Scholar Publishing Group
Nature Environmental Protection
https://doi.org/10.38007/NEP.2022.030302
ISSN 2790-2684 Vol. 3, Issue 3: 9-17

Urban and Rural Natural Environment Protection Policies under Big Data

Jiwei Zhang*

Gansu Industry Polytechnic College, Gansu, China
635479027@qq.com
**corresponding author*

Keywords: Big Data Technology, Urban and Rural Environment, Environmental Protection, Policy Analysis

Abstract: As the country attaches great importance to environmental protection and sustainable development in recent years, and people aspire to a better living environment with green mountains and water, it has become an important and urgent task to restore green mountains and water and accelerate the process of ecological construction through environmental management, which is also a basic principle that must be adhered to in order to implement the national policy of environmental protection in China. The aim of this paper is to study urban and rural natural environment protection policies in the context of big data. The paper discusses the definition of big data theory and urban and rural environment, constructs an evaluation system for the implementation of urban and rural natural environmental protection policies, and conducts an empirical study using District M as an example, concluding that the reasons for the ineffective implementation of policies in District M are complex and diverse, mainly including the policy quality of environmental protection policies needs to be improved and the implementation environment is unsatisfactory.

1. Introduction

Transforming poor mountains into green mountains through ecological environment management is the main theme of China's implementation of the harmonious development of man and nature [1, 2]. In the process of urban and rural environmental management, we must recognize that urban environment and rural environment are not separate and mutually supportive, but are an organic whole, so as to scientifically formulate a comprehensive management plan, using the

synergy of sewage treatment sub-project, safe drinking water sub-project, urban and rural waste transportation and collection sub-project, water environment comprehensive improvement sub-project, major pollution source management sub-project and intelligent water monitoring system sub-project, to purify and beautify the living environment In this way, the urban and rural environmental management model can be changed and innovative[3, 4].

Oluwasegun Taiwo Ojo briefly introduces the current status of the natural forest resource protection project in Haikou Forestry in Kunming in terms of forest resource protection, forest fire prevention, forest management resources, forest pests and financial management. The achievements of the Haikou forestry field in implementing the natural forest protection project are analysed, and the problems in the project and the corresponding countermeasures are described [5]. Green mine construction and ecological environmental protection is a systematic and powerful project that requires consideration of various factors and the impact of different regions in order to make reasonable and scientific decisions and measures, and the emergence of big data provides good technical conditions for this purpose.Konstantinos V. Katsikopoulos explores the green mine construction methods based on big data visualisation and the The use of eco-friendly measures in the era of data provides a theoretical basis for the green development of mines [6]. It is of high theoretical significance to analyse the evaluation model of the implementation of urban and rural natural environment protection policies.

This paper examines a large amount of theoretical information on the evaluation of urban and rural natural environmental protection policies, including development prospects and existing theories. The quantitative methods provided in the policy guidelines are reasonably questioned in the hope of improving the accuracy of quantitative evaluation of value for money from the perspective of refined risk quantification and shared analysis and calculation. On the basis of this research, the quantitative parameters related to the implementation of urban and rural natural environment protection policies are redefined through the derivation of formulas, and a more relevant and applicable measurement method is obtained.

2. A Study of Urban and Rural Nature Conservation Policies under Big Data

2.1. Big Data Theory

The theoretical basis of big data is derived from the intersection of three disciplines: statistics on the one hand, computer science on the other hand, and last but not least, the knowledge of related disciplines in the field of big data applications, such as medical, environmental protection, finance, Internet and so on [7, 8]. Computer technology is only a tool for Big Data applications, statistics is the soul of Big Data applications, and the disciplines related to Big Data applications are the practical focus of Big Data applications [9].

At the level of statistics, the most basic is the data sample, and now it is generally popular that big data is equal to the full set of data, that is, the overall data, if the overall data, then we can find the overall distribution, however, in reality, the overall data is difficult to get, statistics is to use the sample distribution to speculate the overall distribution, so big data is not the absolute overall data, but compared to the original The data obtained from big data are diverse and complex, some are obtained actively and purposefully, some are obtained randomly, some are equivalent to random sampling in probability theory, and some are not, so it seems that big data do not fully comply with some ideas of statistics, so the theoretical basis is not yet mature [10, 11].

