

Evaluating urban eco-tourism resources and environment: a case study in Shanghai Chenshan Botanical Garden, China

Qi Yu^{1,3} and Jie Yin²

¹ Shanghai Vocational College of Agriculture and Forestry, Shanghai, 201600, China;

² School of Geographic Sciences, East China Normal University, Shanghai, 200241, China.

³ 505795882@qq.com

Abstract. In this paper, Shanghai Chenshan Botanical Garden, China has been selected as the study area. The overall status and the development conditions of resources and environment have been analyzed for the park. The eco-tourism resources and environment of Chenshan Botanical Garden were further evaluated synthetically by using expert analysis and questionnaire. A comprehensive evaluation system including 16 indices has been initially established from three aspects of tourism resource element value, resource development condition and eco-environment condition. The characteristics of eco-tourism resources and the score of each indicator for Chenshan Botanical Garden have subsequently been generated. The results show that the comprehensive evaluation score of eco-tourism resources and environment for Shanghai Chenshan Botanical Garden is 72.06, which belongs to third level of excellent tourism resources and environment. Finally, five suggestions are proposed for future development of its eco-tourism resources and environment.

1. Introduction

As the rapid growth of the global economy, people's living standards have been improved accordingly. More and more people choose to return to the original ecological environment to relax and entertainment. Therefore, eco-tourism gradually emerged in this context. In the early 1980s, H • Cebllons Lascrain, an ecological adviser of the International Union for Conservation of Nature and Natural Resources (IUCN), firstly defined Ecotourism. Its main feature was to protect the environment and protect the lives of local residents. Based upon the protection of ecological environment, the concept of sustainable development plays an important role in the ecotourism development. Furthermore, in order to coordinate the harmonious relationship between human being and nature, eco-friendly tourism largely depends on a good ecological environment and natural resources [1]. Ecological tourism resources mainly attract tourists through ecological beauty, which is used for tourism, including ecological resources such as animals and plants, and natural and cultural resources such as buildings [2].

During the past decades, researches on eco-tourism resources and environment were studied widely, largely using qualitative and quantitative methods. However, in terms of research topics, previous studies were mainly focused on prominent tourist destinations such as natural reserves, national parks, forest parks and coastal tourist attractions [3-11]. Here, our paper focuses on urban areas where natural resources are scarce. The botanical garden scene is formed by artificial intervention, is an important type of eco-tourism resource, belonging to the artificial nature of eco-tourism resources. Shanghai is



an international metropolis with a lot of people, but land and natural resources are relatively limited [12]. The establishment of Chenshan Botanical Garden is beneficial to improve the eco-environment of Shanghai. It provides nearly ten thousand kinds of plant species for urban greening. It transforms abandoned quarries into a pit garden through ecological restoration technology, which is a landmark of Chenshan Botanical Garden. Therefore, it is necessary to make a scientific evaluation of eco-resources and environment of Chenshan botanical garden, which is conducive to the sustainable development of eco-tourism.

2. Description of Chenshan Botanical Garden

Shanghai Chenshan Botanical Garden located in Songjiang District, Shanghai, within the Sheshan National Tourism Resort. Its center is located at latitude 31°04'48.10" N, and 121°11'5.76" E. This region experiences a northern subtropical monsoon climate, characterized by warm, humid, four distinctive seasons and abundant rainfall. The vegetative cover belongs to subtropical evergreen broad-leaved forest. In 1950s, the vegetation of Mt. Chen was destroyed by human beings, and the surface soil was almost uncovered. Since 1960s, maple, black locust and so on have been planted by hand. After nearly 50 years' reforestation and natural vegetation succession, this area has formed a closed vegetation landscape with complete community structure. At present, it is occupied by deciduous broad-leaved forest, evergreen and deciduous broad-leaved mixed forest and bamboo forest patches [13].

