

# Research of Tourism Environment Capacity on the East Lake Scenic Area of Wuhan

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**Keywords:** scenic spot; tourism environmental capacity; current situation; measures

**Abstract:** This study aimed to take the connotation of eco-tourism as the main line, reviewed the relevant research on the bearing capacity of tourism scenic spots and explored the current environmental capacity of Wuhan East Lake Eco-tourism Scenic Spot. The article analyzed the relationship between the bearing capacity of scenic spots and eco-tourism, and provided practical countermeasures to prevent public safety in tourism and environmental issues to achieve comprehensive adjustment and optimization of the tourism environmental capacity of Wuhan East Lake Eco-tourism Scenic Spot.

## 1. Introduction

As an important service industry pillar of national economic development, tourism plays an extremely efficient role in promoting national and regional economy, creating jobs and activating traditional culture. With its rapid development, some environmental and social problems have gradually become prominent. The number of instantaneous tourists in the scenic spots increases rapidly in the festival and the traffic is congested around the scenic spots. The environment in the scenic spots is damaged and the public security incidents in the scenic spots take place frequently. All the above typical problems are caused by the overcapacity of tourism spots[1]. This disharmonious state of human-land relationship not only affects the quality of experience of tourists in scenic spots, but also causes hidden dangers in the sustainable and stable development of tourist attractions[2]. Therefore, how to control the bearing capacity of tourist attractions has become an important topic in the theoretical circle.

## 2. Analysis of Current Situation of Environmental Capacity in Wuhan East Lake Scenic Spot

Wuhan East Lake Scenic Spot is a national-level scenic spot. In recent years, due to the large increase in tourists, the tourism environment has been polluted and destroyed, seriously affecting the atmosphere and quality of the tourism environment. Based on the theory and methods of tourism environmental capacity, this paper analyzed the emergence and causes of tourism environment and tourism environmental capacity problems in East Lack Scenic Spot. Based on the composition of land and scenic spots, the article calculated that its tourism environmental capacity is 23.5 million persons per year. It is 64,393 persons per day and the largest number of tourists is 16,058 persons.

### 2.1 The number of tourists has increased rapidly.

Although the East Lake Scenic Spot is very famous around the country, it has been a large-scale reception for tourists for just 20 years. Figure 1 reflects the change in the number of tourists from 1979 to 1999, which was in a state of increase with volatility. However, from 1990 to 2000, it went up straight. In 1999, the number of tourists reached 6.7 million, which was six times than that of 1,109,800 in 1979 and 4.2 times than that of 1.59 million in 1991. After 1994, it increased at a rate of 600,000 per year. Obviously, with the deepening of reform and opening up, the economy of Wuhan and its surrounding areas has developed rapidly and people have become rich quickly. Many people from other areas have flooded in and the number of foreign guests has increased. With the implementation of weekends and the increase of holidays, many potential tourists have become

actual tourists, especially on weekends.

## **2.2 Tour time and location are concentrated.**

Wuhan is located in the subtropical monsoon climate zone. It has the characteristics of warm spring, hot summer, mild autumn and cold winter. The activity and quantity of tourists are limited and seasonal. Visitors mainly go to the spot from May to October, accounting for 78% of the annual visitors; visitors who come to the spot from November to December and from January to March only account for 22% of the annual visitors. From April to May, the spring is warm; from September to October, the autumn is very cool with heavy traffic on the street and many visitors. At 9:00 to 13:00, the number of visitors who enter the park is the largest. At 9:30-14:00, the number of visitors who are in the park is the largest. Around noon, there are more than 2/3 of visitors on the whole day. In spring, the number of tourists can be as many as 40,000 to 50,000 persons per day; in the autumn, it can reach 20,000 to 30,000 persons per day. At noon, the number of tourists in the spring and autumn can reach 35,000 persons and 25,000 persons respectively[3].

According to statistics, the tourists in the East Lake Scenic Spot are concentrated in time distribution, and the visiting space is not balanced. They are mainly concentrated in some classical gardens and cultural buildings, such as East Lake Gate, Tingtao Pavillion, Zebian Guest House, Xingyi Tower, Binghu Gallery, Churen Carnival Island, Liyuan Garden, Moshan Zhubei Pavilion and Chu Culture City. There are fewer tourists in other places, especially on the large area of Guozheng Lake. There are few boats and other amusement facilities with few tourists.

