

Economic Development and Natural Ecology Based on Data Mining Technology

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Abstract: With the rapid development of human beings, the environment for human survival, living and production is also being constantly destroyed. Effective protection of the natural environment can make it better play its economic, ecological and other values, thus promoting the harmonious development of people and the environment, and improving people's living conditions. Based on the above reasons, this paper studied the natural environment protection, and focused on the ecological value of natural environment protection. The ecological value evaluation method based on data mining was proposed, and its effect was studied. The research results showed that the evaluation method based on data mining took less time than the traditional evaluation method. The accuracy rate of the evaluation method based on data mining was 7.06% higher than that of the traditional evaluation method, and the natural environment protection technicians were more satisfied with the data mining evaluation method. The evaluation method based on data mining had certain effectiveness. In addition, this paper also put forward some measures to protect the natural environment.

1. Introduction

With the rapid development of human society, the rapid development of productivity and the rapid progress of science and technology, the amount of various industrial and living wastes is increasing. The pollution of air, water and soil is also becoming more and more serious, and the ecological balance of nature has also been strongly affected and destroyed. Many resources are becoming less and less, which is even on the verge of exhaustion. Water and soil erosion and land desertification have become increasingly serious, thus posing a serious threat to food production and human health. Natural protection of the environment is closely related to human survival, life and production. Based on this, this paper studied the ecological value of natural environment

protection and proposed an evaluation method based on data mining, thus hoping to provide valuable reference for relevant research.

Many scholars have studied the protection of natural environment. Galecka-Drozda Anna described the recurring problems and phenomena in natural environment protection areas, and compared them with geographic information system tools. He analyzed six types of land use forms and calculated their land index cover differences [1]. Li Yanwei discussed the cooperation mechanism between different government agencies engaged in environmental protection, and studied three leading mechanisms, namely the institutionalization of the cooperation network, the interdependence and exchange of resources, and the priority of attachment [2]. Hanson Jeffrey O studied the current situation and existing problems of natural ecological protection, thus providing a reference for the formulation of natural environmental protection and natural species protection policies [3]. Ahamed Tofael assessed women's views and participation in environmental protection. He used a bottom-up approach to conduct quantitative and qualitative assessments of sustainable agricultural practices and entrepreneurship of women living in these two rural areas, and conducted questionnaires and interviews with key informants [4]. Whitburn Julie analyzed the relationship between human and nature and pro-environmental behavior. He found that the deeper relationship with nature might partly explain why some people's behavior was more pro-environmental than others, and this relationship was everywhere [5]. Ford Alex T believed that pollutants would have a negative impact on biological behavior and ecological results, and discussed the role of behavioral ecotoxicology in environmental protection [6]. Mickiewicz Pawel analyzed the local space policy tools within the scope related to environmental conditions, namely the content of local space development planning, and determined the extent to which these provisions constituted elements that could be linked with comprehensive development planning [7]. The above scholars analyzed the natural environment protection, but did not use data mining methods.

Data mining can be effectively used in the field of natural environment protection. Gayathri M. used data mining technology to study air pollution prediction, thus providing support for the improvement of air quality [8]. Ageed Zainab Salih discussed the possibility of mixing cloud computing, data mining and online big data, and studied the big data mining methods in the cloud system. He solved the cloud compatibility problem and computing technology, so as to promote the big data mining in the cloud system, which provided support for the application of data mining technology in the field of natural environment protection [9]. Yang Guanghui studied the seawater quality monitoring and management system model based on data mining, and designed a static service composition method based on Markov chain model. Through the comparative analysis of the experimental data of the system call, the validity of the model was verified [10]. Salih Sinan Q believed that suspended sediment load was one of the important hydrological processes that affected the sustainability of river engineering. Based on data mining technology, he proposed a prediction method of river suspended sediment load based on river flow information [11]. Behrens Grit proposed a data mining method for adjusting indoor climate, and developed a cost-effective measurement system, thus providing a reference for the adjustment of climate environment [12]. Ruan Mengli proposed an ambient air quality evaluation and prediction model based on data mining. In data mining, the exponential smoothing method was used to analyze the input data, and the design of the ambient air quality prediction model was completed. He proved through the experimental results that the proposed method was close to the actual evaluation value of ambient air quality, and had high prediction accuracy and good performance for ambient air quality, which could provide reference for the improvement of environmental quality [13]. In this paper, data mining technology was used to study the natural protection environment.

