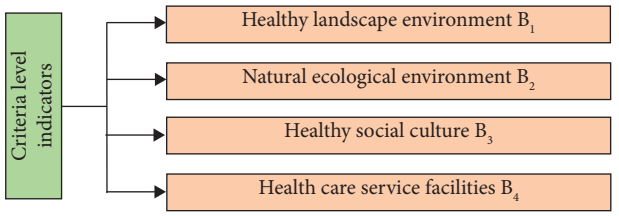

Figure 4: Comparison of criteria-level indicators.

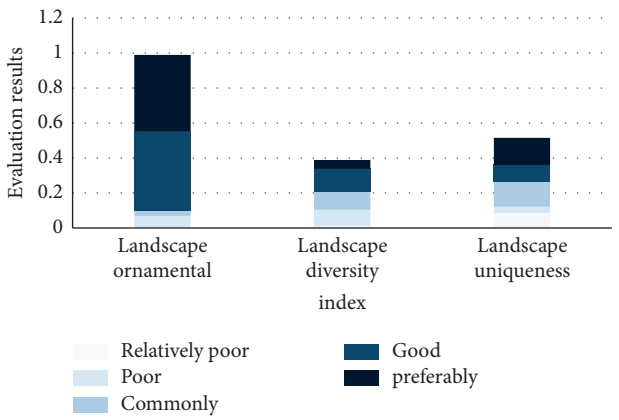

Figure 5: Comparison of landscape environmental indicators for health care.

indicators C7 and C8 are very important and are good, indicating that Huangshan National Forest Park has formed a mature healthcare system, which can create an ideal healthcare atmosphere for tourists. The personnel engaged in this work have high cultural literacy, have received

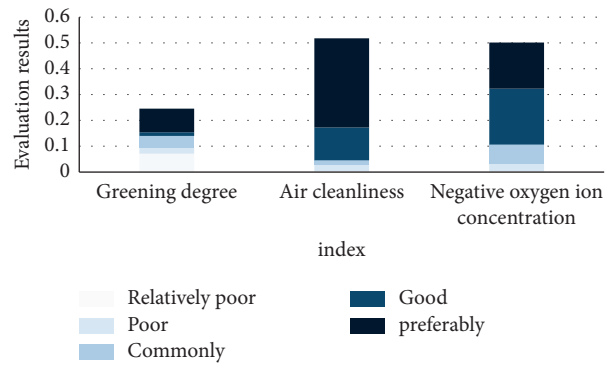

Figure 6: Comparison of natural ecological environment indicators.

relevant professional training, and have a strong sense of service. It can promote the development of tourism in this region. However, the C9 indicator level of healthcare talent construction is average; that is, the region lacks a complete talent construction system, and cannot continuously transport relevant talents. The publicity effect is not ideal. In the later stage, we should start from this aspect to set up relevant healthcare professional courses in universities to strengthen talent training.

5.3.4. Healthcare Service Facilities B4. Figure 8 shows the comparison results of indicators of healthcare service facilities. The indicator grade of tourism public facilities C_{12} is good, while the remaining indicators of accommodation and catering facilities C10 and medical security facilities C_{11} are poor. The tourist rest area built by Huangshan National Forest Park in terms of healthcare service and ecological environmental service facilities is relatively simple, so

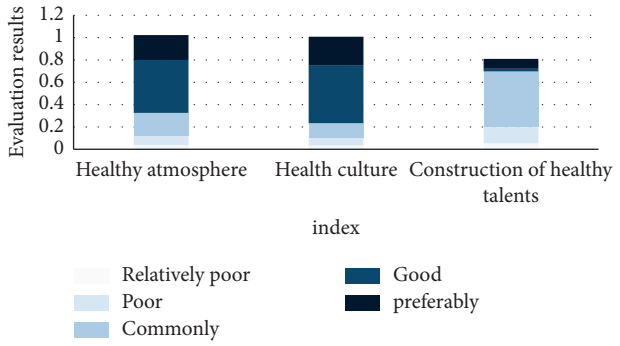

Figure 7: Comparison of indicators of social and cultural environment for health care.

