

Research on Ecological Protection and Restoration of Lijiang River Landscape in Guilin, Guangxi

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ABSTRACT

Guilin landscape is the best in the world, and Lijiang River Basin is one of the most important landscape axis in Guilin landscape, so the landscape planning of Lijiang River Basin and its coast is particularly important. However, in recent years, the ecological environment of Lijiang River Basin and its coastal areas has deteriorated, and the beautiful scenery of Lijiang River is no longer the same as before, which has already attracted the attention of Guangxi Province and even the whole country. In order to respond to the call of building Guilin into a world-class international tourist attraction, it is urgent for us to create a beautiful urban tourism environment and to recreate the grand scenery of the Lijiang River. Based on the existing resources, environment and regional advantages of Lijiang River, this study analyzes the current situation of landscape ecological problems of Lijiang River in Guilin, and puts forward the ecological protection and restoration strategies suitable for Lijiang river ecological construction objectives. Based on the concept of ecological restoration and urban restoration, we analyze and research on the current situation and problems of landscape planning of Lijiang River in Guilin. The research actively discusses and summarizes the governance measures. It is suggested that, in close combination with regional characteristics, we should establish a resource-saving and environment-friendly sustainable development landscape industrial structure scheme suitable for regional ecological carrying capacity. Building a suitable ecological compensation mechanism of the Lijiang river landscape, it provides suggestions and references for the ecological protection and restoration of Lijiang River Basin and the sustainable development of Lijiang River landscape in Guilin.

Keywords: *ecological protection; ecological environment problems; sustainability*

1. INTRODUCTION

Guilin landscape is one of the best landscapes in China, and the Lijiang River Basin is one of the most important landscape axes in Guilin landscape. The Lijiang River originates from Maoer Mountain, the first peak of South China in Guilin, with a total length of 214 kilometers and a total area of 12,159 square kilometers. It involves 5 counties, 1 city and 6 urban areas under the administrative jurisdiction of Guilin. There are 14 national and autonomous regional nature reserves and wetland parks in the basin[1]. Therefore, the landscape planning of Lijiang River Basin and its coast is particularly important. However, in recent years, the ecological environment of Lijiang River Basin and its coastal areas has deteriorated, and the beauty of Lijiang River is no longer the same as before.

The environmental deterioration of the Lijiang River

in Guilin has already attracted the attention of Guangxi Province and even the whole country. The 19th National Congress of the Communist Party of China proposed to promote the construction of Guilin as a world-class international tourist destination. The Development and Reform Commission of Guangxi Zhuang Autonomous Region and the people's government of Guilin have also introduced relevant policies for the ecological protection and restoration of the Lijiang River[2]. Therefore, it is urgent to reproduce the prosperity of the Lijiang River, create the most beautiful Lijiang River and create a beautiful urban tourism environment. The ecological protection and restoration of Lijiang landscape is to repair the urban space, function system and environmental carrying capacity of Guilin, further improve the public service quality of Guilin and improve the level of infrastructure construction. Based on the concept of ecological restoration and urban restoration, this study analyzes the current situation and

problems of landscape planning of Lijiang River in Guilin, and summarizes the governance measures. On this basis, suggestions are put forward for the future landscape of Lijiang River in Guilin to combine regional characteristics, consider ecological carrying capacity, build sustainability and establish corresponding ecological compensation mechanism, so as to provide reference for the ecological protection and restoration of landscape in Lijiang River Basin in Guilin.

2. STATUS ANALYSIS

In recent years, with the increasing intensity of tourism development and the development of industry and agriculture in the city and other factors, the ecological environment of Lijiang River Basin is deteriorating.

2.1. Degeneration of ecological function

2.1.1. The change of upstream forest vegetation structure

There are well-preserved primitive forests in the upper reaches of Lijiang River Basin, with good ecological status. However, since the continuous expansion of the scope of human activities and the increase of human intervention, the vegetation structure in this area has undergone great changes. The proportion of primary forests has been declining, while the proportion of artificial forests and secondary forests has been increasing. This situation is easy to lead to increased soil erosion, reduced biodiversity and decreased soil water conservation capacity.

2.1.2. Aggravated desertification

The middle and lower reaches of the Lijiang River are karst areas with serious desertification problems. In addition to natural and geographical factors, human activities have also caused rocky desertification and desertification. For example, areas that have become bare after artificial development of mines and quarries (Fig. 1) have not been well repaired, resulting in deterioration of the ecological environment.



Fig.1 The naked quarry

2.1.3. Reduction of water area

The middle reaches of the Lijiang River Basin have a flat terrain, which is a plain area, once distributed with a large area of water, and has a network water resources system. The water veins conserve water, regulate urban microclimate, and regulate flood and water storage to reduce the impact of disasters. However, with the acceleration of urbanization, urban construction space area continues to expand (Fig. 2), the original water area continues to decrease, wetland degradation and its area rapidly shrink[3]. This leads to the weakening of self-purification function of water body, the degradation of ecological function of water system, the decline of groundwater and surface water quality, the reduction of water storage capacity, and the drying of rivers.



