

# Research on Sustainable Development Model of Scenic Spots under Carbon Neutrality——Take Yashan in Dayu County as a Case

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**Abstract:** Carbon neutrality has put forward new requirements for the low-carbon development of tourism. The construction of carbon neutral scenic spots is an important content to promote the tourism industry to achieve the goal of carbon neutrality. Taking Yashan scenic spot in Dayu County, Jiangxi Province as a case, this paper analyzes the "two-way, three-dimensional and stereoscopic" carbon neutral sustainable model and characteristics of Yashan scenic spot. This model achieves the maximum carbon sequestration through the construction of the whole forest scenic spot, forms the three-dimensional collaborative support of "mechanism system + Intelligent system + environmental education", and constructs a multi-dimensional carbon reduction behavior system composed of low-carbon transportation, energy conservation, renewable energy, resource recycling, low-carbon creative products and other measures, which directly promotes the implementation of the carbon neutralization goal of the scenic spot.

**Keywords:** Carbon neutralization; scenic spots; sustainable development

## 1. Introduction

In order to cope with global climate change and realize the progress of human civilization and the sustainable development of the earth's ecosystem, the 2015 United Nations climate change conference was held in Paris and adopted the Paris Agreement, which proposed to achieve the goal of "net zero emissions" of CO<sub>2</sub> around 2050, that is, carbon neutral[1]. Carbon neutralization, also known as carbon compensation, refers to the calculation of CO<sub>2</sub> emissions, and then absorb it through tree planting, so as to achieve the purpose of environmental protection[2]. Carbon neutrality has put forward new requirements for the low-carbon development of tourism, driving the development of tourism to usher in new changes. As the foundation and core element of tourism, scenic spots are an important space carrier for the tourism industry to practice the concept of low-carbon. The construction of carbon neutral scenic spots is an important content to promote the tourism industry to achieve the goal of carbon neutrality. Yashan scenic spot in Dayu County, Jiangxi Province is a national 4A level scenic spot, a National Forest Park, a provincial key scenic spot in Jiangxi Province, and a 5A level rural tourism spot in Jiangxi Province. More than ten years ago, the place where Yashan was located was still a remote and poor township. In 2007, with the investment of the multiple entities, it began to develop protectively and build a full industry economic complex of ecotourism. Now, Yashan scenic spot has become a well-known rural tourism scenic spot in China, integrating leisure and vacation, cultural exchange, sightseeing experience, health sports, health care and elderly care, ecological agriculture, agribusiness and agronomy. In the past ten years, Yashan scenic spot has actively explored the sustainable development mode of carbon neutral scenic spot. Therefore, this paper takes Yashan scenic spot as a case, combined with the actual situation, development needs and affordability of Yashan scenic spot, analyzes the realization mode and path of carbon neutral scenic spot construction, and highlights the design concept and method of carbon neutral scenic spot, in order to provide useful reference and enlightenment for the research of carbon neutrality in tourism.

## 2. Carbon Neutral Sustainable Development Model and Characteristics of Yashan Scenic Spot

### 2.1 Carbon Neutral Sustainable Development Model of Yashan Scenic Spot

For scenic spots, on the one hand, there are carbon emission behaviors in food, housing, travel, shopping and entertainment activities in scenic spots; On the other hand, relying on the ecological natural environment, scenic spots have the function of carbon absorption. Therefore, the tourism industry has the comprehensive characteristics of carbon source and carbon sink[3]. Under the goal of carbon neutrality, how to give full play to the ecological advantages of scenic spots as carbon sinks and avoid "carbon emissions" requires effective mode innovation and mechanism design to stimulate the realization of the carbon neutrality goal of scenic spot tourism. In this context, Yashan scenic spot has explored a "two-way, three-dimensional and stereoscopic" carbon neutral development model, which is based on the construction of the whole forest scenic spot, and puts forward the realization path of the construction of carbon neutral scenic spots from the two directions of increasing carbon sink and reducing emissions. Its core content is to take the construction of a global forest scenic spot as the core, decompose the realization of carbon neutralization goal into three support dimensions of "mechanism system + Intelligent system + environmental education". The goals and priorities of each support dimension are different, and further build a three-dimensional carbon reduction behavior system, that is, put forward corresponding carbon reduction measures through carbon reduction behavior composed of low-carbon transportation, energy conservation, renewable energy, resource recycling, low-carbon creative products, etc (Figure 1) .

