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Traditional Trajectory of Nature Conservation Environment Based on Cloud Collaboration

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Abstract: As the process of urbanization becomes more and more rapid, cities become more and more important as carriers relying on human habitation, and people's aspiration for a better life becomes stronger and stronger. Therefore, people are also more in pursuit of the improvement of urban ecological environment(EE) quality. This paper takes the sustainable development(SD) of urban EE as an example and analyzes the SD of economic environment, EE and social environment of city A by combining the framework of cloud-based collaborative network and remote sensing technology, studies the development trajectory of environmental protection in city A from 2015 to 2021, and proposes the EE protection strategy of city A to provide reference suggestions for building a beautiful city.

1. Introduction

Cities are the crystallization of human civilization, representing both the advanced and developmental achievements of human civilization, and also converging the negative and destructive faults in the process of human development, and thus are the focus of building ecological civilization. In order to realize the SD strategy and build a harmonious society, we should pay more attention to the SD of cities and not sacrifice the future interests for the sake of today's prosperity.

Although the domestic research on urban EE is relatively late compared with foreign countries, scholars have made remarkable achievements in the study of related theories. Some scholars have carried out in-depth analysis on the evaluation indexes of the sustainability of urban EE and constructed an evaluation index system, which provides a strong scientific basis for the SD of cities [1]; some scholars have carried out an analysis of different types of cities for An overview of urban transformation analysis, which has greatly promoted the transformation and development of related type cities [2]. In the process of urban development, we have not dealt with the relationship between

development and environment, thus leaving a series of problems that need to be treated. Some cities in China still have not gotten rid of the old way of pollution first and then governance, wasting precious resources and exchanging a huge cost for equal or even devalued development, which is more than worth the loss [3, 4]. Although there are more researches on this aspect, due to our late research on urban EE, many scholars' researches focus more on theoretical studies, while theoretical and practical researches have not yet formed a boom.

This paper first introduces the network framework based on cloud collaboration and elaborates on the mobile devices and cloud servers of this architecture, then propose the concept and calculation formula of urban EE quality evaluation index, then analyze the environmental sustainability of city A, and finally propose suggestions to improve the environmental quality of city A according to the environmental condition of city A.

2. Basic Overview

2.1. A Personalized Network Framework Based on Cloud Collaboration

The architecture consists of two layers:mobile devices and cloud servers.

(1) Cloud server

Cloud servers are usually AliCloud servers, Amazon WebService cloud servers, Microsoft Azure cloud servers and Google Cloud servers [5]. Since cloud servers have abundant computational and storage resources, usually its responsible for computationally intensive tasks, such as training complex models. In the framework proposed in this paper, cloud servers train CLOUD-T using publicly available large datasets without user privacy data uploading to the cloud [6].

(2) Mobile devices

Mobile devices are certain smart devices with limited computing and storage resources, such as smartphones, smartwatches, personal PCs, etc. With the current development of mobile devices, they can provide services to users with certain computing power, such as image classification with certain accuracy tolerance, object detection, and other services. Using mobile devices to receive the CLOUD-T sent down to them, and based on the information distilled from the CLOUD-T, the data on the device is used to train a model SD suitable for making inferences and providing services on mobile devices [7, 8]. Due to the small size of the models deployed on mobile devices, the mobile devices are in a charged and idle state for more than 2.7 hours per day. Therefore we can train offline in such a state using existing data with little user perception and without affecting the user experience [9, 10].

2.2. Urban EE Quality Evaluation

(1) Urban functional mix index

The urban function mix index is an important issue studied in the current urban development. Many successful practices and theoretical supports from home and abroad show that the more kinds of urban facilities in a certain area, the more complex the urban function is, and the higher the mix is [11]. With the advent of the Internet era, ubiquitous big data mining has greater advantages than the traditional urban function mix index measurement, and POI points, as a kind of crowd-sourced data, are characterized by detailed data, precise location information, and strong realism, and its spatial location and attribute information are natural advantages for measuring urban function mix index [12, 13].

