Study on the Application of Comprehensive Evaluation in Comprehensive Evaluation of Water Environment Quality

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Abstract: The comprehensive evaluation of water environmental quality is based on the data of water environmental quality in a certain region within a certain period of time, select a number of representative and analyzable indicators, through the way of comprehensive analysis, establish a comprehensive analysis mathematical model, and then evaluate its quality grade according to the index weight value, the results of the evaluation and the relevant data of the mathematical model can provide an effective and intuitive reference for water resources pollution prevention, later protection, development and utilization. This paper analyzes the methods and requirements of comprehensive evaluation of water environment quality and the application of comprehensive evaluation method in water environment quality evaluation from three aspects: main index of water environment quality evaluation, water resources classification and comprehensive evaluation method, and then studies how to scientifically establish comprehensive evaluation model, and summarizes its data advantages and environmental protection significance in comprehensive evaluation of water environment quality.

1. Introduction

In the comprehensive evaluation of water environment quality, there are a variety of mathematical models in China, each mathematical model will be based on the specific conditions of the water environment, in different indicators and grade division has a certain adjustment. The process of comprehensive evaluation of water environment quality is mainly based on the obtained measurement data, select the index that needs to be analyzed and establish the corresponding weight of the index. Finally, the index is introduced into the established mathematical model analysis to obtain the evaluation grade. This requires a focus on water quality evaluation, in the evaluation process, both comprehensive consideration of the whole, but also to select some representative indicators, the main indicators are determined, conducive to the exclusion of secondary factors, more can help us in the complex data for independent analysis.

2. Main Indicators of Water Environmental Quality Assessment

2.1. Grade of "Quality ", Change of" Quantity "

There are two aspects in the evaluation of water environmental quality, one is the "quality" of water resources, which is mainly reflected in turbidity, microbial species, heavy metal content, the quantity and living condition of aquatic organisms, etc. This "quality" level is mainly related to the local climate change law, the degree of survival of aquatic organisms and biodiversity, a stable water environment system, there will be a stable and complete biosphere; In formulating environmental protection policies to improve water environmental pollution and biosphere imbalance caused by abnormal indicators or the reduction of certain organisms caused by human

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activities, relevant departments need to refer to the data and classification of water environmental indicators in the corresponding regions, and combine the overall data in the region to propose sustainable development programmes that are in line with the actual situation, so as not to affect the original ecological balance, taking into account one another as the basic requirement, analyze and forecast the data, establish the final plan and take protective measures [1].

Figure 1 Water that can be visually identified

The other is the "quantity" of water resources, which mainly includes the changes of the total amount of regional water resources, the data of the fluctuation of foreign water resources with the season and so on. To some extent, the "quantity" of water resources is related to the overall ecological environment of the region and the amount of biological water intake, and the water in nature is always changing the state of existence, circulating in a fixed area through the mode of evaporation and rainfall. In the comprehensive evaluation of water environment quality, what is needed is a comprehensive and systematic comprehensive evaluation result [2]. By comparing the seasonal and periodic changes of water resources' quantity, it can provide a more comprehensive scientific basis for the comprehensive evaluation of water resources' quality, and it can also find out the large increase or decrease of water resources in time, analyze the causes of the total quantity change, timely early warning of natural disasters such as drought and flood, and make corresponding improvement measures to the deterioration or pollution of water environment.

2.2. Current Status Determines Classification, Phenomenon Identification Methods

Water environment is a relatively large concept, including both ecological environment and industrial system; separate classification of water, water is mainly divided into surface water, groundwater, drinking water and industrial discharge water; according to ecological standards, there are well water, river water, sea water and so on, and drinking water standards to classify, mainly drinkable and undrinkable. Different water quality forms different water environment and also divides into different evaluation standards, but these standards are all one-sided and can not represent the overall quality of the water environment. The comprehensive evaluation is to be able to grade the water environment in a certain period of time in a certain region with data language.

At present, the main purpose of water environment quality assessment is to make scientific analysis on the two aspects of water environment capacity and water pollution control, to draw intuitive and effective conclusions, and to provide data support for the protection of water resources policy system and water environment quality monitoring [3]. The use of comprehensive evaluation method can control the overall situation, both comprehensive and systematic evaluation of water environmental quality, but also focus on the conditions of data support, some aspects of the water environment can be independently analyzed.

Figure 2 More stable water environment in ecosystems

2.3. Comprehensive Evaluation Method —— Fuzzy Comprehensive Evaluation Method

It is known that the common methods of water environment quality evaluation mainly include grey clustering method, fuzzy comprehensive evaluation method and so on. Because the water environment situation is complex and changeable, the measurement results of various water quality indexes will also be affected by many aspects, so the index weights determined by each model and the mathematical analysis methods are different.