Another theoretical basis for the application of big data in the field of environmental governance is the theoretical basis of the environmental discipline, which combines the current disciplinary attributes, research status and characteristics of the environmental discipline with big data.

applications [12, 13].

2.2. Urban and Rural Environment

The urban and rural environment refers to the urban and rural appearance, as well as urban and rural environmental health [14, 15]. It includes the appearance of public activity areas within the visible range of urban and rural areas, along the main roads in urban and rural areas, urban farmers' markets, township streets and bazaars, and planned houses in rural areas. Environmental sanitation, mainly refers to the environmental sanitation in urban and rural areas, including the environmental tidiness of central urban areas, townships, urban villages, suburban areas and rural areas, the comprehensive use of urban rubbish, faeces and other household waste, and the planning and construction of urban environmental sanitation facilities [16, 17].

2.3. Evaluation System for the Implementation of Urban and Rural Natural Environment Protection Policies

(1) Policy quality

The quality of the policy is the fundamental premise for the achievement of policy objectives. If the policy is formulated correctly, reasonably and perfectly, the policy implementation can achieve twice the result with half the effort, and vice versa [18]. The indicators selected in the dimension of the quality of the policy itself include: policy legitimacy, policy feasibility, and the perfection of supporting policies three specific dimensions.

(2) Implementation environment support

For the implementation of urban and rural natural environment protection policies, the implementation environment includes not only the political, economic and social environment, but also the natural environment. In areas with a good implementation environment, the local government will be able to implement environmental protection policies more vigorously, while in areas with a poor natural environment and backward economic development, they will struggle. The indicators chosen for the implementation environment include: the natural environment, the economic environment and the cultural environment.

(3) Policy implementation degree

Although the process is important, more people only pay attention to the final outcome of the policy. Although this idea needs to be changed, the process of policy implementation is also about achieving better policy outcomes and obtaining longer-term policy outcomes. Furthermore, at the end of any policy implementation, there is a need to evaluate the effectiveness of the policy and its implementation. The indicators we have set for the degree of policy achievement include: the degree of achievement of policy objectives, the degree of effectiveness of policy objectives, the degree of cost-effectiveness, and the degree of satisfaction of residents.

3. Survey and Research on Urban and Rural Nature Conservation Policies under Big Data

3.1. The Current Situation of Urban and Rural Environment Comprehensive Improvement Management in M District

M District has set up a leading group for comprehensive urban and rural environment improvement with the main leader of the new district and the main leaders of all relevant functional departments and groups as members. The leading group has set up an office, which is located in the new district Urban and Rural Construction and Transportation Bureau (formerly Urban and Rural Coordinating Bureau), and is specifically responsible for handling the daily affairs of

comprehensive urban and rural environment improvement in the new district, coordinating with the provincial remediation office and the member units of comprehensive urban and rural environment improvement in the new district to implement the remediation requirements. The leadership group holds regular meetings every quarter. The leading group holds regular meetings every quarter to study and deploy the comprehensive urban and rural environment improvement work in the new area, and supervise and coordinate the implementation of the provincial urban and rural environment improvement and the relevant work requirements of Ganjiang New Area. In accordance with the requirements of the province and the New Area, each group has set up an organisation, a person in charge of the improvement and a liaison officer, and set up a WeChat group to coordinate the improvement of the urban and rural environment at the group level, the township level and the village (community) level.

3.2. Data Processing Methods and Steps

A total of 262 paper questionnaires were distributed to civil servants, citizens and employees of enterprises and institutions in this survey in District M. 244 questionnaires were returned, with 240 valid questionnaires.

