

Ecological Strategy of Rural Natural Protection Environment Based on Big Data Information System

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Abstract: With the rapid development of social economy, the material living standard of residents is also constantly improving, which also leads to the higher and higher pursuit of living conditions and spiritual satisfaction of residents. At this time, the pollution control and protection of the natural ecological environment has attracted the attention of more researchers. In the protection of natural ecological environment, it is not only necessary to protect the environment around the city, but also to control the ecological environment around the rural areas. The protection of rural natural ecological environment can not only purify the pollution of the ecological environment from the source, but also enable various types of food to grow in a healthy ecological environment. The current pollution of the natural ecological environment in rural areas includes not only the pollution of household waste, but also the pollution of waste in the process of industrial development. Therefore, the current protection of the natural ecological environment in rural areas also needs in-depth discussion. At present, the pollution of the natural ecological environment in rural areas has not been given enough attention. On the one hand, rural areas are vulnerable to the constraints of resource shortage and traffic inconvenience, and on the other hand, it is also related to the inadequate cultivation of environmental protection awareness of rural residents and the lack of relevant environmental protection infrastructure. Big data (BD) technology has put forward more ideas for the protection of the natural ecological environment, so it has also been paid attention by more and more researchers. Through the in-depth study of BD technology, this paper proposed a new rural natural ecological environment protection strategy of BD information system, and finally determined that this new environmental protection strategy has increased by about 37.4% in many aspects compared with the existing protection strategy.

1. Introduction

In recent years, in the process of social transformation towards informatization, a variety of

information technologies have been proposed, and then have a positive impact on many industries. The current problem of pollution improvement in the rural natural ecological environment can also be deeply integrated with some emerging information technologies in recent years, so as to obtain a natural ecological environment protection strategy that is more suitable for the rural environment. This strategy has greatly improved the efficiency of the protection and governance of the rural natural environment, and also improved the governance effect of environmental pollution.

At present, some researchers in the field of environmental protection first explore a series of problems existing in the current natural ecological environment and determine a number of environmental improvement difficulties. Deswanto Refandi Budi first explored the relationship between the state of the natural environment and the financial performance of enterprises in the region, and determined that the state of the natural ecological environment can have a greater impact on the financial performance of enterprises in the same region [1]. Whitburn Julie explored the relationship between human behavior and natural environment protection, and determined that human behavior can have a great impact on the natural environment [2]. Fahrig L explored environmental protection and various challenges in the the Belt and Road policy in a region and determined a feasible environmental protection scheme [3]. Shahzad Tahir explored the residents' views on the local ecological environment and their recognition of the ecological environment protection in a certain area, and determined the residents' willingness to participate in the ecological environment protection [4]. Hou Na explored the relationship between efficiency and environmental protection in the innovative development of green economy, and determined the environmental protection plan for a region [5]. Bulajic Stanko explored some economic means in environmental protection in a certain area, and confirmed the reliability of economic means in environmental protection through relevant experiments and data survey [6]. Stelmasiak Jerzy explored the role of policies and legal provisions in the nature reserve, and determined that the formulation of policies and legal constraints can help improve the environment in the nature reserve [7]. These researchers have provided more ideas for the development direction of the follow-up natural ecological environment protection plan through the determination of the difficulties in environmental improvement.

Another part of researchers have studied the protection of natural ecological environment, hoping to put forward a more perfect ecological environment protection strategy. Mickiewicz Pawel explored the relationship between the policies and regulations of relevant departments in a region and the comprehensive development of environmental protection, and determined that the policies and regulations can play a considerable role in environmental protection [8]. Gordon Igor explored the environmental protection mode of a region with relatively poor economy, and determined that the quality and speed of economic development are directly related to environmental protection [9]. Dallyono Ruswan investigated the social attitudes towards natural resources and the environmental protection awareness of residents in a certain area, and determined that the controllable use of natural resources helps to protect the local ecological environment [10]. Bekezhanov Dauren explored the reliability of digitalization and application of legal constraints in environmental protection, and determined the advantages of digitalized environmental protection [11]. Ponitka Jens explored the relationship between the development of the energy industry in a region and the protection of the natural environment, and determined that sustainable energy development can play a positive role in environmental protection [12]. However, these researchers' research on natural ecological environment protection is too fragmented to form a complete natural ecological environment protection model.

Firstly, this paper makes a full investigation of the development background and current situation of BD technology in recent years, and determines the application scheme of BD technology in various fields and a series of positive effects. On the other hand, it is to investigate and study the

current situation of rural natural ecological environment and a series of problems in it. Through this research, it identifies some parts of the current rural natural ecological environment that can be improved through BD technology, and thus puts forward a perfect rural natural ecological environment protection strategy.

