Research on Sustainable Development of Ecological Tourist Resources of Zhoushan Islands

Shuhua Ren, Sheng Wang, Li Wang
Zhejiang Ocean University, Zhejiang, Zhoushan, 316000
(E-mail:latinow@sohu.com, wangsheng@zjou.net.cn)

Abstract The foundation of ecological tour is ecological tourist resources; the sustainable development of ecological tourist resources is the basic protection of realizing the sustainable development of tourist industry. Zhoushan is the sole prefecture city on the sea that is composed of islands and owns rich ecological tourist resources. On the basis of the ecological resources of Zhoushan islands, this paper analyzes the characteristics of its ecological tourist resources by the evaluation of resource and puts forwards some strategies on the sustainable development of the ecological resources in Zhoushan islands.

Key words Ecological tour; Tourist resources; Sustainable development; Zhoushan islands

1. Introduction

Ecological tour is the new developing tendency of tourist industry in 21 century. So-call ecological tour, firstly put forward by H·Ceballos Lascurain in 1983 who is special advisor on ecological tour in IUCN, is “a kind of activity of tourism based on the ecological protection of environment and the sustainable development, whose attraction is all the natural ecology or raw and regional culture.” Generally speaking, Ecological tour is natural tour and the sustainable tour. Ecological tourist resource can be divided into natural tourist resource with human landscape tourist resource.

2. The Evaluation on Ecological Tourist Resources of Zhoushan

Zhoushan is the sole prefecture city on the sea that is composed of islands. She is located in the center of coastline of Chinese continent and on the south of the deltas of the Yangtze, which is composed of Shengsi islands, Ma’an islands, Qiug islands, Chuanhu islands, Zhongjieshan islands, Langguangshan islands, Qizibamei islands. Geographic coordinates is East longitude 121°30’-123°25’, North latitude 29°32’-31°04’. Its area is 22,200,000 square meters including 1,440,120 square meters of land area. The location of Zhoushan islands is nature-endowed advantage. It owns rich natural resource and diversity of ecology. According to national standard of ecological tourist resources, tourist resources can be divided into 8 main categories, 31 subclasses, and 155 basic sorts. In ecological tourist resources of Zhoushan islands, the Coverage rate of main category is 100%, the coverage rate of subclass is 83.87%, and the coverage rate of basic sort is 64.52%.

2.1 Evaluation on ecological tourist resources of Zhoushan islands

This paper evaluates complexly the exploitation and sustainable development by the use of multiattribute that includes respondent, evaluating indicator, weighting coefficient, aggregate model and valuator.

2.1.1 Complex evaluation on multiattribute of tourist resources

2.1.1.1 Respondent. This paper regards 826 tourist resources units of Zhoushan islands as the respondents. According to the locations of these units, these units belong to 12 scenic zones of Daixiu, Dinghai, Dongji, Liuheng, Putuo Mountain, Chushan, Shengjiamen, Shengshan, Sijiao, Taohua, Yangshan, Zhujiajian. These units are supposed as subsystem of respondents from s1 to s12.

2.1.1.2 Evaluating indicator. According to the principle on system, science, comparability, observability and independence of evaluating indicator, the paper evaluates the 826 independent units of tourist resources and estab-
lishes the system of indicator that involves ornamental value, historical and cultural value, scientific value, artistic value, rarity and specialty, popularity, resource finiteness, resource sustainability, tourist security, tour days every year and the degree of recognition, etc. Each evaluating indicator describes measurement of some characteristics of system from different aspects. In the paper, the developing situation of each system is expressed as vector \( \mathbf{x} \), in this system, each indicator reflects the situation of system from a aspect, the author regards the former five indicator variables \( (x_1, x_2, x_3, x_4, x_5) \) as feature indicator of scenic spot and thinks the latter five indicator variables \( (x_6, x_7, x_8, x_9, x_{10}) \) as the indicator of tourist condition. At last, the degree of recognition is looked as tourists’ degree of recognition of feature of each scenic spot.

2.1.1.3 Weighting coefficient. This paper evaluates the condition of exploitable tourist resources of Zhoushan islands. Given the relatively different importance of five evaluating indicators: the popularity of each scenic spot, tourist resource finiteness, tourist resource sustainability, security of each scenic spot, and tour days every year, the paper applies order method to describe the measurement of the importance of ecological scenic spot.

