

Evaluation of Ecological Livable Construction in Guangzhou

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Abstract: Guangzhou is the capital city of Guangdong Province, which is currently in a stage of transformation and development. This paper takes Guangzhou’s ecological economy, ecological society, ecological environment as the research objects and constructs an evaluation index system for Guangzhou’s ecological liveability. It takes social progress, economic development and environmental protection as the primary indicators. The index system is used to construct the ecological livability evaluation index system of Guangzhou through the entropy method.

1 Introduction

As China enters a new era of ecological civilization, under the background of striving to build a well-off society in an all-round way, people’s thinking is gradually improving, which makes the people have new ideas about life and housing. Their awareness begins to change. In addition, research on the evaluation of ecologically livable construction has attracted widespread attention in many fields of the academic community has achieved fruitful research results.

2 Overview of the study area, research methods and data sources

Guangzhou is the capital of Guangdong Province, a sub-provincial city. Guangzhou’s geographical position is superior, it is the country’s logistics hub and the hub city of China’s the Belt and Road. Guangzhou is rich in natural resources and has a high economic status.

The research methods are Entropy method and Coupling coordination degree model, and the data comes from this article. The data comes from the “Guangzhou Statistical Yearbook”, “Guangdong Statistical Yearbook” and “China Statistical Yearbook”. The serial year is 2020-

2018^[1-3].

3 Construction and comprehensive evaluation of ecological livability evaluation index system

3.1 Principles of Index System Construction

The construction of ecological livability evaluation indicators in Guangzhou needs to meet the principles of comprehensiveness, maneuverability, goal, orientation, dynamics and regionality.

(1) The principle of comprehensiveness; (2) The principle of operability; (3) Objective principle; (4) The guiding principle; (5) Dynamic principle; (6) The principle of regionality.^[4-5]

3.2 Construction of indicator system

According to the entropy method, the weights of each index are assigned and comprehensively measured. The results are shown in Table 1 and Table 2. Table 1 is the evaluation system of ecological livability indicators in Guangzhou, and Table 2 is the comprehensive measurement score table of Guangzhou from 2010 to 2018.

Table 1. Evaluation System of Ecological Livability Indexes in Guangzhou

First level indicator	Index explanation	Secondary indicators	Weights	Indicator attributes
Social progress system	population	Total population (people)	0.037188	Positive
		Natural population growth rate (%)	0.039902	Positive
	Number of colleges	Number of graduates (person)	0.025230	Positive
		Number of college graduates (person)	0.032502	Positive

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Economic development system	Road paving	Paved road area (ten thousand square meters)	0.028751	Positive
		Length of paved road (km)	0.028751	Positive
	Resident consumption	Disposable income of urban residents (yuan)	0.028734	Positive
		Engel coefficient of urban residents (%)	0.039020	Negative
		Consumer Price Index (previous year=100)	0.050739	Negative
	GDP	GDP (100 million yuan)	0.028498	Positive
		GDP growth rate (%)	0.017578	Positive
	output value	Total industrial output value (ten thousand yuan)	0.028643	Positive
		Proportion of tertiary industry (%)	0.031307	Positive
	Fiscal revenue and expenditure	Financial revenue (ten thousand yuan)	0.033478	Positive
Financial expenditure (ten thousand yuan)		0.032598	Positive	
Unit energy consumption	Energy consumption per unit of GDP (ton standard coal/10,000 yuan)	0.050477	Negative	
Environmental protection system	Greening quality	Green coverage area (hectares)	0.024938	Positive
		Green coverage rate in built-up area (%)	0.035845	Positive
		Green area (hectare)	0.044494	Positive
		Green space rate in built-up area (%)	0.039266	Positive
		Park green area (hectare)	0.068668	Positive
		Park green area per capita (square meters)	0.021969	Positive
	Waste disposal	Urban sewage treatment rate	0.021123	Positive
		Industrial solid waste (tons)	0.052147	Negative
	air quality	Average value of sulfur dioxide in the air ($\mu\text{g}/\text{m}^3$)	0.041800	Negative
		Average value of carbon monoxide in the air (mg/m^3)	0.038148	Negative
		Turbidity (mg/L)	0.019845	Negative

3.3 Comprehensive evaluation

According to Table 2 and Figure 7, during the period 2010-

2018, the overall score of Guangzhou City was on the rise. Only in 2011-2012 and 2013-2014, there was a slight downward trend. The rising stage indicates that the overall ecological livability of Guangzhou is continuously improving.

