

The Influence of Coal Water Resources Development on the Development of Agriculture and Forestry

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Abstract: With the rapid development of human society, especially the increasing population, the rapid rise of industry and agriculture, people's demand for water resources is also increasing. In this case, the shortage of water resources and the environmental protection of water resources have attracted more and more attention. Coal water resource is produced in coal mining and belongs to coal mine drainage. Every year, a large part of coal mine water resources are wasted due to coal mining in China. Reasonable development and utilization of these coal water resources will not only help alleviate the problem of insufficient water resources in China, but also have a great impact on the surrounding agriculture and forestry. This paper makes a simple analysis on the current situation and necessity of coal water resources development, and on the basis of factor analysis method, it emphatically analyzes the influence of coal water resources development on the development of surrounding agriculture and forestry. This research is not only conducive to the effective development and utilization of coal water resources in the future, but also has a certain positive significance for related research.

1. Introduction

With the rapid development of human society, water resource shortage and water resource pollution are obviously serious. There is also a sharp contradiction between them, which seriously restricts the further development and progress of human society [1]. China is a big country with coal resources. The annual waste of water resources and the total amount of coal sewage resources due to the development of coal resources is huge, which not only causes huge pollution to the environment, but also exacerbates the problem of water resource shortage in China [2-3]. Therefore, strengthening the development and utilization of coal water resources can not only effectively relieve the existing water resource shortage, but also effectively reduce the pollution of coal water to the environment. China also attaches great importance to agriculture and forestry, and needs a large amount of water resources for agriculture and forestry irrigation every year to ensure the normal growth of agriculture and forestry and maintain the safety of agricultural and forestry production in China [4]. Using coal water for irrigation in agricultural and forestry production can not only ensure the normal growth of agricultural and forestry crops, but also greatly reduce the pollution of coal water to groundwater and soil environment. However, long-term or excessive unscientific use of coal water for agricultural and forestry irrigation will not only cause serious pollution of soil environment, but also greatly affect the safety of agricultural and forestry products and even the safety of the entire agricultural and forestry ecosystem [5-6].

Therefore, it is an urgent problem to strengthen the rational and scientific application of coal water resources in surrounding agriculture and forestry to realize the scientific development and utilization of coal water resources and promote the sustainable development of agriculture and forestry. At present, many regions at home and abroad have started to develop and utilize coal water resources. As early as the end of the last century, Japan began to attach importance to the development and utilization of coal water resources and had begun to take shape [7-8]. With the continuous improvement and development of recycling technology, the cost of coal water

development is decreasing and the quality of coal water resources is rising. Western developed countries have also carried out a series of researches on the development of coal water resources and applied them in various fields, including agriculture and forestry [9]. However, due to the difference in the actual situation of different countries, the relevant research on the development of coal water resources in other countries is inevitably inconsistent with the current situation of the development of coal water resources in China, so there will be more or less exclusivity [10].

In order to make up for the shortcomings in the course of study, in this paper, the current status of coal and the necessity of the development of water resources has carried on the simple analysis, and on the basis of factor analysis, emphatically analyzes the coal impact on development of agroforestry around the development of water resources, and against the proposed countermeasures of coal in agroforestry surrounding the use of water resources[11-12]. This research is not only conducive to the effective development and utilization of coal water resources in the future, but also has a certain positive significance for related research.

2. Method

2.1 Necessity of Coal Water Resources Development

China is a large coal mining country, every year to carry out large-scale coal mining. In this case, the pollution of water resources is increasingly serious, and the discharge of coal mine drainage accounts for the largest proportion of wastewater discharge. China emits 2.3 billion cubic meters of coal water every year, but USES less than 30 percent of the coal water. Not only caused serious environmental pollution, but also a great waste of water resources. Therefore, the reasonable development and utilization of coal water resources is an important way to relieve the shortage of water resources and protect the surrounding ecological environment. Especially the areas facing serious water shortage will bring very good social, environmental and even economic benefits. In particular, the development of coal water resources will have a huge impact on the surrounding agriculture and forestry.

2.2 Scientific Development of Coal Water Resources

If the coal water resources are not developed and purified scientifically, the coal water will pollute the surrounding agriculture and forestry in the process of repeated utilization, thus causing adverse effects. In order to make the coal water produce positive effect on the surrounding agriculture and forestry and ensure that the agricultural and forestry products are not polluted, it is necessary to develop the coal water resources scientifically. From the beginning of coal mine construction to the whole process of production, it is necessary to emphasize the improvement of water technology, reduce the use of clean water resources, and constantly improve the comprehensive utilization rate of coal water resources. At the same time, the water quality standard of coal water resources should be improved, and relevant treatment should be carried out for the discharged coal water resources to meet the needs of the surrounding agricultural and forestry irrigation. In this way, the exploitation of underground water by the surrounding agricultural and forestry resources should be greatly reduced, and the development of the surrounding agricultural and forestry resources should also be promoted.