In order to better protect the natural environment and give full play to the economic and ecological value of the natural environment, this paper put forward the ecological value evaluation

method based on data mining after analyzing the ecological value of the natural environment protection, and studied its effect after putting forward the ecological value evaluation method, which drew the conclusion that the evaluation method based on data mining had less time and higher accuracy than the traditional evaluation method. Compared with other studies, the ecological value evaluation method based on data mining proposed in this paper had higher calculation speed and accuracy, and had better practicability.

2. Ecological Value Evaluation of Natural Environment Protection

This paper analyzed the ecological value of natural environment protection from the following perspectives, as shown in Figure 1.

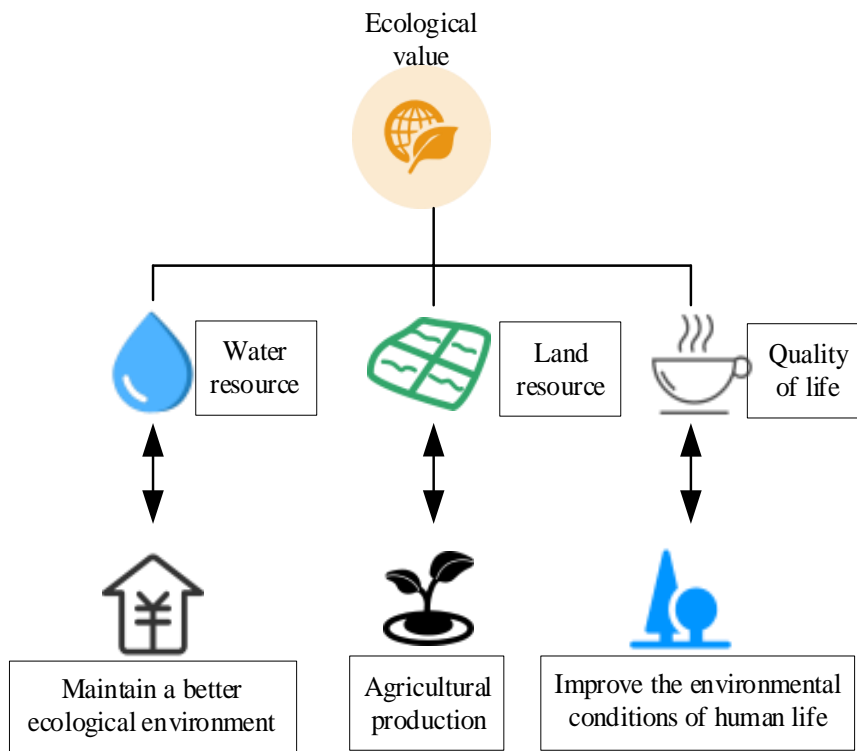


Figure 1. Ecological value analysis of natural environment protection

2.1. Guarantee of Water Resources Health and Safety

At present, environmental problems are becoming more and more serious, especially water environment and water ecology problems, which have become a common concern of the whole society. The shortage of water resources is becoming increasingly prominent. Effective protection of the natural environment would have a positive impact on the water body and the hydrological student environment. This means that it can better meet people’s life, social development and economic development. If the water environment is polluted, it would endanger people’s living conditions and cannot guarantee people’s quality of life, thus causing loss of interests. At the same time, it is unable to maintain a good natural ecological environment, which leads to the insecurity of the water environment. The protection of the natural environment also means that the water pollution caused by people’s life and production activities cannot exceed the carrying capacity of the water environment, that is, the self-purification capacity of water. On the contrary, it would lead to the deterioration of water environment and water ecology, and the insecurity of water

environment would lead to economic insecurity and social instability.

2.2. Guarantee of Land Resources

Land resources are the most important and basic of agricultural natural resources. If land resources are not properly developed or well protected, there would be no good agricultural production. For example, people's irrigation activities can improve the dry and semi-dry land. However, when using unreasonable irrigation methods such as excessive irrigation volume and poor water quality, the phreatic water level would rise, thus resulting in soil salinization. Scientific and efficient natural environment protection is of great significance for improving soil conditions, increasing soil nutrient content and reducing soil loss. The effective protection of the natural environment is conducive to improving the nutritional status of the soil, thus having a positive impact on the yield and quality of crops, and improving the production value and ecological and economic benefits of the land, so as to prevent soil erosion and reduce the loss of soil organic matter.