The park was opened to the public on 23rd January, 2011, covering an area of 2,076,300 m². It is a comprehensive botanical garden through the combination of scientific research, public science education and the sightseeing. The park is divided into four major functional areas, including central exhibition area, plant nursery area, five continents plant area and peripheral buffer zone. As an important part of the botanical garden, the central exhibition area has 26 special parks, such as the quarry garden, the rock and medicinal botanical garden. In total, there are about 10000 kinds of plants in the park, among which 30% come from East China, including 107 rare and endangered plants (i.e. national protected plants: class one and two). It is the largest botanical gardens in East china.

3. Construction of index system

3.1. Building evaluation system

The evaluation method of ecotourism resources and environment includes the qualitative and quantitative evaluation. Qualitative evaluation is also known as Delphi method and expert scoring method. Quantitative evaluation is commonly used AHP [14]. The evaluation method used in this paper is a combination of qualitative evaluation and quantitative evaluation.

First of all, the eco-tourism resources and environment index of Chenshan botanical garden is constructed, which is an important part of the construction of the whole evaluation system. According to GB/T 18972-2003 *classification of tourism resources, survey and evaluation*, combined with the classification of eco-tourism resources and the specific situation of Chenshan Botanical Garden, the eco-tourism resources and environment are divided into three aspects: tourism resource elements, resource development conditions and eco- environment conditions. In this paper, the comprehensive index system of eco-tourism resources and environment of Chenshan Botanical Garden is established by using the methods of expert inquiry, questionnaire survey and subjective intention, which includes a total target layer, three criteria layers and 16 indices (Figure 1).

