

A Study on the Status and Sustainable Development of Zigong Global Geopark

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ABSTRACT

The Park situation and main geological relics of Zigong Global Geopark were introduced. Zigong Global Geopark's current geo-tourism development and geoscience popularization publicity were elaborated. Based on the current development status, the problems of unbalanced tourism development, ineffective protection and utilization of geological relics, and the lack of publicity were analyzed. Some suggestions on strengthening the development and protection of geoheritage resources, increasing propaganda methods, and enhancing the park planning were made.

Keywords: *Zigong Global Geopark, World natural heritage, Development status, Sustainable development*

1. INTRODUCTION

Zigong Global Geopark is in Zigong City, Sichuan Province. By July 2021, there are 169 Geoparks in the world, distributed in 44 countries around the world. Among them, China has 41 world geoparks [1], and Zigong Geopark is the 19th Global Geopark in China and the Second Global Geopark in Sichuan Province. Zigong World Geopark was approved as one of the first national geoparks by the Ministry of land and resources of the people's Republic of China in 2001 and officially approved by UNESCO to join the World Geopark network in February 2008.

The United Nations Educational, scientific and Cultural Organization (UNESCO) proposed the Geopark plan. Geopark is a natural park integrating natural landscape and cultural landscape based on its geoscience significance, rare, beautiful and unique geological landscape. [2]. As a global geopark with a variety of dinosaur fossils intensively buried, Zigong Global Geopark is faced with problems such as competition from scenic spots in the surrounding areas, inadequate publicity, small tourism scale, and poor development around the park [3-4].

2. SURVEY OF THE STUDY AREA

Zigong Global Geopark is located at E 104° 45' 56", N 29° 19' 29", with an area of 1,630.46 km², mainly composed of three parks, including the Dinosaur Park,

the Salt Industry Park, and the Qinglongshan Park. The geological relics landscape resources in the park are rich, including stratigraphic sections, paleontological fossils, wiggler hereditary organisms, well salt mining relics, waterfall landscapes, Danxia landforms, canyon landforms and river and landform landscapes (Table 1).

The dinosaur museum of the Dinosaur Park was completed and opened in 1987, covering an area of more than 66,000 m². A total of 225 various ancient vertebral fossil sites have been discovered in Zigong area, including 160 dinosaur fossil sites [5]. The Dinosaur Park also has the Dinosaur Kingdom Scenic Area and the Qing long Lake Scenic Area, creating a dinosaur restoration area and amusement area.

The Salt Industry History Museum in the Salt Industry Park which is currently the only salt industry history museum in my country. The museum has 12553 items and 172 precious cultural relics. The Salt Industry Park also includes four scenic spots: Shenhajing Salt Well, Jicheng Well, Ziliujing and Dagong Salt Well.

Qinglongshan Park is a park integrating the remains of dinosaur fossils, natural ecology and cultural landscapes, with a total area of 46km². The first relatively well-preserved large Sauropoda Marsh dinosaur fossil skeleton and some other vertebrate fossils were unearthed. Fossils in the Qinglongshan dinosaur Fossil Group are concentrated and widely distributed [6]. There are nearly 20,000 Jurassic relics plants -*Alsophila spinulosa*.

Table 1. Features of Main Geological heritages of Zigong Global Geopark

Geological Features	Name	Stratigraphic age
Stratum section	Ziliujing Formation	Early Jurassic
	Xiashaximiao Formation	Middle Jurassic
Paleontological fossils	Dashanpu Dinosaur Fossils	Middle Jurassic
	Qinglongshan Dinosaur Fossil Origin	Middle Jurassic
	Rong Xian Dinosaur Fossils Origin	Middle Jurassic
	Changshanling silicified wood	Middle Jurassic
wiggler hereditary organisms	Alsophila spinulosa	Jurassic era
Canyon landform	Alsophila canyon	Jurassic era
Remains of Well Salt Mining	Shenhajing Salt Well	Qing Dynasty

Note: Data come from the website of Zigong Global Geopark, <https://www.ziggeopark.com>

3. DEVELOPMENT STATUS AND EXISTING PROBLEMS

3.1. Development Status

3.1.1. Geotourism Development

In 2017, Zigong Global Geopark received 1.3 million tourists, and the main scenic spots realized tourism income of more than 38 million RMB [3]. In 2018, the four major scenic spots of Dinosaur Museum, Salt Industry History Museum, Shenhajing Salt Well, and Rongxian Buddha visited 1.4649 million tourists and the tourism income was 42.0583 million RMB. In 2019, the four major scenic spots received 2.109 million tourists and the tourism income was 40.3806 million RMB. In 2020, the four major scenic spots had 0.7236 million tourists, and tourism income was 20.6498 million RMB (Figure 1- 2). From 2017 to 2019, the number of tourists in Zigong Global Geopark has gradually increased, and tourism income has also increased slowly. Tourist visits are mainly concentrated in the Dinosaur Museum and Salt Industry History Museum. Due to the COVID-19 epidemic, the number of tourists and income in 2020 dropped sharply so the data was not made as a reference.