The data processing methods and steps adopted in this study are as follows: First, the scores of the three-level indicators C1, C2, C3...C10 were calculated. The questionnaires were numbered, with the first questionnaire having C1 indicator number C11, the second questionnaire having C1 indicator C12, and the nth questionnaire having C1 indicator C1n. The final C1 score was the sum of the C1 scores of all questionnaires divided by the total number of questionn. The formula was:

$$C1 = C11 + C12 + C13 + ... + C1n / n \tag{1}$$

Then the values of C2, C3, C4...Cn can also be obtained by this calculation.

Next, the scores of the secondary indicators are calculated from the scores of the tertiary indicators. It should be noted that the score of the second level indicator is calculated by multiplying the C1n of each third level indicator by the weight W of each third level indicator, and then adding up the scores. The final sum of the scores is the score of the second level indicator. Take the second level indicator B1 as an example, its calculation formula is:

$$B1 = C1W * C1 + C2W * C2 + C3W * C \tag{2}$$

The scores of the other secondary indicators B2, B3, B4 and B5 were also derived from this method.

Finally, the scores of the second level indicators B1, B2, B3, B4 and B5 were used to calculate the total score of the first level indicator on the implementation of local government environmental protection policies. This is calculated by multiplying the secondary indicators by the weight of each secondary indicator and summing them together to obtain the final score. The calculation formula is:

$$A = B1W * B1 + B2W * B2 + B3W * B3 + B4W * B4 + B5W * B5 \tag{3}$$

The scores calculated from the above steps and the analysis of the indicators allow for a relatively accurate evaluation of a local government's ability to implement urban and rural nature conservation policies.

4. Analysis and Research of Urban and Rural Nature Conservation Policies under Big Data

4.1. Evaluation of the Implementation of Urban and Rural Natural Environment Protection Policies by Local Governments in Region M

Firstly, the scores of each indicator at three levels were calculated using EXCEL2016, and the scores of each indicator are as follows:

The scores of each three-level indicator under Policy Quality B1 are shown in Table 1.

Table 1. Scores of three level indicators under policy quality B1

Third level indicators	Weight	Average	Score
Rationality and legitimacy of policies C1	0.628	2.167	1.582
Policy feasibility C2	0.314	3.018	0.217
Perfection of supporting policies C3	0.124	3.018	0.317

The scores for each of the three levels of indicators under Implementation Environment Support Level B4 are shown in Figure 1.

