Original Research Article

Ecological Environment Analysis of Saihanba Artificial Forest Farm Based on Weighted TOPSIS

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Abstract: After more than half a century of transformation, Saihanba artificial forest farm has become the largest artificial forest in the world, which has made great contributions to the overall coordinated development of China's ecological civilization and the construction of ecological civilization system. In this paper, the function of artificial forest farm is quantitatively analyzed and evaluated by establishing environmental assessment model.
Keywords: Weighted TOPSIS; Entropy weight method

1. Problem background

China adheres to the concept that green water and green mountains are golden mountains and silver mountains, and adheres to respecting and protecting nature. We will incorporate environmental protection into the national and local medium, long-term and annual national economic and social development plans, implement the strategy of sustainable development, improve the ecological civilization system and build a beautiful China.China's Saihanba forest farm has become a green farm with wind prevention and sand fixation under the construction of the state.As early as the 1960s, a group of young people came to this desolate desert, where generations of people dedicated their lives.Now Saihanba has become the largest artificial forest farm in the world, creating a green scene and providing rich nutrients for Beijing, Tianjin and other places. On the one hand, the historical mission of "civilized development and ecological prosperity" continues. At the same time, it is also facing new challenges. This paper describes it under this background.

1.1 Question requirements

Based on the above background, we need to establish mathematical models to solve the following problems:

Select appropriate indicators and collect relevant data, establish a comprehensive evaluation model of the impact of Saihan dam on the ecological environment, and use the model to compare and analyze the environmental conditions before and after the restoration of Saihan dam.

1.2 Model assumptions

It is assumed that the selected eight tertiary indicators have a great impact on the environment, ignoring the impact of secondary factors.

2. Model solving

2.1 Index selection

Based on the characteristics of the ecological environment change of Saihan dam, this study selects the indicators that can highlight its characteristics, which can objectively reflect the environmental change of Saihan dam. There are three indicators: the number of days of reaching the standard, the number of days of reaching the standard, the amount of carbon dioxide absorbed by the forest environment, the number of days of reaching the standard, the amount of carbon dioxide absorbed by the forest environment, the number of days of reaching the standard, and the environmental quality of the urban area, including three indicators: the first level, the amount of carbon dioxide absorbed by the forest environment, and the second level. The specific evaluation index system is as follows:

Table 1 environmental impact assessment index system of Saihan dam

Primary index	Secondary index	Tertiary indicators
	soil environment	forest coverage
		Coverage area
		Forest stock
natural environment	atmospheric environment	Urban air quality standard days
		Carbon dioxide absorption
		Oxygen release

	water environment	Water conservation
		Surface water quality reaches scalar

2.2 Determination of three-level index weight by entropy weight method

The following table is the calculated index weight table.

Table 2 index weight

Index	W1	W2	W3	W4	W5	W6	W7	W8
Weights	0.1227	0.1005	0.1007	0.1247	0.1531	0.1745	0.1136	0.1009

amongW1、W2、...、W8It is eight three-level evaluation indicators. By comparing and analyzing the weights of the eight indicators, it is concluded that the three indicators of air quality up to standard days, water conservation and surface water quality up to standard rate have a great impact.

2.3 Establishment of TOPSIS evaluation model

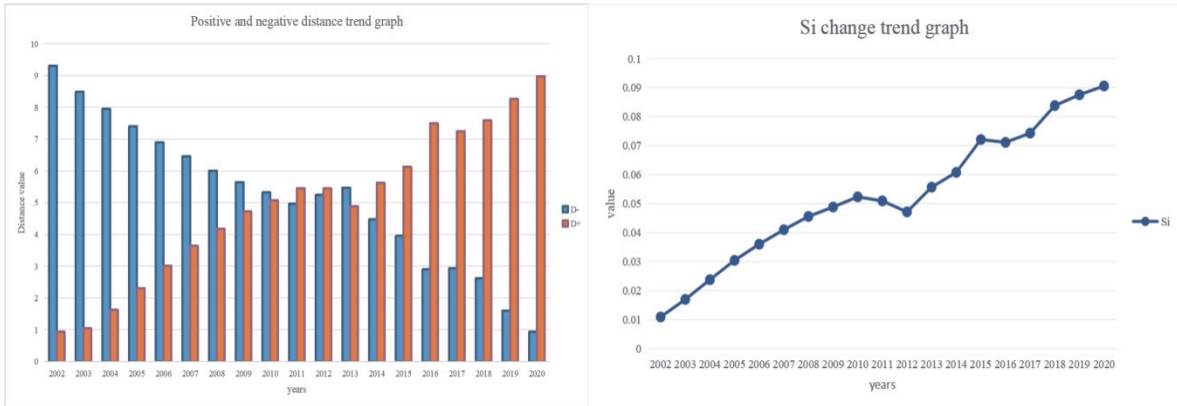The weighted TOPSIS is used to obtain the following pasting progress chart.

Figure 1 positive and negative distance and relative fit

As can be seen from Figure 1, the overall environmental situation of Saihan dam has shown good development in the past 19 years, which also reflects China's adherence to the concept of respecting nature, living in harmony with nature, protecting nature and putting resource conservation, environmental protection and restoration of nature in the first place.

After the establishment of ecological protection area, the comparison of green forest changes in Saihanba is as follows:
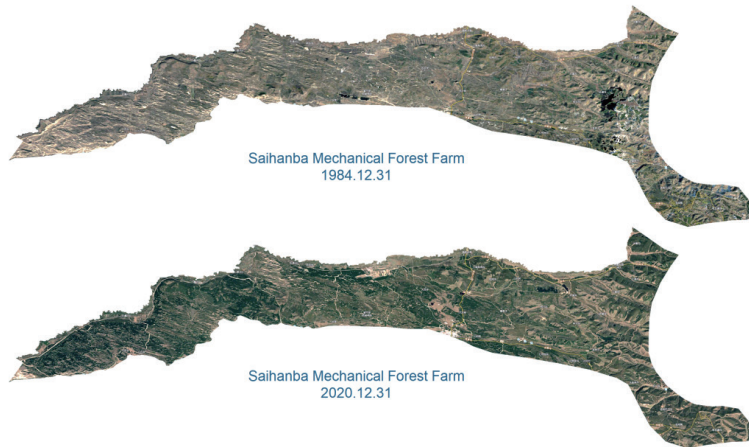

Fig.2 change of green forest in Saihanba Forest Farm

From the figure, we can intuitively find that after more than 30 years of transformation, the green forest area of Saihan dam has increased rapidly, which has played a great role in protecting the environment.

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