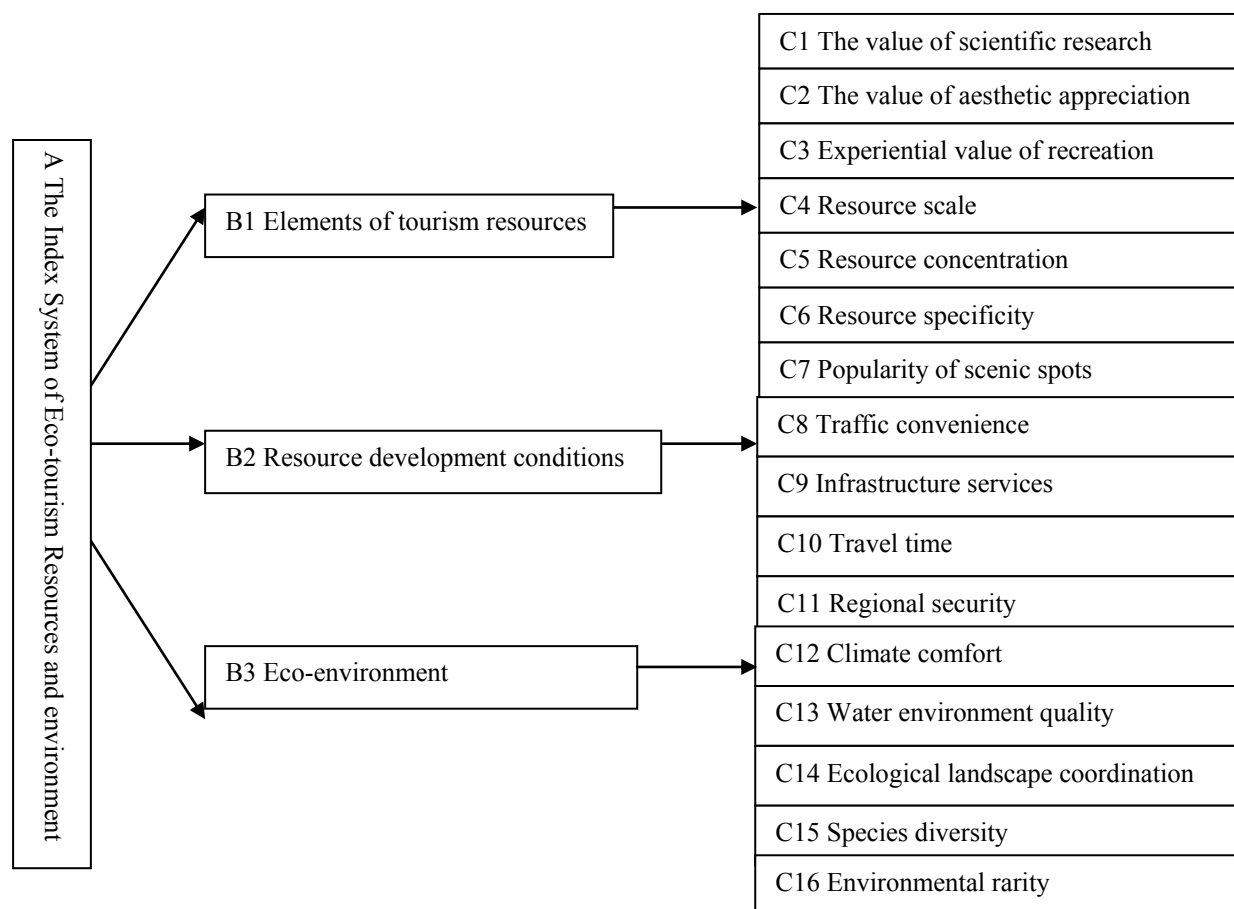


Figure 1. The index system of eco-tourism resources and environment in Chenshan Botanical Garden.

3.2. Determining the weight and scoring criteria

To avoid arbitrary weight allocation, the Delphi method, which has been extensively applied to decision-making problems, was employed to determine the weight of each factor by consolidating the opinions of 20 experts who are working in geography, tourism, and ecology. First of all, the average score M_a of B index is obtained. Secondly, the average score M_b of C index is obtained. Finally, the weights W of the 16 indicators were further calculated.

$$M_a = \frac{BX_1 + BX_2 + \dots + BX_n}{n} \quad M_b = \frac{CX_1 + CX_2 + \dots + CX_n}{n} \quad W = \frac{M_a}{100} \times M_b$$

In addition, we have issued questionnaires to visitors to investigate the satisfaction degree of tourists to the eco-tourism resources of the Chenshan Botanical Garden. We designed the questionnaire containing 16 indexes for visitors to score, according to the ranking from 1 to 5 points (1 point-poor, 2 points-relatively poor, 3 points-general, 4 points-relatively good, 5 points-good). A total of 300 questionnaires were issued, and 100% of the questionnaires were collected. The percentage of effective questionnaire was 98%. The subjects were tourists visiting the Chenshan botanical garden, and they were issued by the botanical garden and the network platform. Through the recovery of the questionnaire data, the arithmetic mean of each index was obtained (Table 1).

3.3. Comprehensive evaluation results

Based on the above results, the average index of tourists is multiplied by the weight of each index, and the index scores are obtained. Then, by summing up the scores of each index, the comprehensive evaluation score of eco-tourism resources of ChenShan Botanical garden is 72.06. According to GB/T 18972-2003 *Classification of tourism resources, survey and evaluation*, it belongs to "excellent tourism resources". The Garden has the following features: First, the major attractiveness of eco-

tourism is natural plant landscape. The experience of watching and recreation is relatively good. It has a certain degree of reputation, but the uniqueness and concentration are not enough. Second, the development condition of the garden is general, especially in the development of transportation and infrastructure. Third, the eco-environment is excellent. Species, climate, water and environmental coordination show good performances except environmental rarity.

The indicators in the top five are C11 regional security, C2 Aesthetic appreciation, C15 species diversity, C14 biological landscape coordination, and C1 scientific research. In addition, the scores of C3 recreational experience value, C13 water environment quality and C12 climate comfort is higher than 70. This shows that Chenshan botanical garden has a beautiful eco-environment, a safe and comfortable environment and a variety of scenic spots. It can provide better recreation experience for tourists, and has a strong scientific and educational research value (Table 2).