2. BD Information System Evaluation

With the continuous progress of social economy and the rapid development of various information technologies, the emergence of BD technology provides new possibilities for development in many fields. The current BD technology is mainly to aggregate multiple distributed cluster computing centers to form a more powerful computing center [13]. The current BD technology has been widely used in finance, military, navigation and other fields [14]. BD technology can also optimize the ecological protection strategy in the natural protection environment. The first is the protection of water pollution in rural natural environment. Generally, BD technology is used to monitor the water quality in the region, so as to obtain relevant water pollution data and carry out accurate treatment. Then, in terms of air pollution and ecological restoration, BD technology is generally used to collect data from multiple periods of time and establish a complete ecosystem database to establish a complete ecosystem information system. The technical structure of BD is shown in Figure 1.

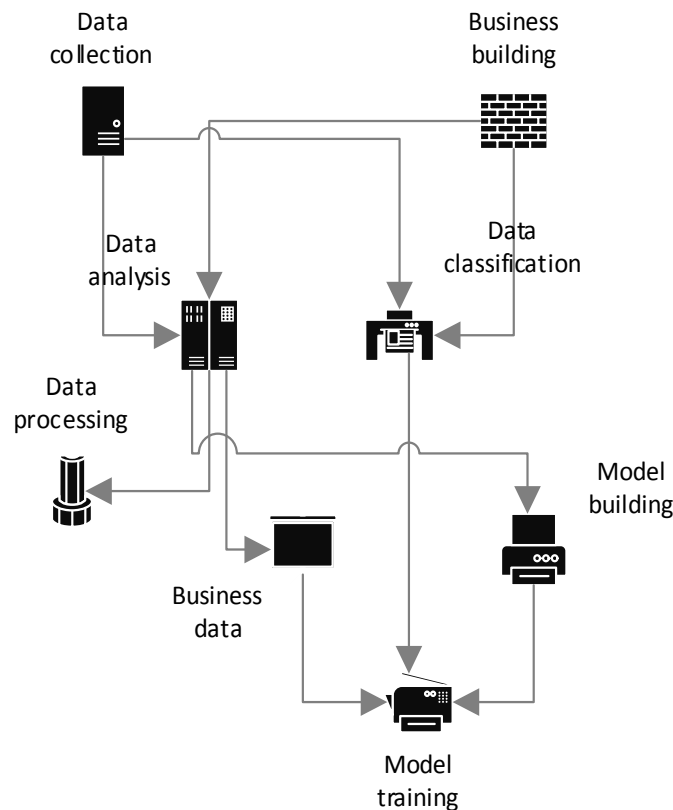


Figure 1. BD technical structure diagram

3. Evaluation of Rural Ecological Environment Protection Strategies

There are many problems in the current rural ecological environment protection strategy. These problems can be integrated through BD technology to establish a set of data sharing and open mechanism. The current ecological environment data resources are relatively scattered, which also

leads to a large degree of data fragmentation in the ecological environment data [15]. Then, the application of core technologies in the ecological protection strategy is still insufficient. The ecological environment protection process is shown in Figure 2.