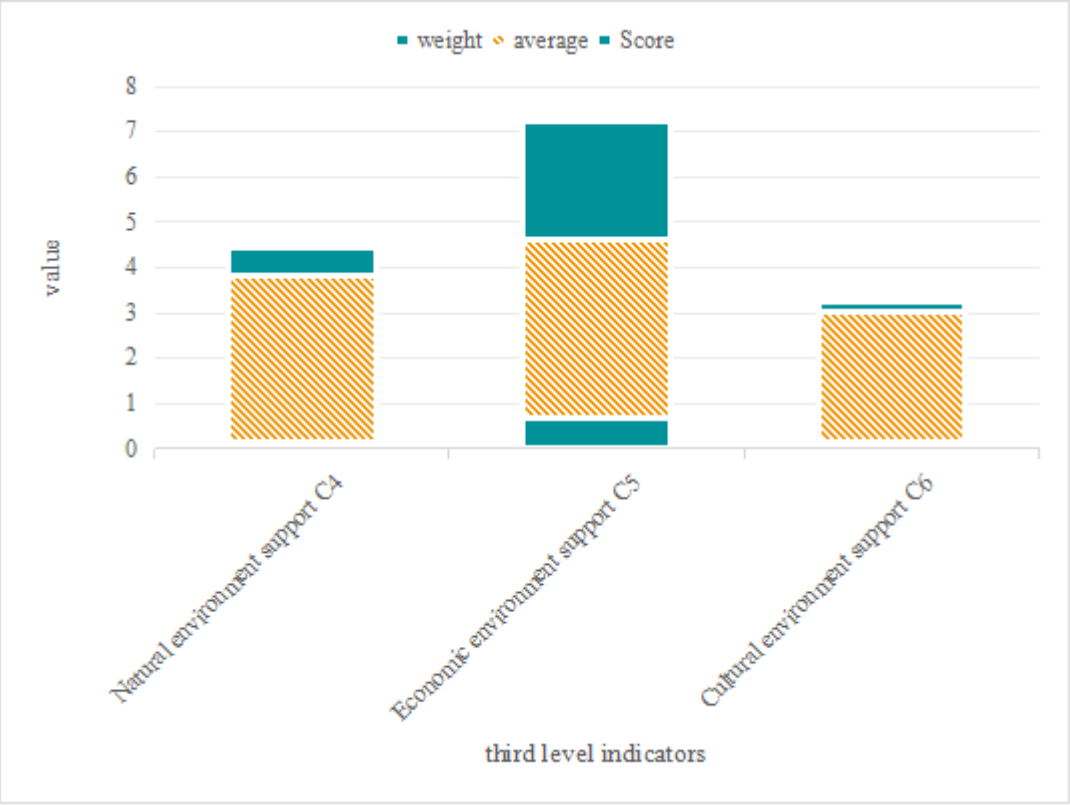

Figure 1. Scores of three level indicators under implementation environment support B4

The scores for each of the three levels of indicators under Policy Attainment Level B5 are shown in Table 2 and Figure 2.

Table 2. Scores of policy realization

Third level indicators	Weight	Average	Score
Goal achievement C7	0.177	3.080	0.715
Timeliness of target realization C8	0.106	2.064	0.164
Cost effectiveness C9	0.188	3.106	0.740
Residents' satisfaction C10	0.208	3.064	1.604