The main method used in the calculation of the urban functional mix index is information entropy. Information entropy is a measure of how much information is available, and the size of information is related to the random probability of its occurrence; the smaller the information the

greater the amount of information generated after the event occurs, and vice versa [14]. And information entropy is an expectation of the amount of information generated after the information occurs before it occurs. It is usually used to measure the complexity of a system. If the more complex the situation in a system, the more situations in which various amounts of information occur, the greater its information entropy, while if a system is more homogeneous and simple, fewer situations will occur and the information entropy will be less [15, 16]. Expressed in the equation then as :

$$D_{(X)} = -\sum_{i=1}^{n} p(\chi_i) \log(p(\chi_i)) \tag{1}$$

Where, H(x) is the information entropy p(xi) is the probability that event xi occurs.

(2) Remote sensing ecological index (RSEI)

RSEI is the most commonly used remote sensing analysis tool to evaluate the EE. Human activities as an important factor affecting the urban EE can be demonstrated by means of remote sensing image analysis [17]. The advantage of remote sensing satellite images as a detection means to capture different reflection bands of the ground cover is that they can be observed for a long time, over a large area, periodically and at a high speed [18].

Through remote sensing information processing technology, the information we need can be extracted from the complex and complicated waveband information. The expression of remote sensing ecological index is :

$$RSEI = f(NVDI, Wet, LST, NDBSI) \tag{2}$$

Among them, NDVI as vegetation index indicates the greenness component, Wet indicates the moisture component, LST indicates the surface temperature component, and NDBSI as impervious surface and surface bare soil index indicates the dryness component.

3. Environmental Sustainability Trajectory of City A Based on Cloud Collaboration

The cloud-based collaborative network framework combined with remote sensing technology collects the ecological and environmental conditions of city A. It is used to analyze the SD trajectory of ecological, economic and social environments in city A from 2015-2021.

3.1. SD of EE

From the graph 1 of the composite index curve of the SD capacity of the EE of city A, we can divide the SD status of city A in recent years into two stages.

The first stage (2015-2018): the comprehensive index of ecological and environmental sustainability of city A has steadily increased, from 0.86 in 2015 to 1.11 in 2018; among them, the natural environment index and social environment index show a gradual increment, and the economic environment index has even improved significantly.

The second stage (2019-2021): the comprehensive index of environmental sustainability of City A has decreased significantly compared with 2017 and 2018, from 1.17 in 2017 to 0.84 in 2021; among them, the social environment index has increased steadily, the natural environment index has fluctuated slightly, and the economic environment index has decreased significantly.