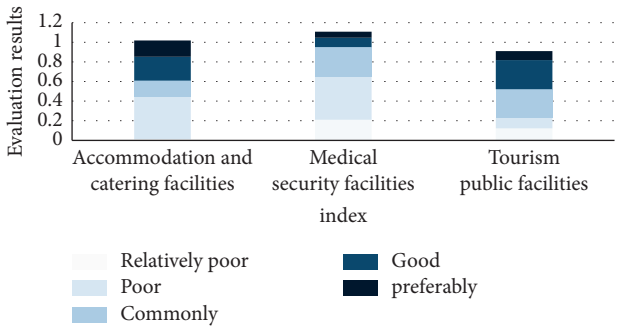

Figure 8: Comparison of environmental indicators of healthcare service facilities.

tourists cannot relax their pressure during their travel. Huangshan Forest Park has less investment in medical care, which makes it difficult for some tourists to meet their requirements when they need medical care services. The supporting catering and accommodation are also relatively simple. In the future, we should improve the service quality from this aspect.

According to the comprehensive analysis, the actual ecotourism situation of Huangshan National Forest Park is being investigated on the spot. Furthermore, the first-order evaluation matrix is constructed, and the weights of each index in the evaluation index system are calculated using the analytic hierarchy process and fuzzy mathematical analysis. The results show that the highest weight of healthy landscape environment B1 is 0.426, followed by healthy social culture B3, with a weight of 0.262. The proportion of these two weights is 68.8%, which has a decisive impact on the comprehensive evaluation results. The weights of other natural ecological environment B2 and healthcare service facilities B4 are 0.157 and 0.155.

6. Conclusions

In this paper, Huangshan National Forest Park is selected to make a comprehensive evaluation of the environmental quality of its healthcare ecotourism. After screening and determining 12 indicators that affect the environmental quality of healthcare ecotourism, the evaluation system of the environmental quality of healthcare ecotourism in Huangshan National Forest Park is established by using the analytic hierarchy process (AHP). The criterion layer indicators in the system include healthcare landscape environment B1, natural ecological environment B2, healthcare social culture B3, and healthcare service facilities B4. Combined with the fuzzy mathematical analysis method, a comprehensive evaluation model of the healthcare ecotourism environmental quality of Huangshan National Forest Park is constructed. Based on the comprehensive evaluation model of the environmental quality of healthcare ecotourism, the weights of each index are substituted, and the weighted function method is used to evaluate the environmental quality of healthcare ecotourism in Huangshan National Forest Park. After calculation, the comprehensive evaluation result is 75.92, and the grade is good, indicating that Huangshan National Forest Park has the environmental quality required for the development of healthcare ecotourism. The higher scores of each index such as landscape ornamental C1, greening C4, air cleanliness C5, negative oxygen ion concentration C6, healthcare atmosphere C7, healthcare cultural literacy C8, and tourism public facilities C12 are all good.

Data Availability

The data are available on reasonable request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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References

[1] J. F. Koens, C. Dieperink, and M. Miranda, "Ecotourism as a development strategy: experiences from Costa Rica," *Environment, Development and Sustainability*, vol. 11, no. 6, pp. 1225–1237, 2009.

[2] J. Coria and E. Calfucura, "Ecotourism and the development of indigenous communities: the good, the bad, and the ugly," *Ecological Economics*, vol. 73, pp. 47–55, 2012.

[3] X. Wu and E. Carrasco, *Ecoturismo: Una Revisi´on de Sus Elementos Fundamentales*, Revista DELOS Desarrollo Local Sostenible ISSN, Spain, 2015.

[4] A. Pedersen and H. Ceballos-Lascurain, "Nature-oriented tourism in the state of Guerrero, Mexico: issues and recommended policies for local economic development," *Regional and Sectoral Development in Mexico as Alternatives to Migration*, pp. 331–361, Taylor & Francis, New York, FL, USA, 2019.