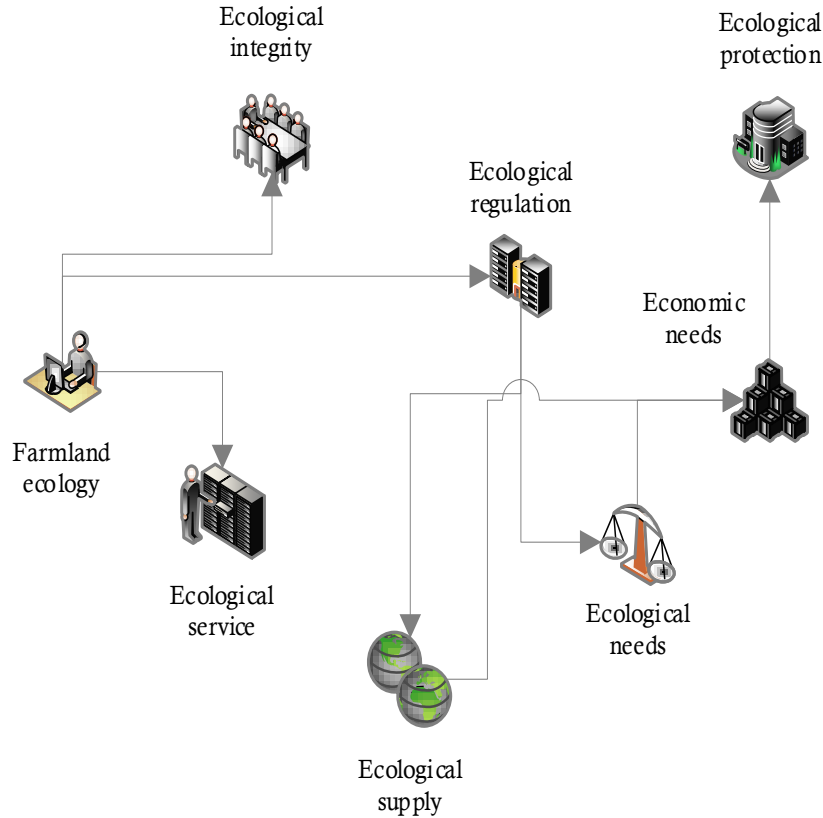


Figure 2. Schematic diagram of the general process of ecological environment protection

4. BD Algorithm Evaluation

With the continuous development of various information technologies in the current society, a variety of natural ecological environment protection models have undergone major changes, which can not only make the natural ecological environment protection have better results, but also make great contributions to the ecological environment protection in many regions. In the current natural ecological environment protection, it is generally necessary to investigate and analyze the current situation of the natural ecological environment in different regions through automatic monitoring and early warning, so as to determine the relatively serious part of the current natural ecological environment, and at the same time, formulate the pollution control plan of the natural ecological environment in combination with this pollution situation. The environmental protection model combined with the algorithm in BD technology can dynamically evaluate the environmental protection indicators in different regions. In this process, people mainly use the logical regression algorithm in BD technology to analyze and process the environmental protection data in the natural ecological environment protection model in rural areas, and then make the rural natural ecological environment protection decision based on the results, which greatly improves the efficiency of environmental protection strategy.

First, the basic expression in the logical regression algorithm is used to map the sample data, and then the pollution in the rural environment can be classified. The formula is shown in Formula (1).

$$f(x) = \frac{1}{1-e^{-x}} \tag{1}$$

Among them, x represents the characteristic vector of the sample data. Then the loss value in the whole calculation process is calculated through the loss function, and the formula is shown in Formula (2).

$$P(x) = \sum_{i=1}^n x_i y_i \tag{2}$$

Among them, x_i represents the sample data and y_i represents the probability of the sample data. Finally, the comprehensive expression is calculated, and its formula is shown in Formula (3).

$$F = \sum_{i=1}^n y_i \ln p + \ln(1-p)(1-y_i) \tag{3}$$

Among them, p represents the weight of the data. The application of the above formula can not only further improve the efficiency of rural natural environment protection, but also improve the pollution control effect of rural natural ecological environment.

5. Experimental Evaluation on New Rural Ecological Environment Protection Strategies

At present, in the process of rapid economic growth in many regions, more and more people have ignored the protection of the natural ecological environment, which has led to a significant decline in the natural ecological environment in many regions, and this gradually bad natural ecological environment has also greatly affected the daily life of residents in the region and the high-quality development of social economy. In the process of rapid social and economic development, the unlimited discharge of various types of waste in the operation of different factories and enterprises, and the random disposal of household garbage by residents have also caused serious damage to the ecological environment of rivers and soil. Such damage to rivers and soil can not only have a variety of adverse effects on residents living in the city, but also cause a variety of damage to residents living in rural areas around the city. Therefore, at present, more and more researchers have begun to attach importance to the protection of the natural ecological environment in urban and rural areas, hoping to complete the treatment of natural ecological environment pollution in urban and rural areas through various new technologies emerging in recent years. On the other hand, in rural areas, this strategy of protection and governance of natural ecological environment not only needs to control multiple types of pollution in the ecological environment, but also needs to help residents in rural areas to establish a strong awareness of ecological environment protection, so that residents in rural areas have a scientific awareness of environmental protection, so as to spontaneously carry out the governance of natural ecological environment pollution.