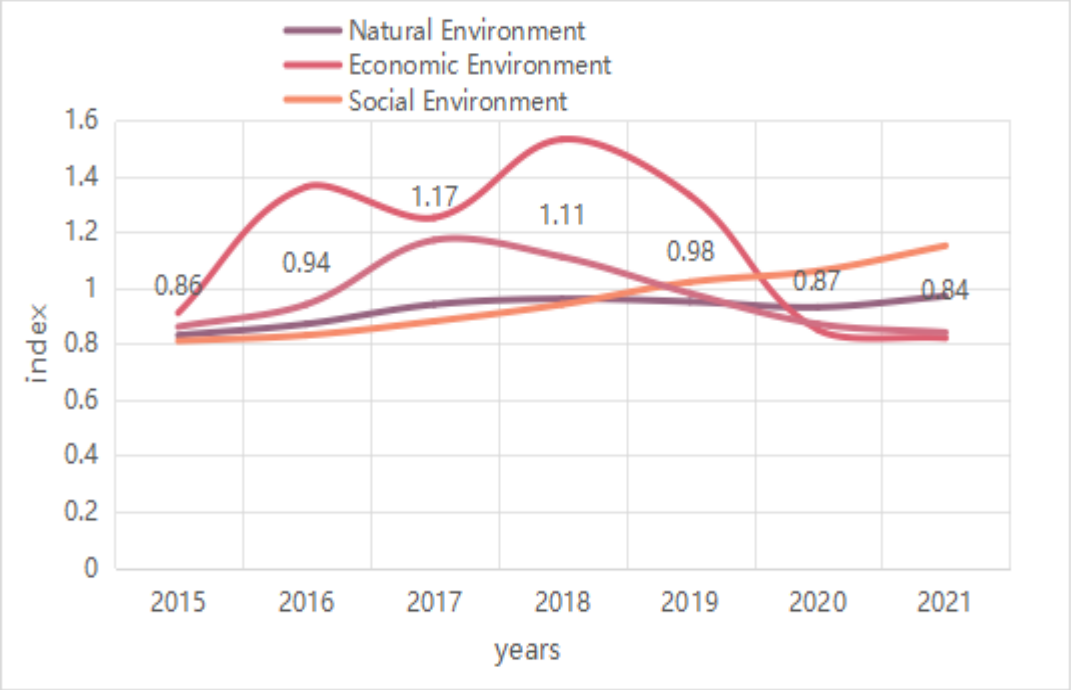

Figure 1. Ecological and environmental sustainability index

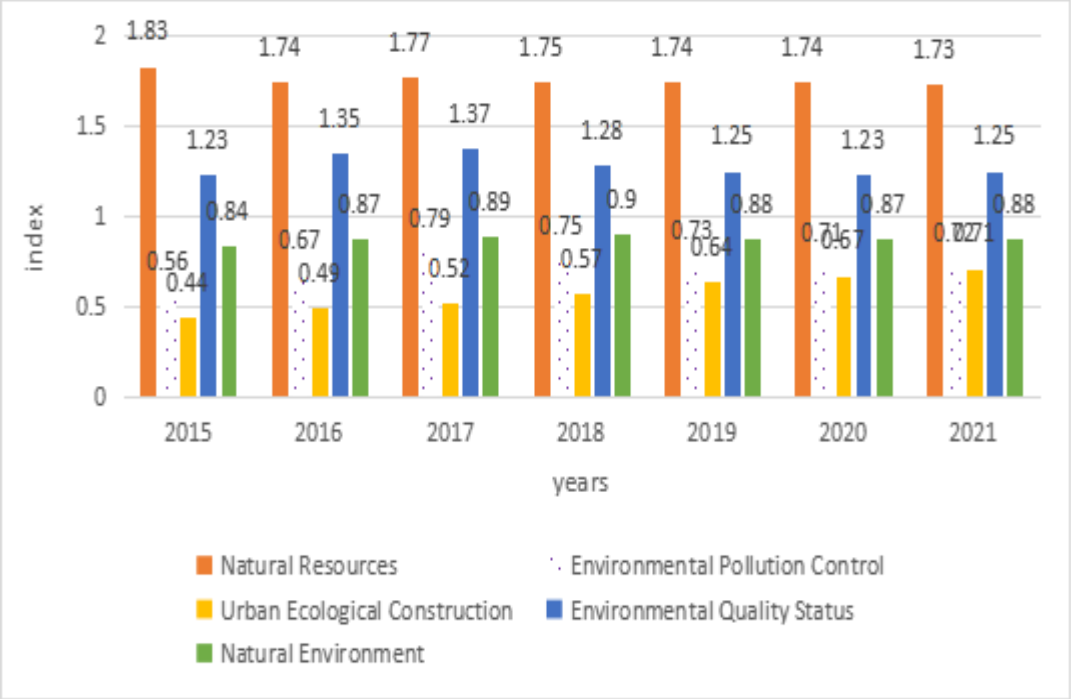

Figure 2. Natural environment sustainability index

From Figure 2 of the natural environment sustainability index curve, Shuozhou's urban natural environment sustainability has been maintained at a high level and has got a small increase in recent years. The urban ecological construction index has increased significantly, the environmental pollution control index has fluctuated, and the environmental quality condition index has decreased slightly, but is still at a high level.

