

Retraction

Retracted: Quantitative Estimation of Ecocultural Bearing Capacity of Urban Agglomerations in Britain

Discrete Dynamics in Nature and Society

Received 15 August 2023; Accepted 15 August 2023; Published 16 August 2023

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] Y. Zhang and A. Davarpanah, "Quantitative Estimation of Ecocultural Bearing Capacity of Urban Agglomerations in Britain," *Discrete Dynamics in Nature and Society*, vol. 2022, Article ID 8091132, 10 pages, 2022.

Research Article

Quantitative Estimation of Ecocultural Bearing Capacity of Urban Agglomerations in Britain

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Received 17 November 2021; Accepted 31 January 2022; Published 17 February 2022

Academic Editor: Daqing Gong

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Aiming at the imbalance of urban ecological carrying capacity, this paper proposes a method to estimate the ecological and cultural carrying capacity of British urban agglomeration. The difference method and standardization method are used for positive combination and dimensionless processing of the indicators to realize the data preprocessing of the indicators. Through questionnaire survey, consulting relevant scholars and experts, and referring to the specified values in relevant British policies, determine the ideal value of the index. The index weight is determined by the open-scoring method. According to the index weight, the ecological and cultural carrying capacity of British urban agglomeration is calculated by vector model method. Calculate the index weight according to the ideal value of the index and the ecological text. The strength of ecological culture carrying capacity is calculated by the actual value of carrying capacity. Taking London urban agglomeration as the experimental object, this paper calculates the ecological and cultural carrying capacity and analyzes the ecological and cultural carrying capacity of three subsystems. The results show that this method can effectively estimate the ecological and cultural carrying capacity of British urban agglomeration.

1. Introduction

Bearing capacity is a concept borrowed from the field of engineering geology. Its original meaning is the capacity of foundation strength to bear the weight of buildings. It has evolved into one of the most commonly used concepts to describe the degree of development limitation [1]. Ecology first introduced this concept into the field of its discipline [2]. In 1921, in the *Journal of Human Ecology*, Parker and Burgess put forward the concept of ecological carrying capacity, that is, the maximum number of individuals in a given environment (mainly referring to the combination of ecological factors such as living space, nutrients, and sunshine). Nowadays, with the wide application of the concept of bearing capacity, it has been extended in various fields of environment, economy, and society to varying degrees, resulting in a large number of different names of various

bearing capacity [3]. In the past period of time, although there have been some problems in the development of bearing capacity, its applicability, intuition, and visualization make it widely used in different fields in the world.

At present, there are many studies on quantitative estimation methods of ecocultural carrying capacity, such as Su et al.'s study [4] using analytic hierarchy process (AHP) for quantitative estimation of ecocultural carrying capacity, but this method has many uncontrollable human factors that affect the real estimation level; Wang et al.'s study [5] using GIS spatial analysis and simulation methods. Quantitative estimation of ecological cultural carrying capacity is more accurate than AHP, but its adaptability is not strong, and factors affecting ecological cultural carrying capacity cannot be found. Luan and Hou [6] use a DEA model to quantitatively estimate ecological cultural carrying capacity; through the transformation of input-output concept, it can

be more intuitive. Various factors affecting the carrying capacity of ecological culture are reflected, but due to the limitation of its model, it is usually only suitable for static analysis.

Therefore, based on the economic and social development of urban agglomeration in Britain, this paper constructs a multi-index and multilevel structure system from three aspects: social subsystem, economic subsystem, and environmental subsystem, and quantitatively estimates the ecological and cultural carrying capacity using vector model method. This paper calculates and compares the changes of ecological carrying capacity of London urban agglomeration from 2013 to 2015 and analyses the ecological and cultural carrying capacity of London urban agglomeration at this stage.

2. Materials and Methods

2.1. Screening Method of Quantitative Assessment Indicators for Ecocultural Bearing Capacity. Establishing a scientific and reasonable evaluation index system is related to the correctness of the evaluation results. Therefore, it is necessary to select characteristic indicators [7], which are representative and can fully reflect all aspects of the comprehensive objectives. When choosing indicators, we need to adopt certain methods. The index selection methods include theoretical analysis, frequency statistics, principal component analysis, and expert consultation [8].