2.3. Improvement of Human Life Quality

Natural environment protection is the process and activity of improving, beautifying and protecting the environment to better meet people's life and work needs. The protection of the natural environment can improve the environmental conditions of human life. The protection of natural environment is of great significance for improving the attractiveness of investment and economic competitiveness. It is conducive to promoting the organic combination of ecology, economy and society, which is conducive to promoting the economic development from extensive to intensive, and realizing the coordinated development of population, resources and environment. It is of great significance to the sustainable, stable and healthy development of social economy, as well as the improvement of people's living conditions and quality of life.

3. Ecological Value Evaluation Method Based on Data Mining

Based on the geospatial data cloud, the basic ecological data in natural environment protection, including soil and water resources, are collected. These data are stored in different formats. Therefore, in order to avoid the impact of data on the research results, it is necessary to standardize the collected data. Based on water conservation and soil protection, the ecological value evaluation model of natural environment protection is constructed to evaluate the ecological value of natural environment protection.

The evaluation model of water conservation is as follows:

$$U = \min\left(1, \frac{m}{W}\right) \cdot \min\left(1, \frac{iL}{n}\right) \cdot \min\left(1, \frac{C}{j}\right) \cdot V \quad (1)$$

$$U_{none} = \min(T_{1max}, T_2) \cdot i \quad (2)$$

Among them, W is the coefficient of flow velocity; U is the total amount of water conservation; m is the depth of soil water conservation; L is dimensionless index; C is the hydraulic conductivity of soil after water absorption and saturation; T_{1max} is the maximum root burial depth; T_2 is the root depth.

The evaluation model of soil protection is as follows:

$$S = U_p cH(1 - RW) + F \quad (3)$$

Among them, S is the soil conservation amount of grid unit; H is the slope length factor; F represents sediment retention; R is vegetation cover and crop management factor; c represents soil erodibility factor; W is the factor of natural environmental protection measures.

By using the shadow project method, the total conservation amount of water resources is obtained, and the effective water content of water resources is estimated. The value of soil and water conservation in the nature reserve is calculated from the perspectives of soil consolidation, fertilizer conservation and sediment reduction. Soil fixation value: When calculating, the soil conservation amount of grid unit is divided and recorded as the total soil conservation amount. The value of forestry income is defined as the holding value of soil. Fertilizer conservation value: The soil contains nitrogen, phosphorus and potassium nutrients, which can be used as fertilizer for the soil. The content of nitrogen, phosphorus and potassium in the soil under natural environmental protection is calculated, and the corresponding market price is obtained by using the market price method, so as to obtain the fertilizer conservation value of natural environmental protection. The value of sediment and sludge is reduced: The fluidity of sludge has a certain rule, so the shadow project method is used to calculate the cost of sludge cleaning, which is defined as reducing the value of sediment and sludge.

4. Effect Evaluation of Ecological Value Assessment Method

The ecological value evaluation method based on data mining was compared with the traditional ecological value evaluation method. A natural environmental protection project was selected as the experimental research object, and the construction process of the natural environmental protection project was divided into four stages on average. 29 monitoring points were set up in the natural environment protection project, and the required data, including rainfall data, vegetation coverage, runoff, etc., were collected using rain gauges, slope meters and other equipment. In this paper, two ecological value evaluation methods were studied from the aspects of calculation speed, accuracy and satisfaction.

4.1. Calculation Speed of Two Ecological Value Assessment Methods

The ecological value evaluation method based on data mining and the traditional evaluation method were calculated in terms of the time spent in evaluating the ecological value, and the time unit was seconds, as shown in Table 1.