However, there are some problems in Chenshan Botanical Garden through our investigation. Among the indicators, the scores of C9 basic service facilities, C8 transportation convenience, C5 resource concentration degree and C16 environment rarity index are lower (less than 70). Meanwhile, in terms of the weighting, experts give a relatively higher importance to C8 traffic convenience, C9 infrastructure services and C6 resource concentration index. The basic service facilities development of Chenshan Botanical Garden is also insufficient, combined with traffic inconvenience, restricting the development of the tourist attractions. Finally, the lower ranking of overall environmental scarcity and resources novelty also limit the further development of ecotourism.

Table 1. Eco-tourism resources and environment ratings for Chenshan Botanical Garden.

Target layer	Criteria layer	Index layer	Weight coefficient	Arithmetic mean of tourist	Overall ratings
A The Index System of Eco-tourism Resources and environment	B1Elements of Tourism Resources	C1The value of scientific research	0.06	72.5	4.35
		C2Aesthetic appreciation value	0.088	75.45454	6.64
		C3Experiential value of recreation	0.08	72.27272	5.79
		C4 Resource scale	0.058	70.68181	4.10
		C5Resource concentration	0.054	68.40909	3.70
		C6 Resource specificity	0.076	69.09091	5.25
		C7 Popularity of scenic spots	0.05	71.59091	3.58
	B2Resource development conditions	C8 Traffic convenience	0.084	69.09091	5.81
		C9 Infrastructure services	0.074	67.95454	5.03
		C10 Travel time	0.058	70.45455	4.09
		C11 Regional security	0.064	76.36363	4.89
	B3Ecological environment	C12 Climate comfort	0.042	71.13636	2.99
		C13Water environment quality	0.046	71.59090	3.30
		C14 Ecological landscape coordination	0.052	73.86363	3.84
		C15 Species diversity	0.072	75	5.40
		C16 Environmental rarity	0.048	68.63636	3.30
Total					72.06

Table 2. A table with ranking of single index scores.

Ranking	Eco - tourism resources and environmental indicators
1	C11 Regional security
2	C2 Aesthetic appreciation value
3	C15 Species diversity
4	C14 Ecological landscape coordination
5	C1 The value of scientific research
6	C3 Experiential value of recreation
7	C7 Popularity of scenic spot
8	C13 Water environment quality
9	C12 Climate comfort
10	C4 Resource scale
10	C10 Travel time
12	C6 Resource specificity
13	C8 Traffic convenience
14	C16 Environmental rarity
15	C5 Resource concentration
16	C9 Infrastructure services

4. Suggestions

Based on the above results and the actual situation of Chen Shan Botanical Garden, we make some suggestions for the development of ecotourism.

4.1. To develop planning on eco - tourism and eco - environmental protection

Scientific planning is the basis for the development of eco - tourism resources. It is not only benefit to the investment and management, but it is also helpful to improve social, economic and environmental benefits

4.2. To strengthen infrastructure construction of the Botanical Garden

Visitors consider the park to be large, with a distance between each theme area. However, there are few facilities available for visitors to rest and shade in the public activity area. Therefore, it is suggested that facilities for visitors rest in public areas should be increased. Meanwhile, there are a lot of viewing activities in Botanical Garden, but experience activities are few. It is proposed to develop diversified tourism activities based on plants, so as to improve the value of recreational experience.

4.3. To strengthen the park infrastructure construction

The result showed that the traffic was not very convenient. The Botanical Garden is located in the outer suburbs of Shanghai, Songjiang. It is about 45 kilometres away from the central city of Shanghai. Take the high speed G50 or G60 for 1.5 hours by car. The condition of the location of the garden is difficult to change. However, the signs should be added along the road, especially after the high-speed to the Botanical Garden. In addition, the internal traffic of the Botanical Garden should be improved. There are some 10-seat battery cars in the garden, but the driving interval of the car is longer.