- (1) Theoretical analysis: it mainly analyses, compares, and synthesizes the characteristics, connotations, and basic elements of the research questions and chooses those development conditions and indicators with strong pertinence [9]. In order to establish an index reflecting a problem, if there is no ready-made index to be synthesized, it is necessary to decompose the problem and synthesize it.
- (2) Frequency analysis: this paper mainly carries out frequency statistics on the current reports and papers on the evaluation of ecologically sensitive areas and chooses the indicators with higher frequency of use [10].
- (3) Principal component analysis: it means that on the premise of minimizing the loss of information, the index is "aggregated" by linear transformation, and a small part of information is discarded, so that the high-dimensional index data can be optimized and simplified.
- (4) Expert consultation method and Delphi method: by consulting experts, we can get the score of the required indicators. The arithmetic average value of each index is used to express the expert's centralized opinions, and the indexes of each state level are sorted according to the arithmetic average value of each index score. The smaller the coefficient of variation, the higher the degree of coordination of expert opinions is.

- (5) Causality: it is mostly used for the selection of environmental and social indicators. It is based on the causal relationship between society, environment, and the development of evaluation objectives and the degree of impact to select evaluation indicators. The development of evaluation objectives can be regarded as the main body influencing the state of social environment, and the social environment conditions in turn can affect the state of development of evaluation objectives.

In the specific selection of indicators, the aforementioned methods are often combined to form a comprehensive index screening method to establish the general level of the index system [11], and under the guidance of the selection criteria, the use of reasonable, scientific, operable, and descriptive indicators is not easy to operate for some. Some secondary indicators with strong subjectivity are deleted, and some evaluation indicators which are missing are supplemented as shown in Figure 1.

2.2. Determination of Index System. In recent years, the development of urban economy in Britain has put more and more pressure on ecoculture, and the problem of ecoculture in urban agglomerations has been aggravated. According to the characteristics of urban agglomerations in Britain and the basic principles of the index system, the social, economic, and environmental aspects involved in the ecological carrying capacity of urban agglomerations have been taken into account. The index system for evaluating the ecological carrying capacity of urban agglomerations in Britain is shown in Table 1.

- (1) Indicators of social subsystem include social development factors and human development factors. Social development factors include urbanization rate, urban population density, urban per capita housing area, per capita water consumption, per capita disposable income of farmers, per capita disposable income of urban residents, and Engel coefficient of rural residents and urban areas. Engel coefficient of town residents, coverage rate of basic medical insurance, and coverage rate of basic endowment insurance in town; natural growth rate of population is included in human development factors.
- (2) The economic subsystem index includes economic growth factor and industrial structure factor. The economic growth factor includes GDP per capita, the proportion of fixed assets investment in GDP of the whole society, the growth rate of total retail sales of social consumer goods, urban registered unemployment rate, energy consumption index per unit GDP, and labor productivity index. The sub-indicators include GDP growth rate and the contribution rate of tertiary industry to GDP.
- (3) Indicators of environmental subsystem include urban environmental factors and environmental pollution factors. Urban ecological factors include forest

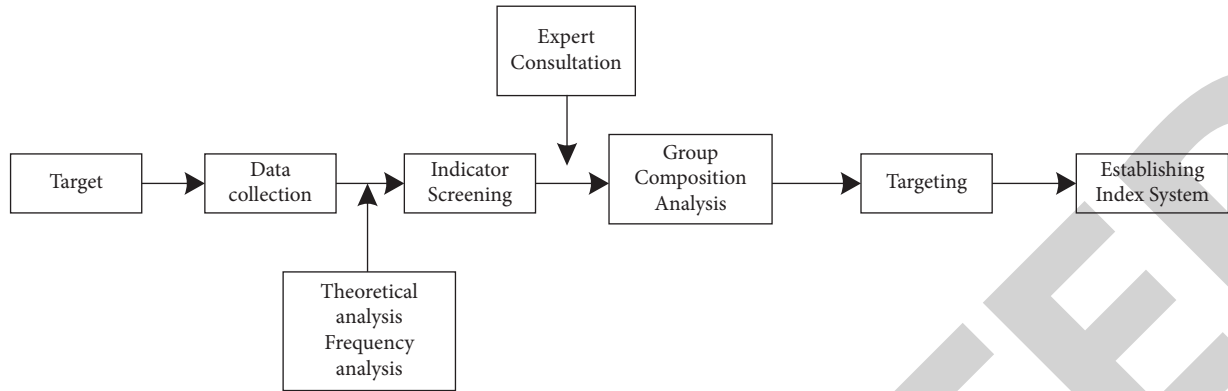


FIGURE 1: Indicator screening program diagram.