Table 1. Calculation speed of two ecological value assessment methods

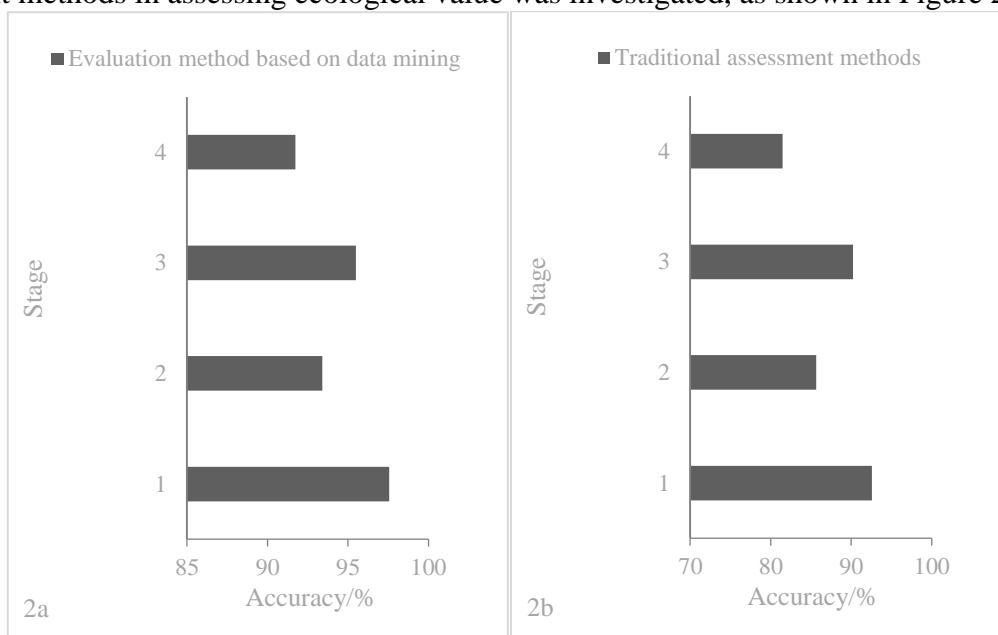
	Evaluation method based on data mining	Traditional assessment methods
1	0.26	0.59
2	0.82	1.24
3	1.64	1.89
4	2.71	3.48

As shown in Table 1, in the first stage of the natural environment protection project, the evaluation method based on data mining took 0.26 seconds, while the traditional evaluation method took 0.59 seconds. In the second stage of the natural environment protection project, the evaluation method based on data mining took 0.82 seconds, while the traditional evaluation method took 1.24 seconds. In the third stage of the natural environment protection project, the evaluation method based on data mining took 1.64 seconds, while the traditional evaluation method took 1.89 seconds. In the fourth stage of the natural environment protection project, the evaluation method based on

data mining took 2.71 seconds, while the traditional evaluation method took 3.48 seconds. From the average data, the average time of the evaluation method based on data mining was about 1.36 seconds, while the average time of the traditional evaluation method was about 1.8 seconds. The average time of the evaluation method based on data mining was 0.44 seconds less than that of the traditional evaluation method.

4.2. Accuracy of Two Ecological Value Assessment Methods

The accuracy of ecological value assessment methods based on data mining and traditional assessment methods in assessing ecological value was investigated, as shown in Figure 2.



2a: Accuracy of data mining evaluation methods

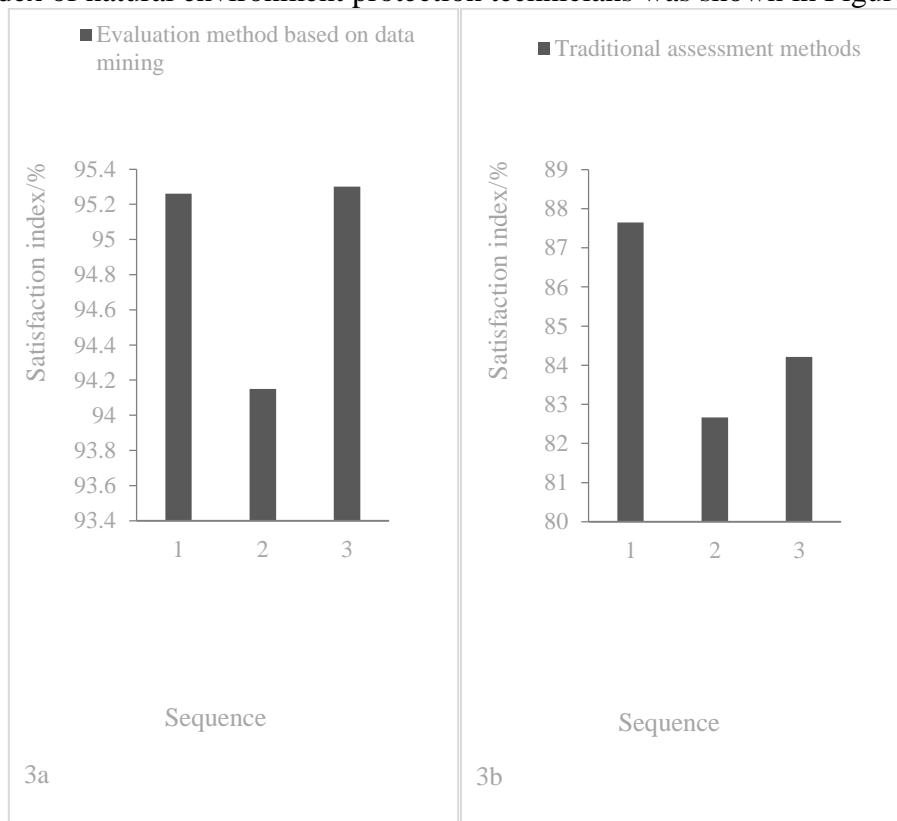
2b: Accuracy of traditional evaluation methods