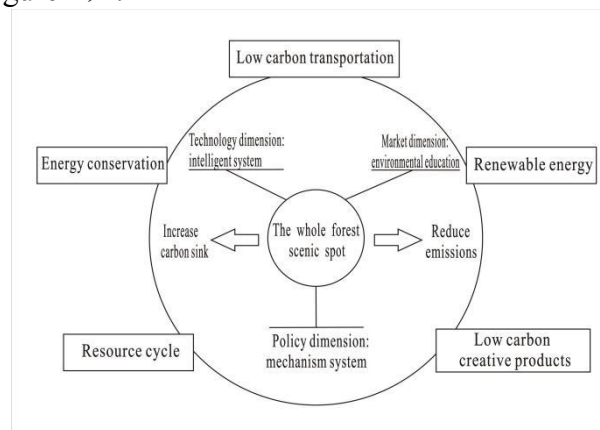


Figure 1 Carbon neutral sustainable development model of Yashan scenic spot

### 2.2 Characteristics of Carbon Neutral Sustainable Development Model in Yashan Scenic Spot

In the "two-way, three-dimensional and stereoscopic" carbon neutral development model of Yashan scenic spot, the key feature is to implement the "carbon sink management" of the scenic spot, and build a solid foundation for the sustainable development of tourism in the scenic spot by building a whole area forest scenic spot and implementing forestry carbon neutrality. The two-way realization of carbon sink increase and carbon reduction cannot be achieved without the support of policy, technology, market and other dimensions. In terms of policy dimension, strengthen the establishment of mechanism and system, strengthen top-level design, set up a leading group for carbon neutralization, and form a broader consensus and coordination and cooperation mechanism among internal and external stakeholders in the scenic spot; In terms of technology, the intelligent scheme of carbon neutrality is realized with the support of intelligent system, and the intelligent scheme is penetrated into all aspects of the scenic spot; In terms of market dimension, implement environmental education for all employees, publicize the concept and policies of low-carbon

development, and create a good atmosphere for low-carbon emission reduction and green life for all employees. The focus of the three-dimensional carbon reduction behavior system is to build a set of combined measures to form a virtuous cycle of "ecology + economy" by implementing emission reduction measures in key links such as low-carbon transportation, energy conservation, renewable energy, resource recycling, low-carbon creative products, etc.

### **3. Implementation Path of Carbon Neutral Sustainable Development Model in Yashan Scenic Spot**

#### **3.1 Achieve the Maximum Carbon Sequestration through the Construction of Forest Scenic Spot**

As the main body of terrestrial ecosystems, forests play the most important role in carbon sequestration and emission reduction. Forest ecosystems absorb carbon dioxide in the atmosphere and release oxygen through plant photosynthesis, and absorb and store carbon in forest ecosystems[4]. Forest carbon sequestration uses natural processes without high costs, and has the functions of creating ecological landscapes, providing healthy resources, protecting biodiversity, and conserving water sources. Yashan itself is a national forest park. During the development, construction and operation of Yashan scenic spot, on the one hand, strengthen forest management and tree protection, actively promote the mountain afforestation of precious tree species, the greening of precious tree species and the cultivation of precious target trees, and further strengthen the construction of forest ecosystem; On the other hand, it is committed to implementing afforestation and environmental greening in peripheral villages, scenic spots, roads, etc., and promoting the construction of forest scenic spot in the whole region, such as continuously strengthening the greening and beautification of channels, both sides of water systems, and surrounding villages, and carrying out the construction of forest tending, forest transformation, precious color and healthy forests, etc.

In the landscape design of the scenic spot, the design concept and method of carbon neutralization are fully used: First, by creating an ecological water system composed of lakes, rivers, wetlands, waterscape sketches, etc., the microcirculation system is constructed to enhance the stability of plant communities, so as to effectively fix carbon; The second is to adopt a multidimensional three-dimensional greening system from the ground to the roof, plant flowers and plants on the existing open space, and the green area coverage of the open space in the scenic area reaches 100%. Make full use of the roof space, implement the roof greening project for the buildings in the scenic spot, implement the wall greening work, and consider the lighting factors in some areas to plant vegetables on the wall. It realizes the effect of plant carbon sequestration, reducing heat island effect and reducing the energy consumption of temperature control system; Third, excavate the characteristics of the site and conform to the existing landform of the site. Taking "nature is the best planner and planner" as the concept, the planning and construction of the scenic spot comply with nature, adhere to no pond filling, no mountain pushing, less tree cutting, less house demolition, and maintain the natural landscape environment, village texture, and traditional buildings of the village; Fourth, use waste materials and renewable materials for reconstruction and refitting, and recycle the waste generated in the scenic spot. For example, the Yashan access footpath conforms to the existing pattern, retains the original shape trend, and uses local materials for laying. The B & B Inn is transformed from the villagers' old houses, and is good at using rural waste materials. By incorporating new design elements, the old objects are turned into treasures, retaining a strong local flavor; Fifth, reduce the carbon footprint of buildings, use energy-saving and environmental protection materials, use local materials in the construction of some accommodation, hotels, roads and other facilities in the scenic area, use local wood and stone materials, and use pure natural bamboo for tables and chairs. Low carbon and environmental protection hotels have become a unique feature of Yashan scenic area. The green and energy-saving building area of the scenic spot exceeds 50% of the total building area of the scenic spot. In addition,