Fig.2 Expansion of urban construction approaching waters

2.1.4. Disaster-prone

The rainfall in Lijiang River Basin is abundant, the temporal and spatial distribution of rainfall is uneven, and the suddenness is strong, resulting in a large fluctuation of water level, and the upstream flood occurs. However, since the upstream rainfall will be converted into surface runoff flow to the middle and lower reaches, but the lower channel is narrow, and the insufficient water storage capacity and poor connectivity in karst areas will cause water accumulation due to poor drainage. The middle and lower reaches of the river basin have less vegetation, thin soil layer, poor water retention capacity, and serious surface water infiltration, which forms a dry karst surface, that is, the typical karst drought zone.

2.1.5. Deterioration of quality

Domestic wastewater, production wastewater, industrial and agricultural wastewater discharge indiscriminately along the river and the river water self-purification capacity is very low, the water quality of Lijiang River is deteriorating (Fig. 3). Chemical pollutants discharged at will and difficult to degrade, algae increased, water and wetland area and quality decline, weak self-purification capacity of these factors are poor Lijiang River water quality.



Fig.3 Water pollution is grievous

2.2. Lag of ecological protection infrastructure

Lijiang River Basin has a wide coverage, long history of environmental protection, flood control, water conservancy, transportation and other infrastructure construction, and many debts. Urban sewage and solid waste treatment capacity is insufficient. Most counties have no spare water sources, and there are certain ecological risks. Urban and industrial park sewage, garbage disposal capacity and operational economic security is insufficient, the vast majority of villages did not establish sewage treatment facilities, garbage disposal facilities are simple, Lijiang River Basin only 240 natural villages initially established centralized sewage treatment facilities. The limited number of centralized treatment sites for industrial waste, medical waste, hazardous materials and animal corpses died of diseases in the study site, resulting in these pollution sources cannot be timely and effectively treated (Fig. 4). Second pollution of soil surface and surface runoff is due to long-term accumulation of pollutants on the ground. The black and odorous water in the tributaries of the Lijiang River and the raising of livestock by coastal villagers have not been comprehensively and effectively controlled. Agriculture is facing serious pollution risks. The construction of ecological protection and management capacity of Lijiang River is lagging behind, and there is a lack of systematic and perfect monitoring and management tools, and the investigation and evaluation of ecological environment and scientific research monitoring are lagging behind.



Fig.4 Domestic refuse has not been treated

2.3. Low capacity of conservation and utilization of ecological resources

Some industrial and mining enterprises which produce pollutants still appear in the red line of ecological protection along the Lijiang River. Ecological park foundation is weak, pollution control, clean production, recycling and reuse technology is relatively backward. The utilization of ecological resources is relatively inefficient, the innovation of ecological tourism is insufficient, and the comprehensive benefit is low. Due to the special geographical environment and vulnerable ecosystem characteristics of Lijiang River, the implementation of ecological protection and restoration measures will be more difficult than other regions. There are still immature areas in the protection and restoration technology of karst landform natural ecosystem, which restrict the development of ecological protection and restoration of Lijiang River.

2.4. Contradiction between ecological protection measures and people ' s livelihood

Deforestation, grazing, hunting and large-scale livestock breeding are prohibited in some key ecological protection areas in Lijiang River Basin. These activities are the source of local rural residents ' life and economy, so people ' s livelihood along the river has received a great impact, production and life has been greatly affected, industrial structure adjustment is difficult, it is difficult to form the scale of ecological economy in the short term, farmers transfer to industry constraints, the contradiction between population and environmental carrying capacity has become increasingly prominent. Therefore, while carrying out the ecological protection and restoration work in the Lijiang River, it will also face how to better protect the lives of residents along the river as little as possible. This requires us to explore the coordinated development of ecological benefits, economic benefits, social benefits and people ' s livelihood benefits, and seek a win-win, balanced management system and effective and suitable ecological compensation mechanism.

3. STRATEGY OF ECOLOGICAL PROTECTION AND RESTORATION

Effectively restore the damaged rocks, rivers, lakes, vegetation communities and ecosystems in the Lijiang River Basin, and restore the self-regulating function of the Lijiang River ecosystem. Continuously improve the level of urban public service quality, strengthen the construction of municipal infrastructure, explore and protect the historical and cultural connotation of the Lijiang River Basin in Guilin, based on the concept of city double fix[4], the ecological protection and repair of the Lijiang River Basin will be the city of Guilin. The

ecological carrying capacity and functional system have been comprehensively and effectively repaired. The ecological protection and restoration of Lijiang River Basin is to protect and restore the urban ecological space of Guilin City[5], and also to improve the urban function and landscape effect. In view of the above problems in the Lijiang River Basin, such as the degradation of ecological functions, the lag of infrastructure, the poor protection and utilization of ecological resources, and the contradiction between relevant measures and people's lives, this case consults relevant literature, and conducts on-the-spot investigation and research along the Lijiang River. Combined with the case of landscape ecological remediation in the land-water ecotone at home and abroad[6], the following references are put forward for the ecological protection and restoration measures of the Lijiang River landscape.