TABLE 1: Index system for assessing the ecological carrying capacity of urban agglomerations in Britain [12].

Target layer	First-level indicators	Secondary indicators	Three-level indicators
Ecocarrying capacity index system of urban agglomerations in Britain	Ecological carrying capacity of social subsystem	Social development level factor	Urbanization rate
			Urban population density
			Water consumption per capita
			Urban per capita housing area
			Per capita disposable income of farmers
	Ecological carrying capacity of economic subsystem	Human development factor	Per capita disposable income of urban residents
			Engel coefficient of rural residents
			Engel coefficient of urban residents
			Coverage rate of urban basic medical insurance
			Coverage rate of urban basic old-age insurance
Ecological carrying capacity of environmental subsystem	Economic growth factor	Natural population growth rate	
		Per capita GDP	
		The proportion of fixed assets investment in GDP in the whole society	
		Gross retail sales growth rate of social consumer goods	
		The registered urban unemployment rate	
Ecological carrying capacity of environmental subsystem	Industrial structure factors	Energy consumption index per unit GDP	
		Labor productivity index	
		GDP growth rate	
		Contribution rate of tertiary industry to GDP	
		Ecological carrying capacity of environmental subsystem	Urban environmental factors
Per capita park green space area			
Per capita urban road area			
Greening rate of urban built-up areas			
Daily capacity of municipal wastewater treatment			
Ecological carrying capacity of environmental subsystem	Environmental pollution factors	Per capita water resources	
		Harmless treatment rate of municipal domestic waste	
		The proportion of investment in environmental pollution control to GDP	

coverage, per capita park green space area, per capita urban road area, afforestation rate of urban built-up areas, daily treatment capacity of urban sewage and per capita water resources occupancy. It is marked with the harmless disposal rate of municipal solid waste and the proportion of investment in environmental pollution control in GDP.

2.3. Index Data Preprocessing. The preprocessing of index data includes two aspects: forward integration and dimensionless processing [13]. In multi-index evaluation, the larger the value of some indicators, the better the evaluation, and the smaller the value of some indicators, the better the evaluation. This kind of index is called reverse index. According to the different types of indicators, the reverse and moderate indicators need to be transformed into positive indicators, which are called the process of index forward [14]. After the establishment of the evaluation index system, considering the incomparability between the positive and negative indicators, this paper uses the difference method to make the reverse indicators positive, that is, the reverse indicators in the index system, such as urban population density, rural residents Engel coefficient, urban residents Engel coefficient, natural population growth rate, and urban registered unemployment rate. The energy consumption index per unit GDP is positive. The formulas for forward selection are shown as follows:

$$X_i = \frac{(X_{\max} - X_i)}{(X_{\max} - X_{\min})}. \quad (1)$$

X_{\max} and X_{\min} are the maximum and minimum of the index, respectively.

Dimensionalization of indicators is to transform different indicators into uniform relative values through mathematical transformation through standardization, eliminating the influence of different dimensions of indicators [15]. Common dimensionless methods include standardization method, mean method, and range normalization method. In this paper, the most common standardization method is used for dimensionless treatment. The formula treatment is shown as follows:

$$z = \frac{X - \bar{X}}{\sigma_x}. \quad (2)$$

\bar{X} is the expected value of M and σ_x is the standard deviation of X .

2.4. Ideal Value and Weight Determination. With the continuous development of social economy, the ideal state of urban agglomeration, a complex system, is different in each period. This paper analyses and studies the urban ecological carrying capacity of British urban agglomeration from 2013 to 2015. It is assumed that the ideal state of urban agglomeration is the same and unchanged in 3 years. On this basis, it is determined that the carrying capacity of urban agglomeration is the right one in overload or loadable state [16].

How to determine the ideal load-bearing parameters at this stage is the key point and difficulty and also the key to ensure the accuracy of the results. Here, the following methods are used to determine the ideal carrying parameters of urban agglomeration: consulting relevant scholars and experts through questionnaire survey and converting some nonquantifiable data to find alternative indicators [17]; referring to the data obtained in some special surveys, in order to achieve this goal. As a standard, refer to the United Kingdom's prescribed values in relevant policies [18]. Combining these methods, the ideal values of urban agglomeration are obtained as shown in Table 2.