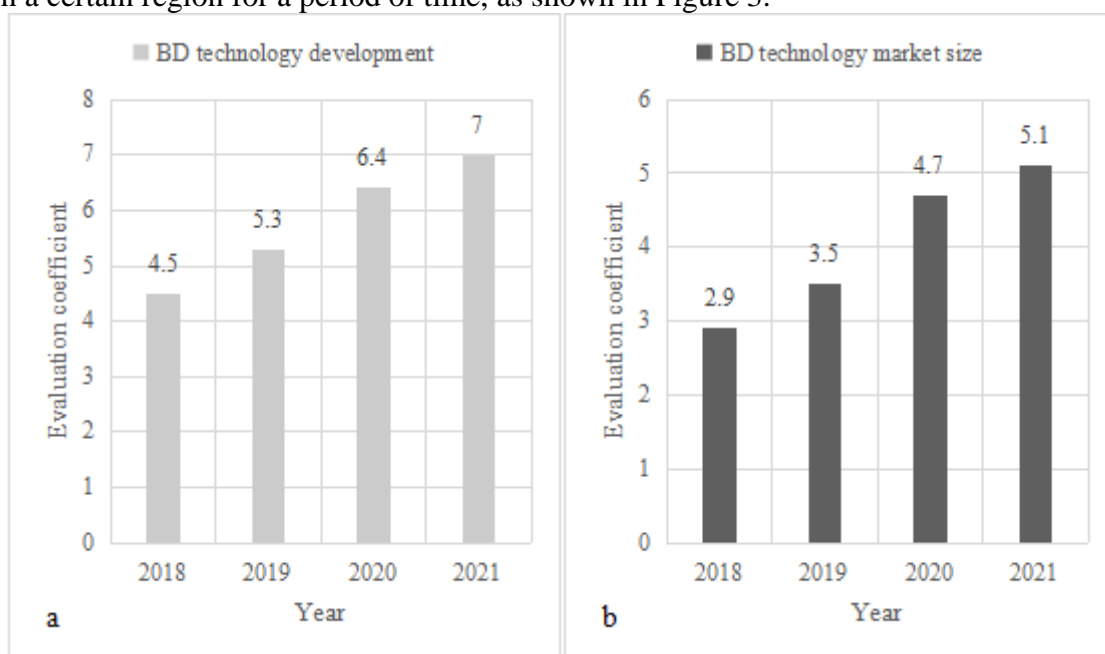
The first is to analyze the different proportions of various pollutants in a rural area and their impact on the overall natural ecological environment of the area, as shown in Table 1.

Table 1. The proportion of pollutants in a rural area and its impact on the natural ecological environment

	Proportion	Overall impact
Domestic pollutants	4.8	5.5
Industrial pollutants	2.6	6.1
Agricultural pollutants	2.1	4.3

Before the transformation and development of society towards the information age, the pollution situation in rural areas was not serious. However, with the advent of the information age and the rapid development of social economy, more and more environmental pollution has begun to spread to rural areas, which also led to the deepening of pollution in rural areas in the current society, and more rural residents have been harmed by natural ecological environmental pollution. Through the analysis of the proportion of various pollutants in rural areas and their impact on the protection of natural ecological environment in Table 1, it can be determined that industrial pollutants have gradually appeared in rural areas in recent years and began to occupy an increasing proportion. On the other hand, industrial pollutants had a greater impact on natural ecological environment pollution, which also led to the deepening of natural ecological environment pollution in rural areas. However, the main pollutants in the existing rural areas were mainly domestic pollutants, and the impact of such pollutants on the ecological environment as a whole was also second only to industrial pollutants.

Then it analyzed the development trend of BD technology development and application market scale in a certain region for a period of time, as shown in Figure 3.



a. Schematic diagram of the development of BD technology

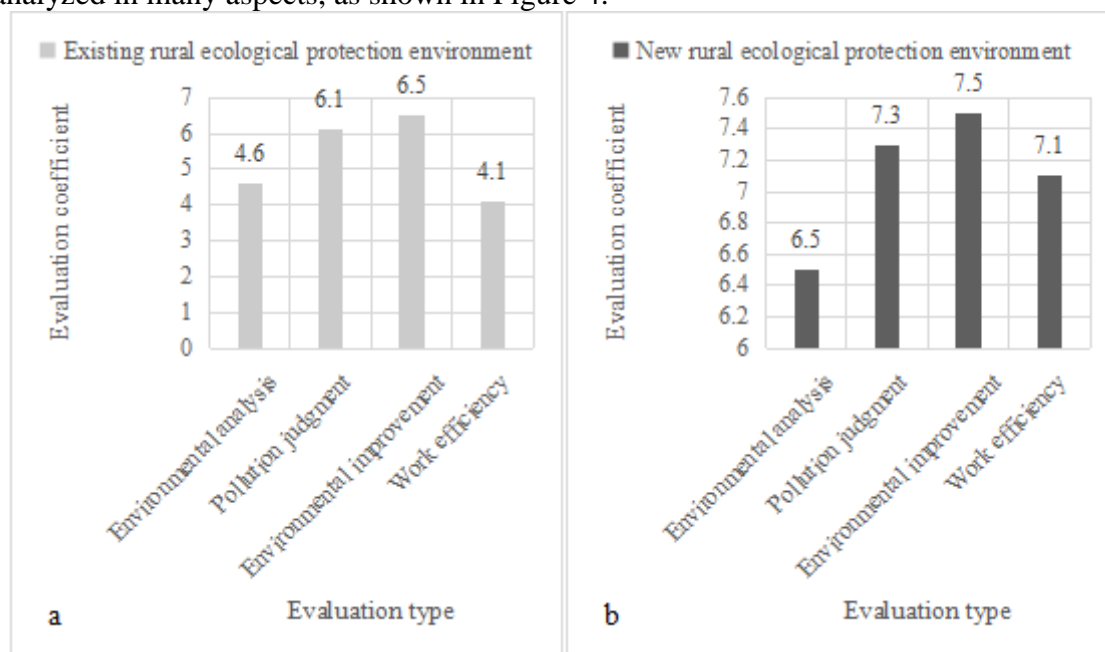
b. Schematic diagram of the market size development trend of BD technology