2.1.1.4 Aggregate model. Because of the different aims of three main evaluation parts in this paper, complex evaluation approach of multiattribute is applied. On the basis of establishing evaluating indicator of 12 subsystems, 826 units, \( \{x_{ij}\} i = 1, 2, \cdots, 826; j = 1, 2, \cdots, m \), the following aggregate model is built.

2.1.1.5 valuator. The author of this paper is the valuator of establishment of this work. Therefore, the result of this evaluation is related to assessment of valuator to evaluation aim, the establishment of evaluating indicator, the choice of evaluating model, the order of importance of evaluating indicators, the influence on the confirm of Weighting coefficient.

2.1.2 Evaluation on ecological tourist resources of scenic spots in Zhoushan

According to the system of evaluating indicator and evaluating purpose of this paper, this paper identifies main three evaluating parts: qualitative evaluation on ecological tourist resources of Zhoushan islands, conditional evaluation on ecological tourist resources of Zhoushan islands, and evaluation on the degree of recognition of tourists to ecological tourist resources of Zhoushan islands.

2.1.2.1 Qualitative evaluation on value of ecological tourist resources of Zhoushan islands

Qualitative evaluation on value of tourist resources. This paper makes data preprocessing about these variables that include quality of ornamental value \( x_1 \), quality of historic and cultural value \( x_2 \), quality of scientific value \( x_3 \), and quality of rarity and specialty \( x_4 \) by indicative function. In order to polarize numerical value of quality of tourist resources value in each scenic zone of each scenic spot, this paper chooses to use power function approach, that is to say, the number of each scenic zone in each scenic spot is \( x_j = x_j^2 / 5 \), \( i = 1, 2, \cdots, n_r \), \( j = 1, 2, \cdots, 5, n \). The order and value of quality of tourist resources value of each scenic spot is like this:

Scenic spot \( (j) = \sum_{i=1}^{n_r} x_j^* \)

\( i = 1, 2, \cdots, n_r \)

\( j = 1, 2, \cdots, 5 \)

\( n_r \) n represents the number of each scenic spot(see in Table One). It is necessary to point out that the order of these two indicators: ornamental value and rarity and specialty is in correspondent with total order. This highlights the value of ecological tourist resources in Zhoushan islands.

2.1.2.2 Conditional evaluation on ecological tourist resources in Zhoushan islands

According to the present situation of ecological tourist resources, the popularity, tourist resource finiteness, tourist resource sustainability, security of each scenic spot, and tour days every year of each scenic spot in Zhoushan islands, the order of importance of conditional variables of each scenic spot \( \{x_6, x_7, \cdots, x_{10}\} \):

Popularity \( x_6 \) > security \( x_9 \) > sustainability \( x_8 \) > finiteness \( x_7 \) > tour day \( x_{10} \)

Suppose that the relationship of the order of importance is \( r_2 = 1.6 \) between popularity \( x_6 \) and security \( x_9 \),
$r_3 = 1.4$ between security and sustainability, $r_4 = 1$ between sustainability and finiteness, $r_5 = 1.2$ between finiteness and tour days. The evaluation of estimate of the condition of tourist resources of each scenic spot is calculated like the following:

$$z_i(k) = \sum_{j=1}^{10} x_{ij} w_j, \quad i = 1, 2, \ldots, n_r, \quad n \text{ represents the number of each scenic spot in each scenic zone.}$$

The evaluation and order of tourist condition is like this (seen in Table Two)

### 2.1.2.3 Evaluation on the degree of recognition of ecological tourist resources of Zhoushan Islands

This paper designs a questionnaire on recreational fisheries and development of sea tourism. The tourists in these three scenic spots, Putuo Maintain, Zhujiajian, Dongji are questioned. The information from questionnaire is processed: recognition rate is goal probability of tourists; the degree of recognition is the total probability of tourists to characteristics of each scenic spot (seen in Table Three).