## **2.3 Environmental pollution and damage are serious.**

Due to the rapid increase in tourists, the facilities and construction of the park have not kept pace with it. Insufficient environmental management results in increasing environmental pollution and damage. Waste plastics, paper scraps and beverage bottles can be seen everywhere. Bad behaviors of destroying trees, flowers and amusement facilities are common. In addition, the waste water and sewage from the surrounding factories flow into the lake, which deteriorates the water quality with putrefactive odor. These have worsened the tourist environment, and tourists generally feel that the atmosphere is depressing and dull. There are crowded places where people feel depressed.

## **2.4 It is inconvenient to evacuate visitors.**

The East Lake Scenic Spot is large in size, but there are few entrances and exits. The East Lake main entrance and the Liyuan Gate are accessible in the Tingtao Area. There are only two entrances and exits in the Moshan District, which often drives visitors to the vicinity of the Garden Gate. Visitor can just linger in the few attractions. Therefore, It is difficult to evacuate visitors to a slightly distant scenic spot in a short period of time. In particular, there are few ferries between the Tingtao Area and Moshan District. The passenger load is low and the traffic in the two places is extremely inconvenient, which objectively increases the pressure on tourist capacity in certain scenic spots.

## **3. Calculation of Maximum Environmental Capacity of Wuhan East Lake Scenic Spot**

A scenic area or tourist spot consists of different scenic spots and attractions, and their suitable space standards are different. According to the study, the suitable area for tourists in the architectural garden area is 20m<sup>2</sup> per capita; the natural landscape park is 60m<sup>2</sup> per capita; the mountain resort is 8m<sup>2</sup> per capita and the water park is 500m<sup>2</sup> per boat (4 people in the boat in average). The calculation method and steps of environmental capacity are as follows:

Firstly, the tourism environmental capacity of the building garden area  $D_{ai}$  and its largest number of contemporary tourists in the park  $d_{ai}$ .  $D_{ai}=12,176$  person-times/d,  $d_{ai}=3,247$  persons.

Secondly, tourism environmental capacity of the natural landscape park  $D_{a2}$  and its largest number of contemporary tourists in the park  $d_{a2}$ . According to the actual measurement, the natural scenery park in the East Lake Scenic Spot is far from saturation, and the per capita activity area is over 200m<sup>2</sup>. Taking 200m<sup>2</sup> as the current value, then,  $D_{a2}=40,617$  person-times/d,

$d_{a2}=10,811$ persons

Thirdly, the tourism environmental capacity of water park  $D_{a3}$  and its largest number of contemporary tourists  $d_{a3}$ . For example, every boat takes 4 persons; activity area per boat is  $500\text{m}^2$  and the turnover factor is 3; the tourism environmental capacity of East Lake Water Park can theoretically reach 327,312 person-times/d. In fact, East Lake currently has only about 500 vessels of various types with an average turnover factor of 5.8, then,  $D_{a3}=11,600$  person-times/d,  $d_{a3}=2,000$  persons.

Fourthly, the entire scenic area has a full-day tourism environmental capacity  $D_a$ . The largest number of contemporary tourists in the entire scenic area  $d_a$  and the annual tourist environmental capacity of the tourist area  $D_y$  are:  $D_a=64,393$  person-times/d,  $d_a=16,058$  persons,  $D_y=23.5$  million person-times/a.

#### **4. Adjustment and Optimization Measures of Environmental Capacity of Wuhan East Lake Scenic Spot**

##### **4.1 To strengthen the infrastructure construction in the tourist scenic area.**

The importance of the parking lot is self-evident for a tourist attraction. The construction of parking lots in the scenic area requires site selection at the entrance of the scenic area and the main geological relics and cultural landscapes. The terrain is required to be relatively flat with an area of about  $5,000\text{m}^2$  to  $8,000\text{m}^2$  to meet the parking needs of private vehicles and tourist buses. At the same time, the spot needs to increase capital investment to increase the tourist roads in the scenic spot as soon as possible, including tourist traffic roads and tourist walking roads, to expand the overall accessibility of tourist scenic spots and fundamentally improve the spatial capacity of tourism resources. There are too few import and export areas and water ferries in the scenic area, which often keep tourists stranded and it is difficult to evacuate and divert them. At present, two things should be done mainly[4]. First, it is necessary to increase the number and frequency of ferries between Moshan District and Tingtao Area, so as to connect the two places as soon as possible to evacuate tourists. Second, the spot needs to add entrances and exits. It is obviously not enough to have only 4 to 5 entrances and exits in a large scenic area. At least 4 to 5 such passages should be built to facilitate the diversion of tourists.