2.3 Factor Analysis Algorithm

Factor analysis is simply a technique for simplifying complex data. Its purpose is to search for the basic structure of the data, simplify the observation system, reduce the data dimension, and explain some difficult problems in the original data with a small number of "factors". Factor analysis is based on the correlation study of the internal dependence of correlation coefficient matrix among multiple variables, to find out a few random variables that can integrate all variables, and we call these few variables as factors. In order to reduce the number of variables, a few factors are used instead of all variables to analyze the impact of the whole coal water resources development on the surrounding agriculture and forestry. The specific model is shown as follows:

$$\begin{aligned}
X_1 &= a_{11}F_1 + a_{12}F_2 + \dots + a_{1m}F_m \\
X_2 &= a_{21}F_1 + a_{22}F_2 + \dots + a_{2m}F_m \\
&\dots \\
X_p &= a_{p1}F_1 + a_{p2}F_2 + \dots + a_{pm}F_m
\end{aligned} \tag{1}$$

Factor analysis method is as follows: the expression of set with the method of data collection (N samples, and reflect each sample quality indicators of total p, expressed as A matrix A, data were collected with A can be said that with the following formula can be obtained through calculation formulas under the main factor score, then according to the score for sorting and analysis.

$$A = \frac{a_y - \frac{1}{p} \sum_{i=1}^n a_y}{\sqrt{\frac{1}{p} \sum_{i=1}^n (a_y - \frac{1}{p} \sum_{i=1}^n a_y)^2}} \tag{2}$$

3. Experiment

Step1: variable analysis and factor determination. SPSS software was used to conduct KMO and Bartlett model tests on the original coal water resources data. The closer the KMO statistic value is to 1, the better the effect of factor analysis will be. In the experimental detection, if the statistical value of KMO is greater than 0.7, it means the effect is good; if it is less than 0.5, it means the effect is poor, and it is not suitable for factor analysis. Bartlett test is used to test the identity matrix. If it is true, then each variable exists independently, and the result of factor analysis has no effect.

Step2: process the data of coal water resources to eliminate the impact of data dimension difference.

Step3: calculate the eigenvalue, variance contribution rate and cumulative variance contribution rate of the correlation matrix, and confirm the number of factors according to the eigenvalue size. Generally speaking, if the cumulative contribution rate of the first m eigenvalues is greater than 0.85, the factor load matrix can be obtained. Then the factor load matrix is calculated and the extracted factor is rotated. The m column vectors of the factor load matrix obtained by the orthogonal rotation transformation with the maximum variance correspond to m principal factors.

Step4: use the linear regression analysis method to obtain the score of each factor, and then take the variance contribution rate of each factor as the weight to obtain the comprehensive score of coal water resources development by weighting. The influence of coal water resources development on surrounding agriculture and forestry was analyzed.

4. Discuss

4.1 Experimental Results -- Impact of Coal Water Resources Development on Agriculture and Forestry

It can be known from the above experimental results that the development of coal water resources is an important factor affecting the growth of surrounding agriculture and forestry. Especially, the coal water resource plays an important role in the agricultural and forestry irrigation. On the one hand, the application of coal water resources in the irrigation of surrounding agriculture and forestry provides sufficient water source for the growth of agriculture and forestry and promotes the growth of surrounding agriculture and forestry. On the other hand, if coal water resources cannot be controlled strictly, pollution will be caused to the surrounding agricultural and forestry growing environment to a large extent, which will reduce the output and quality of agricultural and forestry products and threaten the safety of agricultural and forestry products. The specific data are shown in table 1 and figure 1. The data in the figure is the result of the author's collation of the experimental data.

Table 1. Factor load matrix after rotation

Evaluation index	F1	F1	F1	Evaluation index	F1	F2	F3
X1	0.734	0.114	0.365	X2	0.853	0.146	0.155
X3	0.633	0.152	0.085	X4	0.031	0.803	0.821
X5	0.265	0.916	-0.012	X6	-0.054	0.775	0.486
X7	-0.063	0.174	0.8756	X8	0.312	0.331	0.174

Where, X1: total coal mining amount; X2: total amount of coal water development; X3: total coal water utilization; X4 total agricultural area; X5: total forest area; X6: agricultural irrigation rate; X7: forestry irrigation rate; X8: total irrigation in agriculture and forestry.