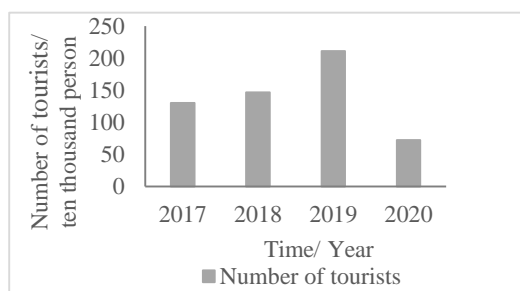


Figure 1 The number of tourists

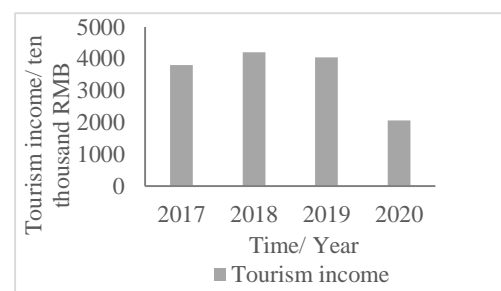


Figure 2 The tourism income

Note: Data come from the website of Zigong Global Geopark, <https://www.ziggeopark.com>

Zigong is called the "solidified Jurassic Park"[7] because the Zigong animal Fossil Group covers almost all terrestrial vertebrates in the Jurassic period. In 2018, Zigong Cultural Tourism cooperated with Shenzhen Fantawild Company to develop the Chinese version of "Jurassic Park"-Zigong Fangte Dinosaur Kingdom, and the project has entered the final stage of tackling tough problems. Fantawild Dinosaur Kingdom will be the first large-scale high-tech modern industrial park with the theme of dinosaur culture in China, with 13 large-scale themed projects.

3.1.2. Geoscience Popularization

Zigong Global Geopark has successively become the "National Youth Science and Technology Education Base", "China Paleontology Science Education Base" and so on. In recent years, Zigong Global Geopark has cooperated with China University of Geosciences, Chengdu University of Technology and other universities to carry out practical activities for college students.

Since 2015, Zigong Global Geopark has independently established the "Salt Expo Classroom" which has been successfully held for more than ten sessions to popularize salt culture knowledge featured popular science education activities, including Chinese

studies, tie-dyeing, paper-cutting, calligraphy, fine arts and other traditional and folk cultures.

Zigong Global Geopark launched a special activity for the recruitment and training of "little commentators" in 2014 to popularize scientific knowledge, and conduct various trainings to enhance the children's self-confidence, scientific literacy and comprehensive capability, and to provide the audience with voluntary explanation service.

On April 22nd each year on Earth Day, according to the annual theme Zigong Global Geopark prepares corresponding Earth Day activities to popularize earth science knowledge to the public, preach the concept of protecting the natural environment, and promote public protection.

3.2. Existing Problems

3.2.1. Unbalanced Tourism Development

The area of Zigong Global Geopark accounts for about one-third of the area of Zigong City, but the scale of geotourism is small and the development is uneven. At present, there are only four mature scenic spots within the park. The other scenic spots are not small-scale tourism for example although Xianshi Ancient Town is 4A scenic spots, it is not well-known, and the flow of people is not high. (Table 2). The geopark scenic area has very limited driving effect on the surrounding communities. Although the main scenic area of the geopark is mainly located in the urban area of Zigong, the surrounding area is mainly operated by a small number of farmhouses, and the radiation range is limited, and there is no complete set of tourist facilities.