![Table One](image1)

![Table Two](image2)
Table three The Evaluation and Order of the Degree of Recognition of Ecological Tourist Resources of Zhoushan Islands

<table>
<thead>
<tr>
<th>Name of Scenic Spot</th>
<th>Degree of Recognition</th>
<th>Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daixiu</td>
<td>0.941</td>
<td>2</td>
</tr>
<tr>
<td>Dinghai</td>
<td>0.724</td>
<td>5</td>
</tr>
<tr>
<td>Dongji</td>
<td>0.683</td>
<td>6</td>
</tr>
<tr>
<td>Luoheng</td>
<td>0.683</td>
<td>6</td>
</tr>
<tr>
<td>Putuo Maintain</td>
<td>0.874</td>
<td>3</td>
</tr>
<tr>
<td>Chushan</td>
<td>0.852</td>
<td>4</td>
</tr>
<tr>
<td>Shenjiamen</td>
<td>0.653</td>
<td>8</td>
</tr>
<tr>
<td>Shengshan</td>
<td>0.653</td>
<td>8</td>
</tr>
<tr>
<td>Sijiao</td>
<td>0.664</td>
<td>7</td>
</tr>
<tr>
<td>Taohua</td>
<td>0.683</td>
<td>6</td>
</tr>
<tr>
<td>Yangshan</td>
<td>0.627</td>
<td>9</td>
</tr>
<tr>
<td>Zhujiajian</td>
<td>0.948</td>
<td>1</td>
</tr>
</tbody>
</table>

3. The Characteristics of Ecological Tourist Resources Of Zhoushan Islands

Besides having the characteristics of complexity, succession, regionality, nationality, originality and culture, Ecological tourist resources of Zhoushan islands owns the following characteristics:

3.1.1 The characteristics of ecological natural resources of Zhoushan islands

3.1.1.1 Good appreciation. Tourist value of islands lies in the multiattribute of geological resources and tourist resources. This is the feature of resource of islands different from other tourist resources. The main feature of islands is to construct its value of appreciation with the combination of landscape contouring, landscape color, landscape component and natural, ecological and various rock, hill and sea, which attracts tourists’ sightseeing, inspection, appreciation and reflects good appreciation and value of appreciation of tourist resources of islands.

3.1.1.2 Diversity. Complex geological change and different geological phenomena makes landscape of islands have profound scientific content, such as: different movements caused by seawater; different natural landscape and geological landscape caused by the difference of dynamic environment which is used to be tourists’ appreciation and enlightenment.

3.1.1.3 Comfort. Resource of “the four S” Sun, sand, sea and seafood, which enjoys tourists so much as to forget to leave.

3.1.1.4 Pleasure. Because of isolation with the continent, tourists can be relaxed and happy in the islands and breathe natural air, forgetting busy work and unpleasant past events.

3.1.1.5 Delightful climate. Generally speaking, the climate of Zhoushan islands is marine climate. It is very cool in summer and very warm in winter, its temperature is very comfortable and natural lighting is rich in Zhoushan, therefore, it is very good to people’s sightseeing, vacation and tour.

3.1.1.6 Fresh air. Zhoushan islands have fresh air because the population of Zhoushan is not large and air pollution is not serious owing to less relatively developed industry. Tourist can feel like returning nature and experience ecological freshness in the islands.

3.2 The characteristics of ecological human tourist resources of Zhoushan islands

3.2.1 Educational popularity. The products of cultural tourism involved with large knowledge and information is knowledge intensive tour product, which contains a series of knowledge, such as: islands, ocean, culture and science, etc. This kind of product can provide tourists with sufficient science knowledge and history knowledge. Tourists can receive artic edification, promote cultural accomplishment and got some enlightenments. Therefore,
islands are both attractive interest of place and special education base.

3.2.2 Rich culture connotation. Culture tourism of islands owns rich historic, economic, and regional connotation, especially ancient human landscape. The construction and development of tourism is accompanied with the development and change of history. Cultural change leaves a lot of cultural historic sites. According to these cultural connotations, a lot of tour products can be exploited, for examples, custom, religion, architecture, literature all are historic and cultural accumulation with the existence of the form of objectives, knowledge and skill, and information and thought, which makes scenic spot have more knowledge and larger attraction. Compared with other the form of tourism, culture tourism has less damage and in some degree can promote the present resources spread and kept. After absorbing the rich connotation of tour products tourists can make these connotations richer by their own minds and are inherited by later generations. Therefore, culture tourism of islands can satisfy the need of tourism and sustainable development and exploitation of the next generations.