##### **4.2 To make full use of land resources and strengthen the construction of tourism infrastructure in the scenic area without affecting the geological heritage.**

In places where tourists gather, such as the scenic spots of the East Lake Eco-tourism Scenic Spot and the entrance to the canyon, the spot needs to add tourist facilities such as ecological toilets, comprehensive rest areas and restaurants; in the scenic area where the geological heritage landscape is scarce with easy access or surrounding areas in the tourism spot, the spot needs to construct accommodation facilities, such as farmhouses and star-rated hotels, to meet the accommodation needs of overnight visitors; commercial areas are set up outside the scenic area to meet the shopping and entertainment needs of tourists.

##### **4.3 In order to maintain development, the environmental pollution of the East Lake Scenic Spot must be treated as soon as possible.**

Solid waste, waste water and air emission in the surrounding areas must be banned. The environmental pollution and destruction of tourists in the area should also be discouraged and eventually eliminated. From the perspective of environmental management, on one hand, we must continuously evaluate and improve environmental quality; on the other hand, we must conduct environmental impact assessment of construction projects and investment activities to prevent pollution and protect the environment. Of course, scientific tourism planning should also consider environmental protection and environmental capacity issues in order to maximize the use of environmental resources, expand environmental capacity, and gain benefits in social, economic and ecological aspects. The scenic area management department should raise funds from various

sources, increase investment, speed up the development and construction of scenic spots, and expand the resource space capacity. The spot needs to make more use of its own resource advantages, seize the opportunities in the tourism market, actively use the government-led mechanism, and jointly develop with relevant units and departments to achieve expected results.

#### **4.4 To increase the publicity of tourism scenic spots and increase the popularity of tourist attractions.**

East Lake Eco-tourism Scenic Spot needs professional publicity and marketing strategic planning to create a tourism brand of Qingshui River, and achieve certain cultural effects through effective publicity. The scenic area management departments and relevant government departments should increase investment in funds, publish advertisements in tourist scenic spots on the print media, and broadcast scenic film of tourist scenic spots on mobile media and TV media; the spot needs to organize special tourism activities to provide tourist highlights in all seasons, so as to enhance their tourism appeal[5]. The off-season is too deserted and the peak season is too crowded. It is the most prominent problem in the tourism environmental capacity of the East Lake Scenic Spot. The off-season promotion has become the key to expanding the tourist market. First of all, we must increase publicity efforts, especially to promote famous brand products; second, relying on Wuhan, an international metropolis, the spot needs to communicate with major shopping malls and hotels in the city to attract tourists, especially foreign guests. The quiet and beautiful environment of East Lake is very attractive to foreign guests and foreign-related business activities. The third is to explore the potential of resources and use the advantages to carry out winter recreation activities, such as calligraphy and painting exhibitions, popular science activities and museum visits.

### **5. Summary**

The current annual and daily actual tourist volume of East Lake Scenic Spot is far less than its environmental capacity. However, due to the uneven distribution of tourists' time and space, the off-season is deserted and the peak season is crowded. Especially at noon around the peak season, the number of contemporary tourists can reach 25,000 persons, far greater than its capacity. Visitors are concentrated in the architectural garden area. Studies have shown that the tourism environmental capacity of architectural garden area in the East Lake Scenic Spot is saturated, while the capacity of the natural landscape park and Water Park are far from saturation. Therefore, the spot needs to vigorously develop forest land and water surface to improve the tourism environment. The area also needs to advance the off-season promotion. They are basic measures for the East Lake Scenic Spot to adjust the tourism environment capacity and implement the sustainable development strategy.

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