3.1. Coastal rural environmental remediation

It is necessary to carry out the improvement of living environment of rural residents in coastal areas, lay sewage collection pipe network, build rural sewage ecological treatment facilities, establish garbage collection[7], transportation and harmless treatment system in coastal villages, and implement comprehensive treatment of sewage and garbage in villages along the Lijiang River. Efficient treatment and utilization of livestock manure resources, migration and management of livestock farms, treatment and relocation of key pollution sources in the Lijiang River Basin, and implementation of various pollution control projects. Emphasis is placed on strengthening the clean-up and renovation of the problems such as random construction, random excavation, random farming, random management and environmental sanitation along the Lijiang River, and prohibiting illegal construction, illegal sand excavation, residential boats, catering boats, cage fish farming and livestock farming. Build characteristic tourism villages along the Lijiang River[8], and build a beautiful countryside with good ecological environment, leisure, livable, tourism, architectural style and natural environment.

3.2. Management of water quality

Open all sewage treatment plants in Guilin and build sewage treatment infrastructure to expand the scope of sewage collection and treatment so that sewage treatment can reach full coverage. The black and odorous water is treated by a series of means such as source control, garbage cleaning, sludge cleaning and drainage. Combined with the upper reaches of the Lijiang River reservoir, strengthen the allocation of water resources, improve the Lijiang River dry season ecological and landscape environment.

According to the construction goal of Guilin, the sponge city is constructed. On the basis of ensuring the normal drainage and waterlog prevention of the city, combined with the natural water system and artificial measures, the flood control and waterlog prevention are realized to the greatest extent, the water storage and storage are realized, and the water quality is purified to achieve the efficient utilization of atmospheric precipitation resources, and the ecological protection and restoration of the Lijiang River Basin are realized.

3.3. Forestry ecological protection

Reducing the proportion of fast-growing forest and economic forest, improving the compensation standard of ecological public welfare forest, increasing the proportion of ecological public welfare forest, improving the structure of forest species, improving the water conservation capacity of the upper reaches of the Lijiang River, and reducing soil erosion; it is strictly prohibited to carry out production and operation activities such as reclamation and burning wasteland in ecological public welfare forest areas, and to increase the ecological restoration of the reclaimed forest areas. To protect the ecological environment of Qingshitan reservoir and its surrounding areas as a whole, repair the system and comprehensively manage it; construction of ecological landscape forest belt along the mainstream of Lijiang River. Under the premise of protecting the original vegetation, the artificial forest and residual forest were reconstructed or the stand quality was improved, and the long-term management and protection mechanism was established. Strengthen the infrastructure and capacity-building of natural protected areas in Lijiang River Basin, accelerate the construction of mountain forests and biodiversity ecological function areas around Lijiang River, carry out biodiversity background survey, establish monitoring, evaluation and early warning system, and strengthen the construction of protection and management infrastructure.

3.4. Developing ecological agriculture

Carrying out the industrial transfer in the core area of Lijiang River, promoting the construction of ecological park, combining with the tourism situation of Lijiang River in Guilin, under the background of returning farmland to forest to protect ecology, using the reserved part of agricultural land to establish an industrial model with local characteristics of Lijiang River combining agriculture, ecology and tourism. Production of high-quality agricultural products, improve product efficiency, in-depth mining of agricultural products function.

4. CONCLUSION

Due to its unique geographical location and unique

natural conditions, the Lijiang River Basin in Guilin has become the most ecological development space in Guilin. Through the comparative study of successful cases of ecological development at home and abroad and the analysis of the current situation of landscape ecological problems of the Lijiang River in Guilin, the ecological protection and restoration of the Lijiang River landscape should be combined with its existing resources, environment and regional advantages. Therefore, the development strategy suitable for the ecological construction goal of Lijiang River is put forward. Based on the concept of ecological restoration and urban restoration, through the analysis and research on the current situation and problems of landscape planning of Lijiang River in Guilin, the governance measures are actively explored and summarized. It is proposed that under the close combination of regional characteristics, the industrial structure scheme of resource-saving and environment-friendly sustainable development landscape suitable for regional ecological carrying capacity should be established, and the ecological compensation mechanism suitable for Lijiang River landscape should be established, so as to provide suggestions and references for the ecological protection and restoration of Lijiang River Basin in Guilin and the sustainable development of Lijiang River landscape.

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