3.2.3 Enlightening inspiration. The natural landscape of islands and vast ocean are integrated with human landscape. Tourists can get good mental appreciation, spend the delightful tourism and pleasant time and also enlighten tourists’ creative inspiration and minds.

3.2.4 Diversity of tourist activities. Taking advantage of islands, sea, coastline, forest belt on the sea bank, up-and-down islands and other service facilities, All the activities can be waged, such as: encouraging tour, convention tour, business tour, vocation tour, etc, which makes tourist resources of islands more efficient.

4. Sustainable Strategies on Ecological tourist resources of Zhoushan Islands

With the human activities increasing, Natural resource and man-made pollutants directly endanger the ecological environment. Ecological tourist resources, especially natural resource is non-renewable resources, although tourism revenues increase, it destructs the ecology and environment in Zhoushan Islands. First, the development neglects protection of natural resources, resulting in ecological damage in some natural scenic sites, such as: cutting into hillsides, the destruction of the mountain, and the destruction of vegetation. Second, as a result of having many investors in tourism projects, and lack of scientific evaluation system of the project, there exists blind development not to preserve and protect the environment and the characteristics of island resources of Zhoushan, so that the natural island landscape is urbanization, architectural style doesn't agree with environment and landscape in Zhoushan. Third, because of the increasingly serious environmental pollution, land-based pollution in recent years directly impacts on seawater quality of Zhoushan. Marine pollution from industrial wastewater, sewage, oil in sea water, nitrogen, phosphorus and other organic material, agricultural fertilizers, the breeding of sea water caused is the main reason for the frequent outbreaks of red tide. In addition, white pollution with the tidal current accumulates on the beach, reef, tidal flats, rock dump piling everywhere; the bugbane and waste floating on the sea, which directly impacts on the image of tourism in Zhoushan. Fourth, it is the extensive development and blind use. Scenic sites of each county and district distribute everywhere and project of tourism is built repeatly, resulting in the formation of a single tour product. Some of the existing ecological features of the natural and cultural landscape is not very good development and use, such as: Ma Ao ancient cultural sites, the Neolithic sites, the Old City Dinghai, fishing sites and Fisherman songs, civil fleas dance, folk apparel and other products are not well developed and utilized. Therefore, the paper gives following suggestions:

4.1 Attention to the ecological tourism of islands, creating the environment of ecological tourism. Tourism is the "eternal sunrise industry." Tourism is a dynamic industry, which is a fully-led, driven "dynamic industry" and linked to society, economy, culture and eco-development. It led the tertiary industry, stimulating the primary industry, linking to secondary industry. Tourism is the "environment industry" of Zhoushan islands, which will comprehensively improve the living conditions of the islands and create eco-tourism environment, especially in the consumer environment for tourists, business environment for tourism enterprises, investment environment for social capital, administrative environment for tourism
4.2 The protection of island eco-tourism resources to ensure sustainable use of resources. Ecological tourist resources of islands are different in quality largely from human tourist resources. Therefore, in the use of ecological tourist resources of the islands, first, paying attention to the protection of the island's natural resources, such as the protection of marine waters, islands mountain and marine ecology; Second, paying attention to the protection of human tourist resources of islands, such as: excavating cultural heritage sites of ancient ancestors, protecting the sites of resisting the foreign enemy, searching for traces of ancient celebrities, spreading religious culture and developing folk customs. Enhancing the awareness of the image of island tourism. Selecting one of the most attractive tourism resources as the advantages of resources, such as the prominent advantages of Putuo Island being Buddhist culture, Daishan Island being a unique advantage of the sea landscape. Taohua Island being the advantage of the humanities.