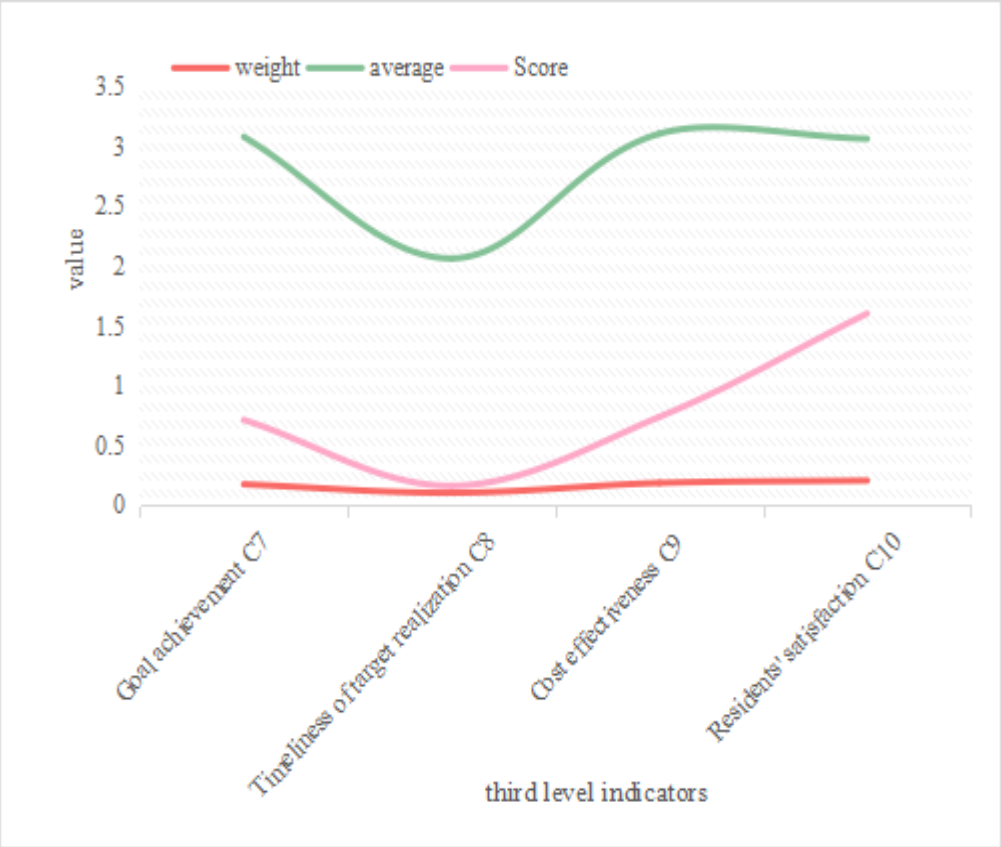

Figure 2. Scores of three level indicators under policy achievement B5

The above are the scores for all three levels of indicators, and the scores for each secondary indicator and the overall objective A are calculated below:

The scores for each Tier 2 indicator and the overall objective are shown in Table 3.

The standard value of the evaluation index system established in this paper is 5 points, and each question in the questionnaire has five scores of 1, 2, 3, 4 and 5, that is, the full score of each index is multiplied by the weight, and the final score of each index is added up to 5 points. After calculating, the score of the implementation of urban and rural natural environment protection policy of the local government in District M is 3.0718. Combined with the information from the government's public data and relevant media reports, this study believes that this score is more in line with the implementation of urban and rural natural environment protection policy of the local government in District M. It has a certain level of implementation of environmental protection policy, but there is still much room for improvement.

Table 3. All secondary indicators and total target scores

Secondary indicators	Weight	Level III indicators	Score	Total target A score
Policy quality B1	0.325	3.421	0.739	2.862
Executive capacity B2	0.552	3.099	0.907	
Implementation resource support B3	0.467	3.621	0.432	
Support degree of execution environment B4	0.148	2.081	0.413	
Policy realization degree B5	0.684	3.112	0.637	

4.2. Analysis of the Results of the Evaluation of the Implementation of Urban and Rural Environmental Protection Policies of Local Governments in District M

After evaluating the implementation of the local government's urban and rural natural environment protection policies in District M, the score for District M is 2.862, which is an average score out of 5. The score for District M is fair, considering the poor support of the implementation environment in District M. If the economic and natural environments in M were better, it would be more beneficial to the implementation of environmental protection policies. However, there are many problems that need to be noted, such as the need to improve communication and coordination, the poor timeliness of policy implementation, the lack of complementary policies and the lack of training for implementation staff. Although the environmental protection department in M is not yet strong enough, it is important to recognise the difficulties faced by M and to look at it with a more understanding and tolerant attitude, as nothing can be achieved overnight, and environmental protection is not something that can be done overnight either.

5.Conclusion

With the continuous development of China's economy and social progress, the development gap between urban and rural areas has been narrowed, and China's urban and rural environmental management has achieved certain results. However, it is undeniable that even though certain achievements have been made, the current environmental situation in China's rural areas is still not optimistic, and the environmental gap between urban areas is large. In the following research, we can model the dynamic process of the deepening application of big data, construct the gradual transformation process of clean technology and polluting technology, further explain the conversion mechanism of polluting technology to clean technology driven by big data, and build a more perfect theoretical system of the influence of big data on environmental policy.

Funding

This article is not supported by any foundation.

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.

References

[1] *Tobias E, Martin P, Doreen T. Automation of Maritime Shipping for More Safety and Environmental Protection. Autom. (2022) 70(5): 406-410. https://doi.org/10.1515/auto-2022-0003*

[2] *Eleni S. A, Evangelos N. G, Konstantina S. Nikita. A Safety System for Human Radiation Protection and Guidance in Extreme Environmental Conditions. IEEE Syst. J. (2020) 14(1): 1384-1394. https://doi.org/10.1109/JSYST.2019.2920135*

[3] *Sivachandran V, Malleswaran M. Performance Analysis of Energy-Efficient Cellular Networking on Urban and Rural Environments. Wirel. Pers. Commun. (2018) 103(4): 3113-3126. https://doi.org/10.1007/s11277-018-5997-6*

[4] *Waleed A, Saleh A. Big Data Analytics: Deep Content-Based Prediction with Sampling Perspective. Comput. Syst. Sci. Eng. (2023) 45(1): 531-544. https://doi.org/10.32604/csse.2023.021548*