the scenic spot also has straw huts built of natural green environmental protection materials, Jiucheng Shanshe Yunhai wooden houses, ecological parking lots, etc., which are not only unique, but also highlight the concept of low-carbon environmental protection, and are deeply loved by tourists. Yashan scenic spot focuses on building a wood plastic environmental protection world, and a large number of high-tech environmental protection building materials wood plastic, which are independently developed and produced by the scenic spot itself and use bamboo and wood processing tailings as raw materials, are used in the scenic spot. Wood plastic has the characteristics of waterproof, insect proof, corrosion prevention, fire prevention, and recyclable and reshaping. Its powerful artistic landscaping function has made Yashan the most complete, latest and perfect application and exhibition base of wood plastic environmental protection materials in the world. In 2016, Yashan built the world's first longest and most beautiful micro horse plank road around the mountain, with 13 kilometers of cliff and mountain, which allows people to explore the magical forest kingdom in natural forest recuperation, fairyland cultivation and sports and fitness, and unconsciously climb the "green Mount Everest".

### **3.2 Form Multi-dimensional Collaborative Support of "Mechanism system + Intelligent System + Environmental education"**

#### **3.2.1 Strengthen the top-level design of carbon neutral scenic spot construction**

Yashan scenic spot has set up a leading group for carbon neutralization, led by the project department, including the finance department, the culture department, the administration and personnel department, the marketing department, the scenic spot management department and other departments. The chairman of the company serves as the leader of the leading group, responsible for guiding, organizing and promoting the carbon neutralization work in the scenic spot, comprehensively solving the major problems encountered in promoting the construction of carbon neutralization scenic spot, and timely reporting the construction work to the development and Reform Commission of Dayu County, The county development and Reform Commission tracks, coordinates, supervises and evaluates the construction of carbon neutral scenic spots. Under the above-mentioned legal framework at all levels of government, formulate relevant rules and regulations to provide institutional guarantee for the normal operation of the carbon market, green and low-carbon transformation, clean development, etc. The system for the use of low-carbon facilities has been formulated to standardize energy-saving measures from the aspects of "Electricity conservation system", "Water conservation management system", "Fuel conservation and maintenance management system for official vehicles", "Office supplies management system", and encourage employees to use low-carbon environmental protection materials, save water and electricity, low-carbon travel, and low-carbon office. The relevant supporting systems for resource and environmental protection, such as the "Wildlife protection system of scenic spots", "Safety management system", "Regulations on environmental health management of Yashan scenic spot", have been issued to standardize the health management, ecological resource protection and safety work of scenic spots, so as to provide guarantee for the good operation of low-carbon scenic spots.

#### **3.2.2 Create an intelligent management system for carbon neutrality**

In the construction of carbon neutral scenic spot, Yashan scenic spot attaches great importance to the construction of intelligent management system by using Internet, Internet of things and other technologies to promote the improvement of intelligent energy management, ecological sensitive area monitoring, disaster early warning and other work. The scenic spot has realized online monitoring and dynamic analysis of energy consumption, equipped with power distribution rooms, and installed independent electricity meters for independent measurement of key energy consumption equipment. First, it can detect circuit faults in time, and second, it can monitor key energy consumption facilities in the scenic spot, timely understand the energy consumption in the scenic spot, and carry out refined energy management. The scenic spot has installed an automatic detection system for ecological sensitive areas, and special personnel are arranged to guard the

detection system, which can realize the real-time monitoring and statistics of the number of people, and can also generate passenger flow data reports in various periods, providing an effective basis for the operation and management of the scenic spot. The scenic spot has installed disaster weather and natural disaster prediction facilities and response systems to achieve real-time early warning and prevention and control of natural disasters.