4.3 The use of ecological resources condition of the islands, optimizing the structure of tour products. Creating unique tour products of Zhoushan islands and giving tourists a unique traveling experience. First, let tourists enjoy the island scenery, take part in experiencing island life, highlighting the participation of tourists, and highlighting harmony between tourists and nature and tourists’ experience and feelings into island environment, such as, the development of leisure-based tour products: fishing family customs, leisure vacation tourism, religious sites, vacation tourism for cultivating one’s mind, summer holiday tourism, tourism products for competitive sports. According to the characteristics of tourist resources of Zhoushan islands, it should focus on the development of "4S" "3N" in the ocean, beach, blue sky, white clouds. Developing and improving the sailing, water, surfing, boating, sea fishing, diving, water bike, motor boats, sea sports meeting, having the beach football, beach volleyball, beach tug-of-war, swimming beach and beach car, providing "free sand bar" and so on. Second, highlighting the challenge of innovation of island tour products. It should take full advantage of the unique conditions of the islands to develop the tour products that exceed the tourists’ limitation of their lives, proving the value of their own lives, appreciating the new sense of harmony between man and nature in the natural environment, continuing to challenge themselves in feelings of self-break and self-realization, such as choosing to develop bamboo raft drifting at sea, rock climbing, surfing, deep-pool adventure, Watching Typhoon landscape, the wild desert island survival, search for loneness in the desert islands. Third, highlighting the richness of tour products of island tourism. The development of products should be diversified and qualified. In addition to the above products, at the present, the sea boat rides, aquarium, ship model museum, fishing folk museum, festival activities should be developed strongly.

4.4 Excavation of cultural connotation of islands, building a comprehensive eco-tourism of islands. The islands on the surface of the Zhoushan ocean is jade-like strings of pearls, some of them have the waved bedrock shore, some of them have the soft sand bathing beach, some of them have night scene of fishing port where there are millions of masts like forestry and millions of fishing light; and some of them have Buddhism culture. In order to rapidly develop island tourism industry, it must tap the marine culture, embody the central soul of the Zhoushan Islands, and create a positive brand of cultural tourism, reflecting the advantages that they give birth to a sustainable competitiveness. Such as: developing deeply cultural resources of the islands, highlighting the marine characteristics of ecology of the islands, holding academic seminars, publishing cultural studies series products, organizing antiques exhibitions, shooting large-scale documentary television series, large TV, which is integrated with the world.

4.5 Rapid construction of system of island tourism, building carrier of island tourism development. Island has beautiful scenery, and simple and kind folk customs, generally having the natural condition of the most popular "3S" and "3N". Therefore, in the unified planning, it needs the concept of regional integration; in particular, protect the natural landscape, heritage, mountain, water, and sand. In a planned and purposeful construction, the construction of an island tourism town is to create a good external environment for tourism development, and lay a good foundation conditions.

4.6 strengthen the tourism infrastructure, improving con-
ditions of tourism infrastructure. To increase tourist traffic services facilities, establish and improve road traffic signs in English and Chinese, speed up the upgrading of tourist vehicles. Optimize the hotel structure; vigorously develop tourism hotels, folk customs hotels and youth hostels to meet the development of the island tourism. Financial budget should be arranged for a certain amount of money each year to support the development tourism infrastructure, the protection of natural environment and cultural heritage, the promotion of the overall image of tourism, tour product promotion, cultural studies of tourism, academic study of tourism, the creation of film and television drama and the support of tourism and information technology modernization. To actively explore adapting financing techniques, such as: the tourism industry funds, open-end equity funds and replacement of the mode of financing. To encourage tourism enterprises to take advantage of government investment, international financial institutions lending to develop tourism projects, enhancing passenger capacity in islands tourist sites.

4.7 Improvements of training centers of tourism, promoting the harmonious development of Zhoushan islands. The development of rich island tourism resources, the increase of number of tourist in tourist areas and the stable economic growth depend mainly on tourism management and development, such as: providing the provision of cheap, convenient, fast and safe transportation, providing a comfortable tourist hotels, providing delicious seafood, providing high-quality travel information and travel services. Source markets so that the tourists are happy to come and go. Therefore the establishment of tourism training center is very important. It should carry out the training which travel managers, scenic staff, tour guides, conductors and drivers should attend time to time, and continuously improve the professional quality and service level, operation of civilization and civilized service, which promotes the harmonious development of island tourism of Zhoushan.

5. Conclusion

The tourist resource of Zhoushan islands is characteristic of sea and owns the advantage of the ecological tourist resource, which combines natural resources with humanist resources. This paper analyzes and evaluates the possibility of development to the exploited and unexploited ecological tourist resources based on the current situation of tourism of Zhoushan islands, the features of Zhoushan ecological tourist resources, the present situation of the development of Zhoushan tourist resources and environmental condition of the development of zhoushan tourist resources. Through the analysis and evaluation, the development of Zhoushan ecological tourist resources is very valuable and meaningful, and has very good future. However, in the direction and scale of the development will need to be studied.

References