[5] *Oluwasegun T O, Antonio F A, Rosa E. Lillo, C S. Detecting and Classifying Outliers in Big Functional Data. Adv. Data Anal. Classif. (2022) 16(3): 725-760. https://doi.org/10.1007/s11634-021-00460-9*

[6] *Konstantinos V. Katsikopoulos, M C. Canellas. Decoding Human Behavior with Big Data? Critical, Constructive Input from the Decision Sciences. AI Mag. (2022) 43(1): 126-138. https://doi.org/10.1609/aimag.v43i1.7381*

[7] *Raúl E. Cybersyn, Big Data, Variety Engineering and Governance. AI Soc. (2022) 37(3): 1163-1177. https://doi.org/10.1007/s00146-021-01348-0*

[8] *Marion M. The future of urban models in the Big Data and AI era: a bibliometric analysis (2000-2019). AI Soc. (2022) 37(1): 177-194. https://doi.org/10.1007/s00146-021-01166-4*

[9] *Adrian B, Acela T G, Rosa M C C. Real-Time Big Data Architecture for Processing Cryptocurrency and Social Media Data: A Clustering Approach Based on k-Means. Algorithms (2022) 15(5): 140. https://doi.org/10.3390/a15050140*

[10] *Clarisse D, Laetitia J. Metaheuristics for Data Mining: Survey and Opportunities for Big Data. Ann. Oper. Res. (2022) 314(1): 117-140. https://doi.org/10.1007/s10479-021-04496-0*

[11] *Varun M, Florian K, Jan N K, Elgar F, Tobias K, David K. Detecting Receptivity for mHealth Interventions in the Natural Environment. Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. (2021) 5(2): 74:1-74:24. https://doi.org/10.1145/3463492*

[12] *Laura A, Ruochen L, Rajiv K, Hejamadi R R. Effects of Structural and Trait Competitiveness Stimulated by Points and Leaderboards on User Engagement and Performance Growth: A Natural Experiment with Gamification in an Informal Learning Environment. Eur. J. Inf. Syst. (2020) 29(6): 704-730. https://doi.org/10.1080/0960085X.2020.1808540*

[13] *Ali A, Roger S C, Roozbeh J, Bobak J M. Using Intelligent Personal Annotations to Improve Human Activity Recognition for Movements in Natural Environments. IEEE J. Biomed. Health Informatics (2020) 24(9): 2639-2650. https://doi.org/10.1109/JBHI.2020.2966151*

[14] *Gábor K, Yasuharu K, Takao M, Hideki H. Saliency and Spatial Information-Based Landmark Selection for Mobile Robot Navigation in Natural Environments. Adv. Robotics (2019) 33(10): 520-535. https://doi.org/10.1080/01691864.2019.1602564*

[15] Alice C, Andrea G: When Virtual Feels Real. Comparing Emotional Responses and Presence in Virtual and Natural Environments. Cyberpsychology Behav. Soc. Netw. (2019) 22(3): 220-226. https://doi.org/10.1089/cyber.2018.0393

[16] Dina K, Suzan A, Birsen D, Martina R, Joyita C. Using Naturalistic Vehicle-Based Data to Predict Distraction and Environmental Demand. Int. J. Mob. Hum. Comput. Interact. (2019) 11(3): 59-70. https://doi.org/10.4018/IJMHCI.2019070104

[17] Euisung J, Eun J J. Service-Oriented Architecture of Environmental Information Systems to Forecast the Impacts of Natural Disasters in South Korea. J. Enterp. Inf. Manag. (2019) 32(1): 16-35. https://doi.org/10.1108/JEIM-03-2015-0022

[18] George M, Stavroula N, Margherita A, Constantine S. Augmenting Natural Interaction with Physical Paper in Ambient Intelligence Environments. Multim. Tools Appl. (2019) 78(10): 13387-13433. https://doi.org/10.1007/s11042-018-7088-9