In the evaluation of composite indicators, subjective and objective weighting methods are usually used to determine the weight of indicators. Subjective empowerment method is a method of determining weights which highlights the evaluator's intuitive judgment ability, the poor transparency and reproducibility of the evaluation process [19]. The objective weighting method refers to a method of determining weights which depends on the original information quantity and the transparency of the evaluation process. Although it uses relatively perfect mathematical theory and methods, it ignores the subjective information of the evaluator to a certain extent, and this information is for some evaluation results. Importantly, objective weighting methods mainly include principal component analysis, factor analysis, entropy method, and so on. Based on this, this paper adopts the method of combining subjective information with objective factors, which can embody the idea of comprehensive empowerment. That is to say, the method of opening grade is used to determine the weight of indicators, as shown in Table 2.

The basic idea of the grading method is to select the weight coefficients so as to maximize the differences between cities, that is, to maximize the differences between cities in different years and to project the m -dimensional space vector into a 1-dimensional space, so as to maximize the degree of dispersion or variance between vectors.

For the linear function $y = w_1x_1 + w_2x_2 + \dots + w_mx_m = w^T x$, where $w = (w_1, w_2, \dots, w_m)^T$ is the weight coefficient of the evaluated object and $x = (x_1, x_2, \dots, x_m)^T$ is the state vector. If the m data values of the i evaluation object are substituted into the linear function, then $y_i = w_1x_{i1} + w_2x_{i2} + \dots + w_mx_{im}$, ($i = 1, 2, \dots, n$) in the formula is obtained. The matrix form is expressed as $y = Bw$. The calculation steps are as follows:

- (1) The function $y = w^T x$ is substituted into the variance formula $s^2 = 1/n \sum_{i=1}^n (y_i - \bar{y})^2 = y^T y/n - \bar{y}^2$. As $\bar{y} = 0$, $ns^2 = w^T B^T B w = w^T Q w$ can be obtained, where Q is a real symmetric matrix. Here, we limit $w^T w = 1$, and find the maximum value of formula, that is, choose w , and get the following formula:

$$\begin{cases} \max w^T Q w, \\ s.t. w^T w = 1, \\ w > 0. \end{cases} \quad (3)$$

- (2) Obtain the weight of each year, and then normalize the weight vector $w = (w_1, w_2, \dots, w_m)^T$ of the index system.

TABLE 2: Ideal values and weights of ecocarrying capacity indicators for UK urban agglomerations.

Target layer	First-level indicators	Secondary indicators	Three-level indicators	Unit	Ideal value	
Ecocarrying capacity index system of urban agglomerations in Britain	Ecological carrying capacity of social subsystem (0.33)	Social development level factor (0.87)	Urbanization rate (0.10)	%	60	
			Urban population density (0.10)	Person/km ²	1500	
			Water consumption per capita (0.10)	L	210	
			Urban per capita housing area (0.10)	m ²	40	
			Per capita disposable income of farmers (0.10)	Pound	10,000	
			Per capita disposable income of urban residents (0.10)	Pound	20,000	
			Engel coefficient of rural residents (0.10)		0.4	
			Engel coefficient of urban residents (0.10)		0.35	
			Coverage rate of urban basic medical insurance (0.10)	%	80	
			Coverage rate of urban basic old-age insurance (0.10)	%	50	
	Ecological carrying capacity of economic subsystem (0.33)	Economic growth factor (0.73)	Human development factor (0.13)	Natural population growth rate (1.0)	%	5
				Per capita GDP (0.19)	Pound	30,000
				The proportion of fixed assets investment in GDP in the whole society (0.16)	%	70
				Gross retail sales growth rate of social consumer goods (0.13)	%	25
				The registered urban unemployment rate (0.14)	%	4
				Energy consumption index per unit GDP (0.19)	%	110
				Labor productivity index (0.19)	%	200
	Ecological carrying capacity of environmental subsystem (0.34)	Urban environmental factor (0.75)	Industrial structure factor (0.27)	GDP growth rate (0.47)	%	7.5
				Contribution rate of tertiary industry to GDP (0.53)	%	50
				Forest coverage (0.15)	%	21
				Per capita park green space area (0.17)	m ²	15
				Per capita urban road area (0.17)	m ²	15
				Greening rate of urban built-up areas (0.17)	%	40
Daily capacity of municipal wastewater treatment (0.17)				thousand m ³	14,000	
Per capita water resources (0.17)				%	90	
Environmental pollution factor (0.25)	Environmental pollution factor (0.25)	Harmless treatment rate of municipal domestic waste (0.5)	m ³	3000		
		The proportion of investment in environmental pollution control to GDP (0.5)	%	2		