4.4. To strengthen publicity and improve visibility

In view of the characteristics of the eco-tourism resources in Chen Shan botanical garden, a variety of publicity methods should be adopted to increase publicity and enhance the popularity. Botanical Garden on the basis of the existing publicity, it can also take part in domestic and international tourism exhibition. Meanwhile, it can invites domestic and foreign tourism experts, travel media and expert tourists to study the tourism resources, with its personal experience to improve resource reputation and international visibility.

4.5. To strengthen human resource training

For managers, the training of resource management, marketing and development planning should be carried out. This is conducive to change management ideas and improve management capabilities. For staffs, it should focus on strengthening the basic knowledge of eco-tourism, eco-tourism resources development and eco-tourism resources protection, and to strengthen the tour guide and tourism services training. It is helpful to improve service awareness, and service quality. Through a series of training, making them to become both responsible for resource management and environmental conservation, but also qualified for eco-tourism development and service personnel. For managers,

5. Conclusions

There are a lot of eco-tourism resources in the park. A comprehensive evaluation system is established on the basis of a large number of documents, including 16 indices from three aspects of tourism resource element value, resource development condition and eco-environment condition. The results show that the level of ecotourism resources in Chenshan botanical garden is excellent, with 72.06 points, especially in regional security, aesthetic appreciation, ecological landscape coordination and species diversity. However, there are many problems in the park, for example, the infrastructure and traffic conveniences of the garden are relatively poor, and the environment is not unique, which restricts the development of eco-tourism in botanical garden. Finally, this evaluation system is valuable, but its completeness and objective accuracy have yet to be further improved, which will be to the research direction in the future study.

References

- [1] Zhong L S, Ma X Y, Zeng Y X 2016 Progresses and prospects of ecotourism research in China *Progress in Geography* **35**(6) 679-690
- [2] Yu K J, Li B, Li D H 2008 Ecological infrastructure of natural and cultural heritage areas: a case study in Fujian Wuyi Mountain *Journal of Urban Planning* **10** 79-82
- [3] Zhang B Y, Chen M L 2016 A evaluation of eco-tourism resources in Baihua Mountain National Nature Reserve *Journal of Northeast Forestry University* **44**(7) 70-75
- [4] Zhu S R 2016 A study on the evaluation and development of ecotourism resources in Sichuan province *China Agricultural Resources and Regionalization* **37**(8) 218-222
- [5] Li C, Yang X L, Gao D D 2016 The application of AHP in the evaluation of eco-tourism resources: a case study of Zhangjiajie *Agriculture and Technology* **36** (3) 147-149
- [6] Tang C C, Zhong L S, Cheng S K 2012 Tibetan attitudes towards community participation and ecotourism *Journal of Resources and Ecology* **3**(1) 8-15
- [7] Li L, Wang LY 2017 An empirical study on the effect of eco-tourism visitors' environmental attitudes on environmental behavior applied ecology and environmental research **15**(2) 91-101
- [8] Lee C K, Lee J L, Han S Y 1998 Measuring the economic value of ecotourism resources :the case of South Korea *Journal of Travel Research* **36**(4) 40-46
- [9] Weaver D B, Lawton L J 2007 Twenty years on: The state of contemporary ecotourism research *Tourism Management* **28**(5) 1168-1179
- [10] Sanela A , Djordje N , Zivan Z 2017 Hybrid SWOT-ANP-FANP model for prioritization strategies of sustainable development of ecotourism in National Park Djerdap, Serbia *Forest Policy and Economics* **80**(7) 11-26
- [11] Priskin J 2001 Assessment of natural resources for nature based tourism: the case of the Central Coast Region of Western Australia *Tourism Management* **22**(6) 637-648
- [12] Hu Y H, Ma Q J 2014 Botanical Garden and the Construction of Soft Power in International Metropolis: a case study of Shanghai *Chenshan Botanical Garden* **11** 80-83
- [13] Lin M R 2009 the research about vegetation characteristics and countermeasure of conservation area in Shanghai *Chenshan Botanical Garden East China Normal University*
- [14] Deborah C 2006 Developing ecotourism in 1 World resource dependent areas *Geoforum* **37**(2) 212-226