[5] B. Juric, T. B. Cornwell, and D. Mather, "Exploring the usefulness of an ecotourism interest scale," *Journal of Travel Research*, vol. 40, no. 3, pp. 259–269, 2002.

[6] J. Elliott, *Tourism: Politics and Public Sector Management*, Routledge, Milton Park, UK, 2020.

[7] G. T. Hvenegaard and P. Dearden, "Ecotourism versus tourism in a Thai national park," *Annals of Tourism Research*, vol. 25, no. 3, pp. 700–720, 1998.

[8] V. M. Athawale and S. Chakraborty, "A comparative study on the ranking performance of some multi-criteria decision-making methods for industrial robot selection," *International Journal of Industrial Engineering Computations*, vol. 2, no. 4, pp. 831–850, 2011.

[9] P. A. Nvight, "North American ecotourism markets," *Journal of Travel Research*, vol. 35, no. 1, pp. 3–10, 1996.

[10] M. Maria, E. Mikel, I. Katsunori, D. Carla, and G. Alessandro, "Assessing the Ecological Footprint of Eco-tourism Packages," *A Methodological Proposition Resources*, vol. 7, no. 2, 2018.

[11] P. F. Eshoo, T. Hansel, A. Johnson, S. Duangdala, and T. Hansel, "Design, monitoring and evaluation of a direct payments approach for an eco-tourism strategy to reduce illegal hunting and trade of wildlife in Lao PDR," *PLoS One*, vol. 13, no. 2, Article ID e0186133, 2018.

[12] P. Zając and A. Avdiushchenko, "The impact of converting waste into resources on the regional economy, evidence from Poland," *Ecological Modelling*, vol. 437, Article ID 109299, 2020.

[13] A. Maritati and L. Leonardini, "Conceptual framework on health and tourism—an interregional point of view of the Silver Economy," *The European Journal of Public Health*, vol. 30, no. 5, p. 165, 2020.

[14] T. Akgün, K. Ok, E. Yilmaz, A. A. Kul, and İ. Çeİik, "Determination of priorities on ecotourism values in forest areas maneged different aims," *Turkish Journal of Forestry | Türkiye Ormancılık Dergisi*, vol. 21, no. 4, pp. 417–427, 2020.

[15] K. A. Waylen, P. J. K. McGowan, and E. J. Milner-Gulland, "Ecotourism positively affects awareness and attitudes but not conservation behaviours: a case study at Grande Riviere, Trinidad," *Oryx*, vol. 43, no. 03, p. 343, 2009.

[16] H. Goodwin, "In pursuit of ecotourism," *Biodiversity & Conservation*, vol. 5, no. 3, pp. 277–291, 1996.

[17] R. J. Gitelson, *Review: Special Interest tourism*Halsted Press, New York, NY, USA, 1993.

[18] C. Zografos and D. Oglethorpe, "Multi-criteria analysis in ecotourism: using goal programming to explore Sustainable Solutions," *Current Issues in Tourism*, vol. 7, no. 1, pp. 20–43, 2004.

[19] The International Ecotourism Society, "What is Ecotourism?," 2015, https://www.ecotourism.org/what-is-ecotourism.

[20] S. Chiutsi, M. Mukoroverwa, P. Karigambe, and B. K. Mudzengi, "The theory and practice of ecotourism in Southern Africa," *Journal of Hospitality Management and Tourism*, vol. 2, no. 2, pp. 14–21, 2011.

[21] H. Ceballos-Lascurain, "The future of ecotourism," *Mexico Journal*, vol. 1, pp. 13-14, 1987.

[22] T. Weitzel, I. Perez, and L. Porte, "Lyme borreliosis presenting as severe back pain after Shinrin-Yoku (forest bathing) in southern Germany," *Journal of Travel Medicine*, vol. 29, no. 2, 2022.