Table 2. Main Scenic spots of Zigong Global Geopark

Name	Scenic level	Features
Dinosaur Museum	-	Middle Jurassic dinosaurs and other associated vertebrates
Salt Industry History Museum	-	Well salt production, deep well drilling related collections
Shenhajing Salt Well	AAAA	The world's first large well over a kilometer
Rongxian Buddha	AAAA	The world's largest Buddha Shakyamuni
Xianshi Ancient Town	AAAA	A masterpiece of the unity of architectural style and design thinking in ancient towns in my country
Fushun Confucian Temple	-	An important carrier of Confucian culture and the relics of Qing Dynasty reconstruction

Note: Data come from the website of Zigong Global Geopark, <https://www.ziggeopark.com>

3.2.2. Ineffective Protection and Utilization of Geological Relics

Like most parks, many geological heritage resources in the park have not been effectively protected and utilized [8]. At present, only important relic resources such as the Dinosaur Museum, Liangshan Silicified Wood and Shenhajing Salt Well have been protected and utilized. Several resources distributed within the geopark have not been protected or exhibited. For example, the fossil excavation sites still have high scientific and popular science value after being excavated and need to carry out corresponding protection and display work. The core area of the dinosaur fossil remains within 2 km² in the Fangqiu Bay and Pangnichong areas near Qinglong Mountain have not been excavated, and they have been left for in-situ protection due to the complex stratum and limited technology.

3.2.3. Lack of Publicity

Compared with other global geoparks, the number of tourists in Zigong Global Geopark is still relatively small.

According to 2012 data [9], other Global Geoparks have received more than 20 million visitors, and their tourist visits were nearly 10 times that of Zigong in 2019. The publicity of Zigong Global Geopark is not strong enough, and its brand has not yet gained popularity. Funiu Mountain Global Geopark which contains the same type of geological relics has cooperated with China Central Television to shoot programs as early as 2013, and broadcast on CCTV-4 and CCTV-10 in 2014, showing its geological relics and landscapes [10]. Although the Zigong Global Geopark also promotes with the media, it only cooperates with the media in Zigong.

4. SUGGESTION FOR SUSTAINABLE DEVELOPMENT

4.1. Strengthen the Development and Protection of Geoheritage Resources

Zigong Global Geopark should develop Dashanpu dinosaur fossil resources in a planned way. For sites that are difficult to develop, they should develop mining technologies and cultivate relevant talents for rational development. The implementation of important

geological relics protection projects, mainly for the protection and display of the Qinglongshan Fossil Group site, the Longguanshan dinosaur footprint fossil and other relatively intact relics. The occurrence of geological disasters poses a great threat to the protection of geological relics [11]. Zigong City is in the Huayingshan fault zone and earthquakes are more serious than landslides and mudslides [12]. Areas with potential geological hazards should be divided, monitored and corresponding protective measures shall be taken. Some geoparks in Europe attach great importance to the protection of geological heritage resources in the development and construction [13], and we should also conduct tourism development under the premise of protecting geological heritage.

4.2. Increase Propaganda Methods

As the park marketing work needs to be strengthened, the experience of "Colorful Guizhou" in Guizhou can draw in experience, use its unique natural landscape, rich national culture, and long red history as the communication content, and greatly increase the popularity of its brand by the public through advertising, public relations and word-of-mouth [14]. Zigong should break through the old brands, because these names do not directly point out the name of Zigong. We can refer to the name of "Colorful Guizhou" and publicize it together with the old brand name. For mature scenic spots the park can focus on publicity and increase their popularity in the country by means of TV stations, college activities, short videos, etc. Enhance the popularity of the surrounding villages and towns of the site locally or in the province, attract tourists to visit in short-term holidays, and change the imbalance of tourism development in the park. In the future, taking the Fangte Dinosaur kingdom Park as the publicity selling point, the first large-scale high-tech modern industrial park with dinosaur culture as the theme in China will certainly attract many tourists and carry out cooperative marketing with Zigong World Geopark to drive the tourism industry of Zigong World Geopark.

4.3. Enhance the Park Planning

Check and fill in the missing spots in the park and improve the sign interpretation system. For the geological heritage protection area in the park, the scope and boundary shall be defined, the core area and buffer area shall be established with reference to the protection mode of world heritage, and the experimental area can be established for scientific research and scientific education practice. The construction of towns and infrastructures around the park should be further standardized to prevent its geological landscape from causing visual impact and affecting the integrity of relics and landscape.

5. CONCLUSION

The tourism of Zigong Global Geopark is developing

better, but there is a big gap with other world geoparks in China. The fossil groups of Zigong Global Geopark still have great potential for development and utilization so we should make rational development. Carry out multi-channel publicity of the park, increase the popularity of the park, and do an all-around park planning to realize the sustainable development of the geopark from three aspects, and drive the development of the local economy.

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