3.2. SD of Economic Environment

Table 1. Economic environmental sustainability index

	Level of sustained economic development	Economic efficiency indicators	Economic Structure Indicators	Economic Environment
2015	0.83	1.34	0.86	0.91
2016	1.46	1.29	0.87	1.35
2017	1.94	1.38	0.85	1.57
2018	1.58	1.25	0.96	1.31
2019	1.16	1.14	0.87	1.12
2020	0.97	1.05	0.84	1.08
2021	0.88	0.91	0.93	1.03

From the economic environmental sustainability index in Table 1, the economic environmental sustainability of City A has fluctuated significantly in recent years, with 2015 being the lowest level in the past seven years. Among them, the economic sustainability level index grew from 0.83 in 2015 to 1.94 in 2017 and then dropped to 0.88 in 2021; the economic efficiency index also showed a notable decline; only the economic structure index had a small increase in 2021.

Supply-side structural reform, as a major development strategy to adapt to and lead the new normal, is also an inevitable requirement to adapt to the new normal of China's economic development. 2021 since City A vigorously promote economic structural reform, fully understand the significance of promoting supply-side reform, take the initiative, take a series of measures, and introduce supporting policies to promote supply-side structural reform, the economic structure has been continuously optimized.

3.3. Socio-Environmental Sustainability

Table 2. Socio-environmental sustainability index

	Quality of life level	Population Development and Urbanization	Infrastructure Indicators	Social Environment
2015	0.69	1.17	1.14	0.87
2016	0.81	1.03	1.19	0.92
2017	0.93	1.08	1.36	1.06
2018	1.12	1.02	1.54	1.13
2019	1.21	1.04	1.48	1.25
2020	1.28	1.01	1.42	1.29
2021	1.35	0.99	1.37	1.30

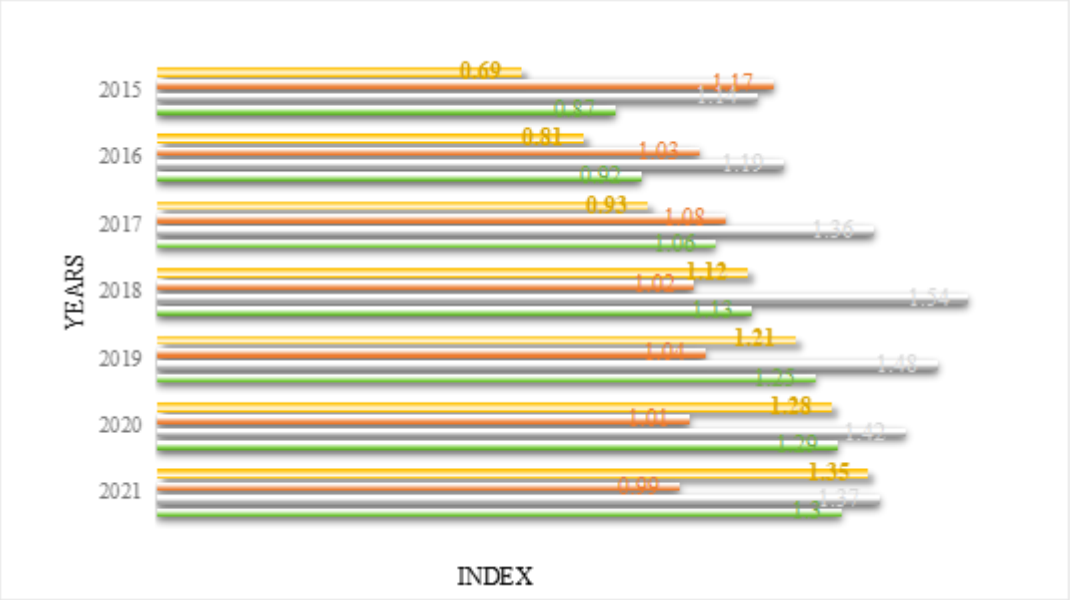

Figure 3. Comprehensive social sustainability index

From the socio-environmental sustainability index in Table 2 and Figure 3, the socio-environmental sustainability in City A has been increasing in recent years, with the index increasing from 0.87 in 2015 to 1.30 in 2021. among them, the quality of life level and infrastructure indicators have been improved substantially; the population development and urbanization index fluctuates slightly, but has been at a high level. The economic environment does not have a large impact on the sustainability of the social environment.