A simple look at the quality evaluation of the water environment, only from some representative indicators, can be preliminarily concluded; but in some more complex waters, more effective evaluation methods, more accurate and scientific judgment, all based on scientific data analysis, can provide effective data support for the improvement and protection of the water environment. The application of comprehensive evaluation in comprehensive evaluation of water environment quality provides measurable, weighted and independent data support for complex water environment conditions, and points out the direction for water environment quality protection [4].

Fuzzy comprehensive evaluation is a general evaluation of the water environment affected by various fuzzy factors. Because the water environment is complex and changeable, the various indexes are interrelated and influence each other, and there is great uncertainty and randomness. From the point of view of the change of the water environment, the fuzzy comprehensive evaluation solves the difficult problem of analysis caused by the rapid change of the water environment and the complex situation, which accords with the general law of data analysis; because in the comprehensive evaluation of water environment quality, there are many complex phenomena and changeable factors, the application of fuzzy comprehensive evaluation method can quantify the quality of water environment, and the quality grade of water body can be evaluated to achieve the purpose of evaluation by grasping the key indicators in a targeted way.

The comprehensive evaluation of water environment quality obtained from fuzzy comprehensive evaluation is a scientific and quantified effective evaluation, considering the complex and changeable water environment and the mutual influence of various index factors, and has certain reference significance in environmental control and pollution prevention and control, which is the main manifestation of comprehensive evaluation in water environment quality evaluation.

Figure 3 Water environment for scientific treatment following comprehensive evaluation

3. Establishing a Comprehensive Evaluation Model to Protect the Water Environment

The comprehensive evaluation model of water environment quality is established to select the main indicators, from the single goal evaluation, comprehensive multi-objective evaluation, give different weights, under the combination of qualitative analysis and quantitative analysis, through the software classification analysis of the data, find the reasons, draw conclusions. The conclusion of the comprehensive evaluation is mainly applied to the control of the overall situation of the water environment, pollution prevention and control, and provides data reference for the management department to formulate improvement policies.

3.1. Establishment of Integrated Models

In order to establish the comprehensive model, we should select the corresponding index and then establish the mathematical model on the basis of obtaining the water environmental quality index within a certain time limit.

At the same time, the integrated evaluation of water resources needs to be focused; in the evaluation process, it is necessary to consider the whole as a whole, but also to select some representative indicators, the main indicators are determined, which is conducive to the exclusion of secondary factors, and more independent analysis in the complex data. And the clarity of the evaluation index can also make the established mathematical model have high maneuverability. In the case of accurate data, through rigorous and consistent with the analysis of professional theory, we can draw the correct conclusion, combine the dynamic and static indexes pertinently, and draw a comprehensive conclusion.

3.2. Protection of the Water Environment

Comprehensive analysis of water environment measurement data can comprehensively and systematically understand the current situation of water environment, which has positive significance for the protection and development of water environment. Although in the early selection of indicators, there are many mutual influence and changeable factors may affect the screening of data, but through the conclusion of fuzzy comprehensive analysis, water environmental quality can be effectively analyzed, its main purpose of systematic and comprehensive analysis of water environmental quality is to better protect the water environment. In addition, reference to the conclusions of comprehensive evaluation to formulate measures and implementation, gradually improve the quality of water environment, but also regular data sampling, to provide raw data for future water environment quality evaluation.

4. Summary

The application of comprehensive evaluation to water environment quality assessment can solve the problems of water environment evaluation with various indexes, complex geographical situation and intersecting factors, and provide effective evaluation for water environment quality systematically and scientifically after selecting the key indicators from the complicated data.

References

[1] Zhang, Zhao., Zhang, Yanzhi. The Cloud Element Model for Comprehensive Evaluation of Water Environment Quality A Cloud Matter-Element Model for Comprehensive Evaluation of Water Environmental Quality with Interval Number and Its Application% Interval Number. Practice and Understanding of Mathematics, vol. 049, no. 008, pp. 269-276, 2019.

[2] Yan, Shousong., Wang, Guotao., Li, Haifeng. Comprehensive Evaluation of Water Environment Quality of Yuecheng Reservoir in 2017%2017 Comprehensive Evaluation of Water Environment Quality of Yuecheng Reservoir. Wetland Science, no. 2, pp. 179-184, 2019.

[3] Liu, Yuwei., Liu, Jian. Fuzzy Comprehensive Evaluation of Water Quality in Shahe River. Journal of Hebei Institute of Water Conservancy and Electric Power, 2019.

[4] Liu, Liping., Zhao, Shimin., Zhang, Yu. Comprehensive Evaluation Method of Water Environment Quality in Dianchi Lake. China Environmental Monitoring, 4, 2019.