Table 2. Qinghai Province 2010-2018 Comprehensive Measurement Score

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
score	0.026230	0.088731	0.077447	0.116417	0.095722	0.107862	0.131821	0.157532	0.198237

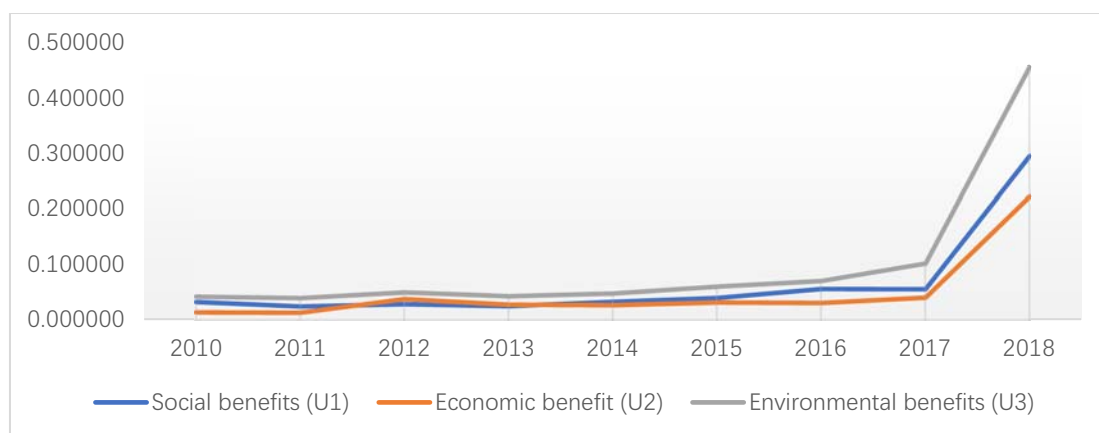


Figure 1. Changes in benefit evaluation scores of Guangzhou from 2010 to 2018

It can be seen from Table2 and Figure1 that during the period 2010-2018, both social benefits (U1), economic benefits (U2) and environmental benefits (U3) are on an overall upward trend. Among them, U3 is higher thanU1, higher than U2. During 2017-2018, U1, U2 and U3 increased the most, indicating that during 2017-2018, Guangzhou’s social progress, economic development, environmental protection, and other policy measures have been put in place.

3.4 Coupling and coordination analysis

Based on the analysis of the coupling coordination degree, the SPASSAU is used to analyze the coordination degree of the scores of the established Guangzhou ecological livability evaluation index system. The analysis results are shown in Table 3 and Figure 2:

Table 3. Calculation results of coupling coordination degree

Year	Coupling degree C value	Coordination index T value	Coupling coordination degree D value	Coordination level	Coupling degree
2010	0.905	0.03	0.164	2	
2011	0.908	0.026	0.153	2	
2012	0.974	0.039	0.194	2	Serious disorder
2013	0.972	0.032	0.176	2	
2014	0.971	0.036	0.187	2	
2015	0.964	0.044	0.206	3	
2016	0.946	0.053	0.223	3	Moderate Disorder
2017	0.927	0.066	0.247	3	
2018	0.957	0.325	0.557	6	Barely coordinated

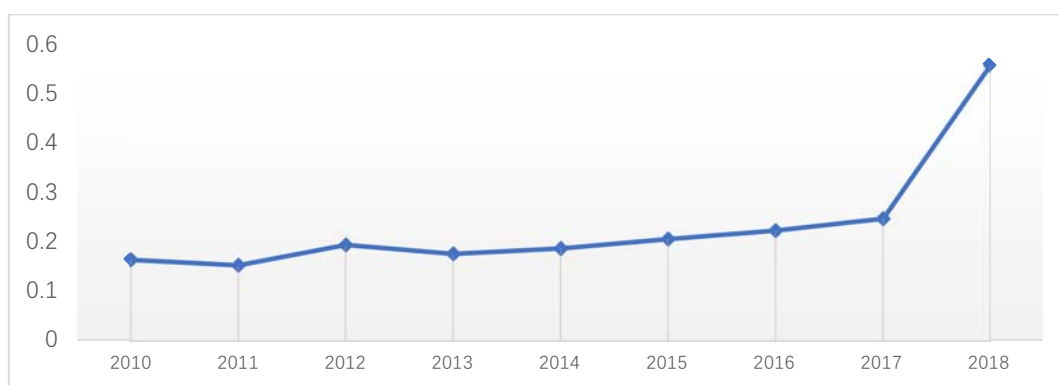


Figure 2. Analysis of coupling coordination degree from 2010 to 2018

It can be seen from the results of the coupling coordination degree analysis that the coordination degree of social benefits, economic benefits, and environmental benefits of Guangzhou from 2010 to 2018 has become increasingly coordinated.

4 Conclusion

In the evaluation index system of ecological livability in Guangzhou, it can be seen that the development direction of ecological livability in Guangzhou should focus on

environmental protection. On this basis, develop the economy to ensure the construction of a livable city in Guangzhou.

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