2.5. Quantitative Estimation of Ecocultural Bearing Capacity. UK urban agglomeration is set up and is selected as the index factor to form the index system of ecological and cultural carrying capacity of urban agglomeration.

First, the single-factor ecological and cultural carrying capacity of each index system is calculated. Indicators can be divided into two kinds: the bigger the value of positive indicators, the better the quality of ecological culture, the

higher the carrying capacity of ecological culture; the bigger the value of reverse indicators, the worse the quality of ecological culture, the lower the carrying capacity of ecological culture, and the calculation method of single-factor carrying capacity of positive indicators and reverse indicators [20].

The calculation method of the single-factor ecological and cultural carrying capacity of the positive index is shown in the following formula:

$$E_x = \frac{C_x}{C_{x0}} - 1. \quad (4)$$

The calculation method of the single-factor ecological and cultural carrying capacity of the reverse index is shown in the following formula:

$$E_x = 1 - \frac{C_x}{C_{x0}}. \quad (5)$$

In formulas (4) and (5), E_x is the single-factor ecological and cultural carrying capacity of a certain index, with positive and negative values. C_x is the measured value of the index, and C_{x0} is the standard value of the index.

At present, the commonly used method for calculating the ecological and cultural carrying capacity is the vector modulus method, as shown in formula:

$$E_k = \sqrt{\sum_{x=1}^q (w_x E_x)^2}. \quad (6)$$

In the formula, E_k is the carrying capacity of urban ecological culture, E_x is the single-factor carrying capacity of x index, and w_x is the weight of the index factor.

Relevant studies have found that there are some shortcomings in the aforementioned methods. The main manifestation is that when single-factor overload occurs, the method of calculating ecological and cultural carrying capacity by formula (6) will no longer be applicable. Because in the case of outstanding ecological problems, if the measured value C_x of a positive index is less than the standard value C_{x0} , or the measured value C_x of a reverse index is greater than the standard value C_{x0} , the single-factor ecological and cultural carrying capacity E_x of the index will appear negative, and the calculation of formula (6) is based on the square of the single-factor ecological and cultural carrying capacity E_x , that is, the square of the single-factor ecological and cultural carrying capacity E_x . There is no difference between the positive and negative of the single-factor ecological cultural carrying capacity E_x , which will lead to the deviation of the final calculation results from the actual situation [21].

For this reason, the vector model method is proposed to calculate the single-factor ecological and cultural carrying capacity E_x with positive and negative values respectively, and then the difference is taken to form the calculation model of ecological and cultural carrying capacity as shown in formula:

$$E_k = \sqrt{\sum_{i=1}^m (w_i E_i)^2} - \sqrt{\sum_{j=1}^n (w_j E_j)^2}. \quad (7)$$

In the formula, E_i is the single-factor ecological cultural carrying capacity with positive i value, w_i is the weight of the index factor. E_j is the single factor with negative j value, and w_j is the weight of the index factor. m is the positive index of single-factor ecological cultural carrying capacity, and n is the negative index of single factor ecological cultural carrying capacity, $m + n = q$.

If the UK urban agglomeration has set the future development goal of ecocultural protection, then when each index factor takes its target value, the ecocultural carrying capacity is the ideal value under this condition. The ideal value is determined by the method in the article 2.4 summary and expressed by $E_x \max$.

According to the actual value E_k and the ideal value $E_x \max$ of urban ecocultural carrying capacity in Britain, the strength P_k of urban ecocultural carrying capacity can be calculated. The method is shown in the following formula:

$$P_k = \frac{E_k}{E_k \max}. \quad (8)$$

Through the value of P_k , we can measure the degree of realization of ecological and cultural protection planning objectives. The lower the value of P_k , the greater the gap between the level of urban ecological and cultural quality and the planning objectives. The higher the P_k value is, the more the quality of urban ecological culture tends to the planning goal.