[23] A. Peterfalvi, M. Meggyes, L. Makszin et al., "Forest bathing always makes sense: blood pressure-lowering and immune system-balancing effects in late spring and winter in central europe," *International Journal of Environmental Research and Public Health*, vol. 18, no. 4, p. 2067, 2021.

[24] C. Johansson, R. Bedggood, K. Farquharson, and A. Perenyi, "Sared leadership as a vehicle to healthy service eco-systems: practical or fanciful?" *Journal of Social Marketing*, vol. 8, no. 2, pp. 159–181, 2018.

[25] S. Yang and X. Duan, "Discussion on the development of ecotourism education in China's national parks," *IOP Conference Series: Earth and Environmental Science*, vol. 526, no. 1, Article ID 012019, 2020.

[26] C. Agula, F. N. Mabe, M. A. Akudugu, S. Dittoh, S. N. Ayambila, and A. Bawah, "Enhancing healthy ecosystems in northern Ghana through eco-friendly farm-based practices: insights from irrigation scheme-types," *BMC Ecology*, vol. 19, no. 1, p. 38, 2019.

[27] C. H. Zhang, W. Xue, and Y. Xin, "On sustainable development of health and wellness tourism in Yushe National Forest Park based on SWOT-AHP model," *Journal of Zhejiang A&F University*, vol. 37, no. 4, pp. 769–777, 2020.

[28] Q. Li, H. M. Zhang, X. H. Yang, C. J. Xie, and X. Y. Li, "The scientific development strategy of forest nature convalescent in guizhou Province under the background of great health and large tourism," *Journal of Fujian Forestry Science and Technology*, vol. 44, no. 2, pp. 152–156, 2017.

[29] Y. Zou, J. Zhou, and X. F. Cheng, "Development status and countermeasures of forest healthcare industry in wuyuan county," *Journal of Anhui Agricultural Sciences*, vol. 49, no. 18, pp. 113–115, 2021.

[30] H. X. Chen, J. Luo, and S. B. Zeng, "Research progress and implementation ways on the effect of forest bathing and relaxation activities on health promotion," *Health Research*, vol. 40, no. 5, pp. 500–503, 2020.

[31] Z. Li, "A study of measuring ecological values and mechanism of realization," *Journal of Shanxi Normal University (Philosophy and Social Sciences edition)*, vol. 40, no. 5, pp. 500–503, 2022.

[32] K. Fang and Y. R. Zhu, "The theory and practice of the natural resources asset balance-sheet compilation," *Environmental conformity Assessment*, vol. 11, no. 3, pp. 24–30, 2022.

[33] X. M. Liang, Y. Z. Yang, and K. P. Du, "Study on estimation and quantification of ecological value of leilin Eucalyptus plantation in zhanjiang city," vol. 49, no. 14, pp. 101–105, 2021.

[34] Z. Y. Li, S. P. Li, Y. G. Cao, S. F. Wang, S. H. Liu, and Z. J. Zhang, "Supply and demand of ecosystem services:Basic connotation and practical application," *Journal of Agricultural and Resource Economics*, vol. 39, no. 3, pp. 456–466, 2022.

[35] C. Li, X. Zhang, L. Zhao, L. Li, J. S. Wang, and Y. N. Li, "Ecosystem structure and material flows of Miyun Reservoir based on the Ecopath model," *Amino Acids & Biotic Resources*, vol. 43, no. 3, pp. 292–302, 2021.

[36] S. Ali and S. U. Khan, "Software outsourcing partnership model: an evaluation framework for vendor organizations," *Journal of Systems and Software*, vol. 117, pp. 402–425, 2016.

[37] L. Wang, Y. Ali, S. Nazir, and M. Niazi, "Isa evaluation framework for security of internet of health things system using AHP-Topsis Methods," *IEEE Access*, vol. 8, pp. 152316–152332, 2020.

[38] S. Ali, H. Li, S. U. Khan, Y. Zhao, and L. Li, "Fuzzy multi attribute assessment model for software outsourcing partnership formation," *IEEE Access*, vol. 6, pp. 55431–55461, 2018.