### **3.2.3 Implement online and offline environmental education for all employees**

The realization of the goal of carbon neutralization in scenic spots is not only the responsibility of scenic spot product providers, but also the common responsibility of tourists, residents and other scenic spot stakeholders. Yashan scenic spot actively carries out environmental education for all staff by combining online and offline activities, realizes all media linkage and three-dimensional communication, and stimulates public awareness and responsibility of ecological environment. For example, the scenic spot has built low-carbon billboards, signs and popular science windows to publicize and report good deeds and ideas in time. Carbon neutral tourism brochure was designed and issued. The tourist center has established a popular science e station in cooperation with Ganzhou Science and Technology Association, and added the content of low-carbon publicity, which enriched the ways of low-carbon publicity and enhanced the effect of low-carbon publicity. Actively carry out online forest park environmental protection "cloud class" and forest ecology "cloud visit", take the form of video recording and publishing articles, and use Sohu Yashan column, official wechat and other media platforms in the scenic spot to broadcast and push, so that the public can enjoy the low-carbon environmental science education in the scenic spot without leaving home, understand the progress of environmental protection in the scenic area, and learn about ecological environmental protection.

Yashan scenic spot also actively carries out offline education visits, so that practitioners and tourists can get participatory, experiential and interactive feelings, improve the ecological environment awareness and literacy of all staff, explore institutional mechanisms and interest mechanisms that can guide and supervise the low-carbon behavior of all staff, and build a social action system for all staff to participate in the construction of carbon neutral scenic spots. For example, meetings such as low-carbon training for tour guides were held, low-carbon guidance training was conducted for tour guides in scenic spot, low-carbon behaviors and energy-saving measures were explained and simulated on site, and the knowledge of low-carbon and energy-saving of tour guides was improved. The scenic spot also carried out low-carbon tourism interactive experience activities to eliminate the carbon footprint, organized primary school students to walk to the orchard from the starting point, guided the children to bring their own water cups, avoided buying mineral water, and planted plants to eliminate the carbon footprint of the day's activities. Relying on the excellent ecological environment, Yashan scenic spot has built an outdoor sports base and carried out a variety of low-carbon tourism activities, such as outdoor quality development, whole journey collective walking, hiking treasure hunt, tearing up famous brands, etc.

### **3.3 Build Stereoscopic Carbon Reduction Behavior Combination Measures**

In the construction practice of carbon neutral scenic spot, Yashan scenic spot has actively constructed a stereoscopic carbon reduction behavior system, forming a set of combined measures in low-carbon transportation, energy conservation, renewable energy, resource recycling, low-carbon creative products, etc., which directly promoted the implementation of the carbon neutral goal of the scenic spot.

In terms of low-carbon transportation, a three-dimensional low-carbon transportation system for scenic spots has been established. The scenic spot provides tourists with a variety of low-carbon public transportation modes, such as sightseeing buses, electric vehicles, walking, bicycles, etc. Since 2017, "one ticket" has been implemented in Yashan scenic spot, and a full sightseeing car service has been opened for tourists, greatly reducing the number of tourists' private cars for sightseeing. Promote the use of non motor vehicles, and the scenic spot has opened a bicycle rental service, and built a dedicated bicycle lane. The bicycle rental service cabin is also used as a bicycle