3. Results

The ecological and cultural carrying capacity of London urban agglomeration in British urban agglomeration is analyzed using the aforementioned description method. London urban agglomeration, formed in the 1970s, is the capital of Britain. It covers an area of 1577.3 km². It is situated on the plain of southeastern England. It crosses the Thames River, an important river of London urban agglomeration. It flows through six counties in southern England, eastward to London, across London, and more than 10 cities along the river. Therefore, the ecological and cultural carrying capacity of London urban agglomeration has an important impact on the ecological security of the whole British urban agglomeration.

3.1. Estimation of Ecocultural Bearing Capacity of Urban Agglomeration. According to the ecological and cultural characteristics and protection requirements of London urban agglomeration, this paper chooses three categories of indicators, totaling eight items, to quantitatively analyze the ecological and cultural carrying capacity of London urban agglomeration, including water ecological and cultural indicators (total nitrogen concentration, total phosphorus concentration of Thames River, and comprehensive pollution index of backbone rivers), and atmospheric hygiene.

Ecocultural indicators include annual average of sulfur dioxide, annual average of nitrogen dioxide, and annual average of inhalable particles; ecological and cultural indicators include regional environmental noise, and traffic trunk noise. The aforementioned indicators constitute the index system of ecological and cultural carrying capacity of London urban agglomeration.

According to the measured value C_x and standard value C_{x_0} of each index from 2013 to 2015, the single-factor ecological and cultural carrying capacity E_x of each index is calculated by formulas (4) and (5), as shown in Table 3.

After determining the weight value w_x of each index and the target value C_x min, the ecological and cultural carrying capacity E_k of London urban agglomeration and the ecological and cultural carrying capacity P_k of London urban agglomeration are obtained from formulas (7) and (8). The ideal value E_x max obtained in subsection 2.5 is added, and the results are shown in Table 4.

From the single-factor ecological and cultural carrying capacity values of the indicators in Table 3, it can be seen that the concentration of total nitrogen and total phosphorus in the Thames River is overloaded in terms of aquatic ecoculture, which indicates that the water pollution of the Thames River is serious, and the water quality of the backbone rivers is good. The quality of atmospheric ecoculture is high, and it is on the rise year by year. The quality of ecological culture has improved slightly, but it needs to be controlled. Therefore, in the future work of ecocultural protection, the London urban agglomeration should focus on the comprehensive management of the Thames River. On one hand, it should strengthen the regulation and supervision of the production and living behavior of the Riverside Area. On the other hand, it should actively take comprehensive measures such as water ecological restoration and microbial restoration to effectively improve the water quality.

From the value of ecological and cultural carrying capacity of London urban agglomeration in Table 4, the development of London urban agglomeration has been in the stage of ecological and cultural loading in recent years and gradually tends to the ideal value. This shows that the overall ecological and cultural quality of London urban agglomeration has been effectively controlled while the economic and social development has been brought into play. The ecological and cultural carrying capacity of urban agglomeration has increased year by year, but there is still a certain gap compared with the ideal goal. In the future, we need to further strengthen the protection of ecological culture, adjust and optimize the industrial structure, and realize the win-win situation of social, economic, and environmental benefits.

3.2. Analysis of the Bearing Situation of Social Subsystem.

In order to analyze the ecological and cultural carrying capacity of British urban agglomerations in detail, this paper uses the quantitative estimation method to calculate the ecological carrying capacity of London urban

agglomerations from the social, economic, and environmental perspectives.

The ecological and cultural carrying capacity of the social subsystem of London Urban Agglomeration from 2013 to 2015 is calculated by the quantitative estimation method in this paper. The results are shown in Table 5.

As shown in Table 5, the carrying capacity of London urban agglomeration in 2013 to 2015 is greater than 0, and increasing year by year. The actual ecological carrying capacity of each year is greater than the ideal carrying capacity, which indicates that the social subsystem of London urban agglomeration has been in an overload state from 2013 to 2015. The reason is that in the process of new-type urbanization in London, disposable income of urban residents, rapid growth of urban population, high density of urban population, excessive urban population base, although not high natural population growth rate, still make urban population growth rapidly, and Engel coefficient with the rapid development of the economy. With the rapid growth of new urbanization, the income gap between urban and rural areas becomes wider, which is also one of the important factors of unbalanced urban ecological carrying capacity.