Figure 2. Accuracy of two ecological value assessment methods

As shown in Figure 2, Figure 2a showed the accuracy of the data mining evaluation method, and Figure 2b showed the accuracy of the traditional evaluation method. It could be observed from Figure 2a that the accuracy of the evaluation method based on data mining was 97.56% in the first stage of the natural environment protection project. In the second stage of the natural environment protection project, the accuracy of the evaluation method based on data mining was 93.41%. In the third stage of the natural environment protection project, the accuracy of the evaluation method based on data mining was 95.49%. The accuracy rate of the evaluation method based on data mining was 91.74% in the four stages of the natural environment protection project. It could be seen that the average accuracy of the evaluation method based on data mining was 94.55%. It could be observed from Figure 2b that the average accuracy of the traditional evaluation method was 87.49%. To sum up, the average accuracy of the evaluation method based on data mining was 7.06% higher than that of the traditional evaluation method.

4.3. Satisfaction with Two Ecological Value Assessment Methods

In the form of telephone interview, natural environment protection technicians were invited to evaluate the satisfaction of the two ecological value assessment methods, and the value range of the satisfaction index was 1%-100%. Three telephone interviews were conducted in this paper. The number of people invited for each telephone interview was 15, 13 and 16, respectively. The average satisfaction index of natural environment protection technicians was shown in Figure 3.



3a: Satisfaction with data mining evaluation methods

3b: Satisfaction with traditional evaluation methods

Figure 3. Satisfaction of two ecological value assessment methods

As shown in Figure 3, Figure 3a showed the satisfaction of natural environmental protection technicians with the data mining evaluation method, and Figure 3b showed the satisfaction of natural environmental protection technicians with the traditional evaluation method. It could be observed from Figure 3a and Figure 3b that the average satisfaction of natural environmental protection technicians with the data mining evaluation method was about 94.9%, and the satisfaction of natural environmental protection technicians with the traditional evaluation method was about 84.84%. The natural environment protection technicians were highly satisfied with the data mining evaluation method.

5. Natural Environment Protection Measures from the Perspective of Ecological Value

Based on the perspective of ecological value, this paper proposed some measures to protect the natural environment, as shown in Figure 4.