Figure 3. Schematic diagram of the development of BD technology and the development of reference market scale in a certain region for a period of time

In recent years, the continuous development of social economy has led to the rapid development of various information technologies, and the emergence of BD technology has led to major changes in the development mode of many industries. This change has also brought greater convenience to people's daily life. After analyzing the development of BD technology in recent years in Figure 3a, it can be confirmed that BD technology has been developed in the past four years, and the development speed was relatively slow, which also showed that BD technology still had great development potential. On the other hand, after analyzing the development of the market scale of BD technology in Figure 3b, it was determined that the market scale of BD technology has increased rapidly in the past four years. This increase not only showed that BD technology was

more practical and can be applied in many fields, but also showed various advantages of BD technology.

Finally, the existing rural natural ecological environment protection strategy and the new natural ecological environment protection strategy proposed in this paper combined with BD technology were analyzed in many aspects, as shown in Figure 4.



a. Schematic representation of existing rural ecological environment protection strategies

b. Schematic diagram of the new rural ecological environment protection strategy

Figure 4. Schematic representation of existing rural ecological environment protection and new rural environmental protection strategies

The economic development not only improved people's economic conditions, but also made people start to pursue the high quality of living environment and the satisfaction of spiritual mountain, which also led to the gradual deepening of the research on rural ecological environment protection by relevant researchers. Through in-depth analysis of the performance of the existing rural ecological protection environment in the four aspects of environmental analysis, pollution judgment, environmental improvement and overall work efficiency in Figure 4a, it was determined that the existing rural ecological protection environment strategy was weak in the performance of environmental analysis and work efficiency, which also showed that the existing rural ecological protection environment needed to be improved in these two aspects. Through the analysis of the performance of the new rural ecological protection environment combined with BD technology in the same four indicators in Figure 4b, it was determined that the performance of the new rural ecological protection environment combined with BD technology has been greatly improved in many aspects, which showed the feasibility of BD technology. Finally, after comprehensive analysis, it was determined that the performance of the ecological decision-making of the new rural natural protection environment has increased by 37.4% on average compared with the existing ecological decision-making.

6. Conclusion

With the continuous development of social economy and various technologies, people have put forward more requirements for their ecological environment, which are often difficult to solve with traditional models. Therefore, some researchers have analyzed a variety of information technologies and integrated these information technologies into the protection of the natural ecological environment. The arrival of the information age and the rapid development of BD technology also make the protection of the natural ecological environment no longer difficult to achieve. Under this background, researchers in the field of environmental protection discussed how to integrate a variety of emerging information technologies with environmental protection by analyzing the needs of environmental protection. At the same time, in the protection of natural ecological environment, the rural natural ecological environment protection program is a more complex and difficult project to solve, because the rural natural environment protection often also contains the pollution of emissions from industry and agriculture, and the rural area itself has a large gap between the urban and the urban cleaning concept and tools. This leads to the need for a new model combining emerging technologies for the protection of rural natural ecological environment in the current society in China. This paper, through in-depth analysis of BD technology and some requirements for the protection of rural natural ecological environment, identified several aspects of the current serious pollution in the rural environment. On the other hand, people would discuss these aspects to determine the environmental governance model in different situations. In this process, people would also deeply integrate the various intelligent devices and algorithms in BD technology with the rural ecological environment protection scheme, so that the rural natural ecological environment can be better protected and improved. This strategy of rural natural ecological environment protection based on BD technology can also significantly improve the overall efficiency and final effect of environmental protection.

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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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