3.3. Analysis of Bearing Situation of Economic Subsystem.

The ecological and cultural carrying capacity of the economic subsystem of London urban agglomeration from 2013 to 2015 is calculated by the quantitative estimation method in this paper. The results are shown in Table 6.

As shown in Table 6, the carrying capacity of London urban agglomeration in 2013 to 2015 is greater than 0, and the actual ecological carrying capacity in each year is less than the ideal carrying capacity, which indicates that the social subsystem of London urban agglomeration in 2013 to 2015 has been in the loading state. The ideal carrying capacity is the concept of ecological carrying capacity in a certain area, which is a specific ecological ecosystem in a certain period. Under the condition of ensuring the reasonable development and utilization of resources and the good circular development of ecological environment, the sustainable population number, economic intensity, and social aggregate carry the capacity. With the rapid development of economy and the further advancement of new urbanization, the per capita GDP shows an upward trend. The increase of the proportion of fixed assets investment and the total retail sales of consumer goods and the decrease of urban unemployment rate make the economic carrying capacity in a certain extent in a state of loading. However, from 2013 to 2015, the carrying capacity of the economic subsystem is very close to the ideal carrying capacity, and the economy is on the edge of being loadable and full. The reason is that the government pays too much attention to the economic growth and neglects the sustainable development of the economy, which leads to the imbalance of the industrial structure. The proportion of the tertiary industry in the whole industrial structure is too low. These problems cannot be taken seriously. Economic development will gradually develop towards full load and overload, which is

TABLE 3: Single-factor ecocultural bearing capacity of eight indicators of London urban agglomeration [12].

Project indicators	C_x			C_{xo}	E_x			w_x	$C_{x\min}$
	2013	2014	2015		2013	2014	2015		
Total nitrogen concentration in the Thames River (mg/l)	4.6	3.9	3.6	1.6	-2.01	-1.54	-1.34	0.06	1
Total phosphorus concentration in the Thames River (mg/l)	0.25	0.19	0.22	0.1	-1.41	-0.81	-1.11	0.06	0.06
Comprehensive pollution index of main rivers	0.86	0.82	0.77	2	0.59	0.61	0.62	0.31	1
Annual average of sulfur dioxide (mg/m^3)	0.062	0.054	0.033	0.07	-0.03	0.13	0.48	0.16	0.03
Annual average of nitrogen dioxide (mg/m^3)	0.047	0.044	0.05	0.09	0.44	0.47	0.51	0.16	0.05
Annual average of inhalable particles (mg/m^3)	0.094	0.088	0.073	0.1	0.07	0.14	0.29	0.11	0.05
Regional environmental noise (dB(A))	53.9	54.6	54.4	61	0.11	0.10	0.11	0.11	56
Traffic trunk noise (dB(A))	66.4	65.9	64.6	71	0.06	0.09	0.09	0.11	66

TABLE 4: Ecocultural bearing capacity and strength of London urban agglomeration over the years [12].

Index	E_k	$E_{k\max}$	P_k
2013	0.07	0.22	0.31
2014	0.12	0.22	0.53
2015	0.14	0.22	0.63

TABLE 5: Ecocultural bearing status of the social subsystem of London urban agglomeration.

Particular year	2013	2014	2015
Social development factors	0.8429	0.8809	0.9205
Human development factor	0.9440	0.9440	0.9755
Annual loading status	0.7862	0.7873	0.7887

TABLE 6: Ecocultural bearing status of the economic subsystem of London urban agglomeration [22].

Particular year	2013	2014	2015
Economic growth factor	0.8446	0.9025	0.9435
Industrial structure factors	0.8941	0.8837	0.8334
Annual loading status	0.6941	0.6945	0.6904

not conducive to the long-term development of London urban agglomeration. It is necessary to improve the carrying capacity of the economic system of urban agglomeration, adjust the industrial structure and promote the healthy development of urban agglomeration economy.

3.4. Analysis of Bearing State of Environmental Subsystem.

The ecological and cultural carrying capacity of the environmental subsystem of London urban agglomeration from 2013 to 2015 is calculated by the quantitative estimation method in this paper. The results are shown in Table 7.