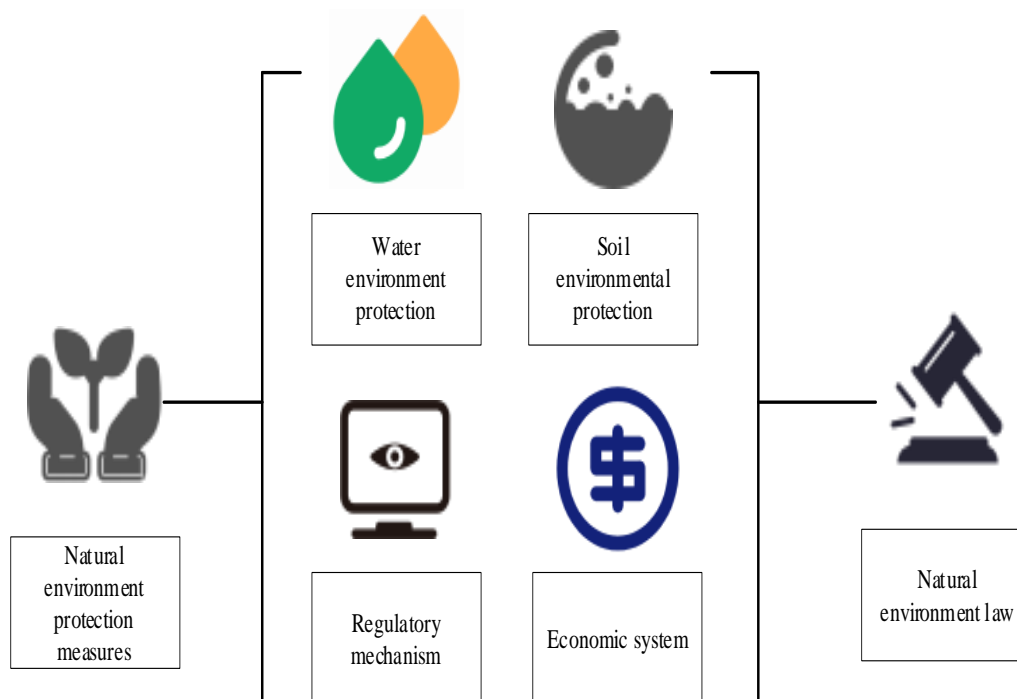


Figure 4. Natural environmental protection measures from the perspective of ecological value

5.1. Enhanced Protection of Water Environment

Relevant departments should promote the standardization construction, and strengthen the ecological environment protection of water sources and along the line, so as to carry out in-depth prevention and control of groundwater pollution, and comprehensively investigate and rectify the problems of violations in the water source protection zone. Relevant departments should accelerate to make up for the shortage of urban sewage collection and treatment, and improve the sewage charging system, so as to strengthen the construction of rainwater collection and treatment facilities at the initial stage of the city, and reduce the risk of urban non-point source pollution. Relevant departments should do a good job in the prevention and control of pollution in agriculture and rural areas. They should also take the creation of a beautiful and livable countryside as the direction of work, and continue to carry out the renovation of rural residential environment, so as to reduce the use of chemical fertilizers and pesticides in rural areas.

5.2. Enhancement of Soil Environment Protection

Relevant departments should strengthen the classification management of soil environment, and strictly investigate and deal with the serious pollution of cultivated land. They should accelerate the promotion of garbage classification, and strengthen the pollution prevention and control of solid waste, so as to comprehensively ban foreign garbage. In addition, relevant departments can also play the role of plants in soil environmental protection and increase plant planting rate [14].

5.3. Perfection of Natural Environment Supervision Mechanism

Relevant departments should integrate the scattered responsibilities of natural environment protection, and strengthen the supervision of natural environment protection, repair and pollution prevention. They should build a perfect natural environment protection management system, and

build an independent, authoritative and effective ecological environment monitoring system, so as to achieve the purpose of forecasting, early warning and quality control of regional natural environment quality.

5.4. Improvement of Economic System for Natural Environment Protection

Relevant departments should increase investment in environmental protection, and improve the price, investment and other policies to promote the development of environmental protection enterprises, so as to actively develop green credit, green bonds and other financial products. They should implement price policies conducive to the development of environmental protection enterprises, and implement relevant tax incentives, so as to give environmental protection companies corresponding income tax relief, and carry out comprehensive rectification of “scattered pollution” enterprises.

5.5. Improvement of Laws on Natural Environment

Relevant departments should speed up the formulation and revision of laws and regulations on the prevention and control of water and soil environmental pollution, and improve the civil and administrative public interest litigation system in the field of natural environmental protection, so as to effectively punish violations of natural environmental laws and regulations, and strengthen the construction of law enforcement teams [15].

6. Conclusion

The protection of natural environment is conducive to the effective control of the environment and the prevention of the decline of environmental quality, which can promote the harmonious development between people and the environment and improve the quality of life of people. This can ensure people’s health and seek benefits for future generations. First of all, this paper analyzed the ecological value of natural environment protection from the perspectives of protecting the health and safety of water resources, protecting land resources and improving the quality of human life. Based on data mining, an ecological value evaluation method based on data mining was proposed from the perspective of water conservation and soil protection. Finally, the effect of the evaluation method was analyzed, and the conclusion that the evaluation method had high calculation speed and accuracy was drawn. In addition, this paper also put forward measures to protect the natural environment, such as strengthening the protection of water environment, enhancing the protection of soil environment, and improving the ecological environment supervision system.

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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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