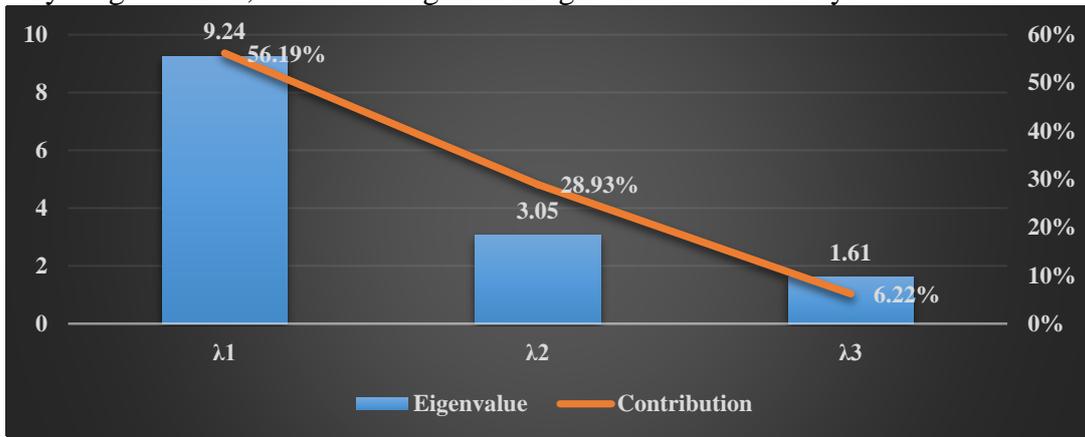


Figure 1. Index information of contribution rate of coal water resources

4.2 Counter Measures for Utilization of Coal Water Resources in Surrounding Agriculture and Forestry

4.2.1 Strengthen coal water quality monitoring

Coal water resources are mainly used for irrigation of surrounding agriculture and forestry. Therefore, relevant water conservancy and agricultural departments must strengthen the monitoring of coal water quality. There is a close relationship between coal water quality and agriculture and forestry. If water quality is ignored, it will not only greatly reduce the output of agriculture and forestry, but also pose a threat to the product safety of agriculture and forestry. Therefore, in order to ensure that the growing environment of agriculture and forestry is not polluted and ensure the food safety of agriculture and forestry products, it is necessary to strengthen the supervision of the quality of coal water.

4.2.2 Carry out technical research on coal water irrigation

The research focuses on the influence of coal water agricultural and forestry sewage irrigation on soil growth environment, yield and quality of agricultural and forest-related products and groundwater quality, as well as the transformation of soil environment under different irrigation conditions (including irrigation times and irrigation amount), the growth of agriculture and forestry, and the yield and quality of agricultural and forestry products. The maximum bearing range of harmful substances in coal water under different soil conditions was studied. Provide scientific irrigation methods for different agricultural and forestry crop species around. On this basis, the paper puts forward the sewage irrigation methods, times of irrigation and the best irrigation quota for different agricultural and forestry crop varieties in different soil environments, so as to make coal water scientific and safe in agricultural and forestry irrigation.

4.2.3 Establish a coordinating body for the management of coal water pollution irrigation

The design of coal water irrigation problems in agriculture and forestry to various departments, including water conservancy departments, agricultural departments and environmental protection departments. The discharge of coal water should be managed by the urban construction and environmental protection departments. However, the irrigation and utilization of coal water should be managed by the water conservancy department. Without coordination, it is easy to have multiple interventions in coal water irrigation but no one manages it. Therefore, it is the most important work for coal water irrigation to establish a coordination organization for coal water management as soon as possible.

5. Conclusion

The development and utilization of coal water resources is beneficial to ease the shortage of water resources, especially to the surrounding agriculture and forestry. On the one hand, the development of coal water resources alleviates the problem of insufficient agriculture and forestry irrigation and is beneficial to the growth of agriculture and forestry. On the one hand, unscientific development and utilization of coal water resources will cause pollution to the growing environment of the surrounding agriculture and forestry, cause pollution to agricultural and forestry products, and endanger the safety of agricultural and forestry products. Therefore, it is necessary to strengthen the scientific development and utilization of coal water resources, promote its positive influence on the surrounding agriculture and forestry, and further promote the development of the surrounding agriculture and forestry.

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