parking place to uniformly manage bicycles in the scenic spot. Tourists can rent bicycles according to their preferences. The tourist distribution center has electric vehicle parking lot and electric bicycle charging device, which is convenient for employees and tourists riding electric vehicles. Tourists can ride electric bicycles to the tourist distribution center, and then take sightseeing buses to visit Yashan. Walking is encouraged. The scenic spot has established a wood and plastic walkway system, including viewing plank roads, scenic platforms, corridors, canyon bridges and so on. In terms of energy conservation, small solar energy-saving lamps are arranged in the streets, roadsides, pools and other lighting fixtures in the scenic area, which absorb solar energy during the day and automatically light at night, greatly saving electricity and reducing carbon emissions. Energy saving appliances such as energy-saving air conditioners and refrigerators are widely used in scenic spots. The newly-built Dalong mountain ecological hotel adopts central air conditioning for centralized cooling in summer and hot water boiler for centralized heating in winter. The building wall adopts thermal insulation materials and the windows adopt double-layer heat insulation glass to reduce the heat loss as much as possible. The scenic spot achieves the goal of water conservation by adopting water-saving faucets, ecological non flushing toilets, urinal intelligent flushing system, open-air emergency pools and other measures. In terms of renewable energy, Yashan strengthens the utilization of renewable energy in the scenic spot. Residents in the scenic spot are widely equipped with solar water heaters, and solar street lamps have been installed in some streets and living areas. In terms of resource recycling, the scenic spot has established a rainwater recovery system to collect rainwater through drainage ditches, pools and other devices, and the recovered rainwater is used to irrigate crops, flowers and plants in the scenic spot. The scenic spot arranges special cleaning aunts to clean up the sanitation of the scenic spot to ensure that the scenic spot is clean every day; Install garbage sorting bins, which cover 100% of the scenic area and promote the recycling of resources. In terms of low-carbon creative products, the scenic spot reuses waste in the product design process, which fully reflects the characteristics of low-carbon development. For example, the scenic spot has created a unique “A duo” rural tire park. The amusement facilities, animal sculptures and toilets built in the park are all built with waste tires, which is not only environmentally friendly and ecological, but also plays a role in low-carbon publicity. By excavating and cultivating local craftsmen such as bamboo weaving and straw weaving, Yashan has developed creative bamboo, straw weaving and other modern household products and daily necessities. The scenic spot has also developed Yashan series of agricultural products, which are made from the self owned ingredients of Yashan ecological agricultural base. They are natural, organic, ecological, green, low-carbon and environmental friendly. At present, the main agricultural products include ya shantengpo tea, Yashan rice wine, brown sugar glutinous rice dumplings, and Yashan's unique and secret tofu milk, douchi pepper, october red, chili sauce, mushroom sauce, radish granules, shredded ginger, long-term soy beans and other food accessories.

#### 4. Summary

As a comprehensive natural and cultural scenic spot, there are abundant carbon sink resources in the spatial environment of Yashan scenic spot. Although the scenic spot has made efforts and attempts to manage carbon sink resources from the perspective of natural landscape and human landscape, there are still some problems: First, there is a lack of systematic sorting out of the carbon sequestration space of the scenic spot and a lack of scientific evaluation of the carbon sink level of the scenic spot. The development and management of carbon sink resources in the scenic spot are mainly based on experience. Second, facing the comprehensive and cost challenges of operation management. The construction of carbon neutralization in the scenic spot involves natural landscapes such as forest land, grassland, garden, water area and tidal flat, as well as human activities such as investment, operation, management, service and consumption. The connection is relatively complex. It needs to start from the construction of external industrial system, traffic construction, urban and rural emission control, ecological protection and restoration, as well as

internal land use, landscape design, product development, consumer behavior guidance the establishment of carbon sink capacity and other aspects shall be comprehensively coordinated. This poses a challenge to the comprehensive coordination ability of the scenic spot. At the same time, internal energy conservation and emission reduction may further increase the operating cost of the scenic spot, and better mechanism arrangement is needed to integrate the emission reduction value concept and path into the sustainable development strategy of the scenic spot. Third, the low-carbon tourism business model of the scenic spot has not been fully established. At present, the low-carbon consumption behavior guidance of tourists in Yashan scenic spot mainly focuses on publicity and education, and lacks systematic and normal consumption behavior guidance of mechanism system.

Based on the above problems, this paper suggests that Yashan scenic spot should clarify the carbon sequestration space of the scenic spot by combing and estimating the carbon sink level of the scenic spot, and explore effective ways and measures to increase, protect and optimize the carbon sink of the scenic spot. At the same time, Yashan should explore its own carbon emission reduction behavior norms and standards in the standardization construction of the scenic spot, such as adding relevant carbon emission indicators in the overall brand creation of the scenic spot and the creation of hotels, guesthouses and other related brands, so as to promote the standardization of carbon emission reduction in the scenic spot. As the national unified carbon emission trading market has started online trading, Yashan scenic spot should actively participate in the carbon market trading and achieve carbon neutrality through the offset mechanism. At the same time, the government should actively create an external incentive policy environment for tourism enterprises such as scenic spots to encourage carbon neutral development. For example, in terms of Taxation, the government can provide tax concessions for low-carbon tourism enterprises; In terms of financing, the government will encourage low-carbon development of tourism enterprises through preferential policies. Innovate the business model, guide the formation of low-carbon consumption habits of scenic spot tourism, promote the low-carbon and economization of tourism consumption, and form corresponding institutional constraints and institutional implementation mechanisms[5]. For example, different low-carbon consumption scenarios will be launched in various links such as travel, accommodation, catering, sightseeing and shopping in the scenic spot. Through the implementation of various low-carbon consumption scenarios identified by tourists offline, they can punch cards and obtain carbon points, which can be used to exchange for corresponding universal benefits, so as to enhance the low-carbon consumption experience of tourists and form a normal traction mechanism.

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