4. Suggestions for Improving the Quality of Urban EE

4.1. Emission Reduction of Enterprise Pollution

Popularize environmental management and clean production, improve the technical standards of industry and commerce in City A, popularize environmental management systems, implement clean production processes, reduce energy consumption and pollutant emissions per unit of output value in industrial enterprises, and strictly implement guidelines and regulations for pollutant emissions in enterprises. Optimize and promote the subsidy mechanism for business enterprises' environmental protection work, improve the mechanism of environmental protection and energy saving fund, and enhance the role of this fund in promoting business enterprises to carry out different aspects such as energy saving, water saving and reducing air pollutant emissions.

4.2. Build a Low-Carbon Production and Consumption System

Promote green living patterns and raise public awareness of environmental protection. Strengthen education on water conservation through the development of school education in primary and secondary schools and environmental protection awareness programs for different segments of society, while also promoting environmental protection efforts such as energy conservation and emission reduction, focusing on waste separation and disposal, and advocating green products, thereby deepening the public's sense of responsibility for caring for the environment. Develop the environmental protection industry, keep abreast of the development of the international environmental protection industry, and introduce and apply the latest international environmental

protection technologies and concepts by organizing various international environmental protection cooperation exhibitions and conferences, so as to improve the environmental protection management level of local industries.

4.3. Increase Green Technology Innovation

In order to provide stronger policy support for green innovation, the government needs to increase investment in green science and technology innovation to improve the country's green innovation capacity as a whole. At the same time, the government needs to establish a sound system to improve the efficiency of technology research and development. In this regard, the government can establish a development model that combines government, industry, academia and research and a public-private partnership model, especially the need to integrate the strengths of research institutions, enterprises and the market, so as to take coordinated and powerful actions to improve the overall innovation capacity of enterprises and promote the rapid development of strategic emerging enterprises. First, it is necessary to strengthen research and deepen the reform of the institutional mechanism of public interest research institutions, which includes the reform of the budget, personnel and other aspects of the supporting system, in order to promote the rational allocation of resources and improve the utilization rate of resources. Secondly, we need to step up the implementation of science and technology special projects to promote green development, which requires coordination and coordination of energy conservation, environmental protection, low-carbon economy and other aspects, and launch various special research projects according to the roadmap of green development. At the same time, it is also necessary to step up the construction of commercialization demonstration projects and try to attract more enterprises' participation. Finally, in terms of low-carbon technology research and development, there is a need to focus on arranging individual R&D technologies and vigorously develop low-carbon technology systems, etc.

4.4. Strengthen Environmental Protection Publicity and Education

Humans are the direct influencers of the EE, and their lifestyles and concepts are an important part of the SD of the urban EE. It is important to popularize environmental protection knowledge through a combination of traditional media (TV, radio, newspapers, etc.) and new media, so that the public can understand the national guidelines, policies and laws and regulations on ecological and environmental protection, etc., to improve environmental awareness, the concept of the legal system, and to stimulate the public to consciously carry out environmental protection, green consumption and low-carbon travel. Social organizations based on practical, public welfare lectures and experience activities, so that the public experience low-carbon life, reduce the waste and consumption of resources, the formation of material civilization, spiritual civilization combined with the new civilization of the city; improve the mechanism, so that the public for the SD of the city suggestions and suggestions, establish a sense of ownership, and build a beautiful city.

5. Conclusion

Urban EE is the most easily neglected and most important issue in urban development, and it is an important factor in creating a bright and shiny name card of the city and improving the comfort of human living. Therefore, improving the quality of urban EE is directly related to the reputation of the whole city and the happiness of the residents. At present, the significance given by urban EE to the city is being aggravated, and the residents value the quality of living environment and ecological quality more than the development of economy. In the protection and development of urban EE,

more attention is paid to the integrity of the urban system, so that the natural EE and human activities are organically combined, and the ecological concept design is integrated into human clothing, food, housing and transportation. The urban structure is complex and different cities face different problems, so we cannot generalize and consider multi-function in a comprehensive manner. Comprehensive urban development planning should start from multiple perspectives and dimensions to ensure the improvement of urban EE quality and the deepening of ecological concepts while meeting the needs of urban economic development.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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