As shown in Table 7, the carrying capacity of London urban agglomeration in 2013 to 2015 is greater than 0, and the actual ecological carrying capacity in each year is greater than the ideal carrying capacity, which indicates that the environmental subsystem of London urban agglomeration has been in an overload state from 2013 to 2015. From 2013 to 2015, the growth rate of green space area and road area of urban agglomeration per capita is far lower than that of urban agglomeration population. To

TABLE 7: Ecocultural bearing status of environmental subsystem of London urban agglomeration [22].

Particular year	2013	2014	2015
Urban environmental factors	0.9008	0.9175	0.9458
Environmental pollution factors	0.8631	0.6701	0.7611
Annual loading status	0.7722	0.7667	0.7713

some extent, the environmental problems of urban agglomeration have been alleviated by the improvement of sewage disposal capacity, harmless disposal rate of urban agglomeration garbage, and investment in environmental pollution control. However, the deep-rooted environmental problems of urban agglomerations cannot be alleviated in a short time. The governance of environmental problems of urban agglomerations needs long-term persistence and cannot be achieved overnight. We should implement the concept of sustainable development and the new urbanization plan in an all-round way, improve the environmental carrying capacity of urban agglomerations, and strive to build a green environment.

4. Discussion

As the ecocultural system of British urban agglomerations is a complex process, it is necessary to take into account multiple systems and levels in evaluating the ecocultural carrying capacity of British urban agglomerations. In order to better analyze the ecocultural carrying capacity of British urban agglomerations, a multi-index and multilevel system is established from the three subsystems of society, economy, and environment.

Through the calculation results of the ecological and cultural carrying capacity of urban agglomerations, the analysis results of the carrying capacity of social subsystems, the analysis results of the carrying capacity of economic subsystems and the analysis results of the carrying capacity of environmental subsystems, we can see the following:

- (1) In the period of 2013 to 2015, through the calculation of eight single-factor ecological and cultural carrying capacity values of London urban agglomeration and the ecological and cultural carrying capacity values of London urban agglomeration, we should strengthen the governance of the Thames River and further strengthen the ecological and cultural protection of

urban agglomeration, so as to shorten the gap with the ideal goal.

- (2) In the period of 2013 to 2015, although the load-carrying status of the social subsystem of London urban agglomeration fluctuates little, the actual load-carrying status of each year is greater than the ideal load-carrying capacity, and it has been in an overload state for 3 years. The reason is that the rapid development of new urbanization leads to the rapid increase of urban population. The population density is too large, and the gap between urban and rural areas increases the resistance to the improvement of the bearing capacity of social subsystems.
- (3) From 2013 to 2015, the economic subsystem of London urban agglomeration has been in a loading state, and the actual carrying capacity is less than the ideal carrying capacity. The reason is that with the further advancement and standardization of new urbanization, the whole economy is in a new growth situation, and GDP is growing rapidly. However, in the past 3 years, the carrying capacity of the economic subsystem is very close to the ideal carrying capacity. The economy of the whole London urban agglomeration is at the edge of being loadable and full-loaded. The reason is that the government pays too much attention to the economic growth and neglects the sustainable development of the economy, which leads to the imbalance of industrial structure and the lack of favorable support for the economic development.
- (4) From 2013 to 2015, the carrying capacity of the environmental subsystem of London urban agglomeration has been slightly greater than the ideal carrying capacity, and it is in an overload state. The reason is that the development speed of urban agglomeration exceeds the ideal state, resulting in a series of environmental problems. Although the government has invested a lot of energy in environmental pollution control, the ecological environment of the city has not been effectively improved.

5. Conclusion

Aiming at the imbalance of urban ecological carrying capacity, a method to evaluate the ecological and cultural carrying capacity of British urban agglomeration is proposed. Based on the three subsystems of society, economy, and environment, this paper constructs a multi-index and multilevel structural system, uses the vector model method to calculate the ecological and cultural carrying capacity of British urban agglomeration, and calculates the strength of ecological and cultural strength. The ideal value of carrying capacity based on the index and the actual value of ecological and cultural carrying capacity are obtained. This paper empirically analyzes the ecological and cultural carrying capacity of London urban agglomeration from 2013 to 2015.

The experimental results show that the proposed method can effectively estimate the ecological and cultural carrying capacity of British urban agglomeration and provide reliable theoretical support and reference for the development of British urban agglomeration.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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