

LETTER TO THE EDITOR

Construction of Rationality Assessment Model for Natural Resources Utilization in Rural Areas

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Based on the coordination degree index and fuzzy comprehensive evaluation method, based on the four dimensions of scale intensity, structure, layout and efficiency, the index system and model for the rationality evaluation of natural resources utilization in rural areas are constructed. The results show that the current utilization of natural resources in rural areas is basically at a reasonable level or above; the regional differentiation of natural resources utilization in rural areas is obvious, and the problem of unreasonable structure and layout is particularly prominent; the rational use of natural resources in rural areas in some areas is reasonable. The constraints are different. The constructed evaluation index system and model method are closer to the current content and means of macro-control of natural resources in rural areas. The evaluation results can provide scientific guidance for rational planning of water resources allocation and utilization and improvement of natural resource management.

Rural areas; Natural resources; Evaluation index system; Rationality assessment.

I INTRODUCTION

With the rapid growth of demand for environmental capacity due to the accelerated development of economic construction and urbanization, the spatial and temporal distribution of natural resources in rural areas does not match the spatial and temporal distribution of demand. The contradiction between supply and demand of natural resources and environmental pollution in rural areas is becoming more and more serious. The rationality evaluation of natural resource utilization in rural areas is the basis and basis for grasping the utilization of natural resources in rural areas and formulating plans for the sustainable development and utilization of natural resources in rural areas. To comprehensively implement the ecological civilization strategy and solve the natural resource environment and regional economy in rural areas. The contradictions and problems of development have important practical significance.

Bo Wang, Zhiyong Li, Tianyu Fan, et al published an article in the journal Ekoloji's 2019 Issue 107 entitled "Modeling of Economic Value Assessment of Ecological Environment Agricultural Resources based on Binary Tree Option Pricing" (Wang et al. 2019). This paper establishes an economic value evaluation model of agricultural resources based on binary tree option pricing model. Based on the binary tree option pricing model, the key variables of the binary tree option are set by the stage gate method. The variables of selecting tree location were determined and the actual success probability of single stage of agricultural resource economy was

calculated. According to the probability, the economic value of agricultural resources at binary tree nodes was calculated. The actual probability of success is transformed into the risk-neutral probability of success. By calculating the risk neutral probability of each stage of agricultural resources economy, the economic value of agricultural resources at each node is deduced. Experiments show that the model can effectively and accurately evaluate the economic value of agricultural resources, but this method does not analyze the rationality of the development and utilization of agricultural resources. In this regard, relevant scholars have studied it.

Based on the object-field model, Liu (2017) understands the impact of basic farmland delineation as the systemic effect of the basic farmland protection zone delineation, the basic farmland functional elements, and the organic combination of the three elements of the basic farmland protection zone. Function. Based on the gravitational model of spatial interaction, a basic farmland delineation rationality evaluation model including basic farmland delineation suitability, basic farmland functional element coordination and distance coefficient is constructed. The research results can be used for management decision-making departments. Evaluation of the rationality of the spatial layout of farmland protection areas, providing a basis for rationally arranging basic farmland production, ecological functions, and adjustment of basic farmland layout (Liu and Bi 2017). Dai (2016), the article uses the analytic hierarchy process to comprehensively evaluate 20 evaluation indicators of the three aspects of the agro-ecological tourism resources, ecological environment conditions and tourism development conditions of Nanjing, and combines the judgment matrix of the two pairs. Field survey analysis, expert scoring and other methods to determine the weight value and evaluation score of the evaluation index system, construct a multi-index comprehensive evaluation model of agro-ecotourism resources weighted summation, and evaluate the main agro-ecological tourist attractions in Nanjing (Dai 2016).

Most of the above literatures are evaluations of the degree of utilization of natural resources, focusing on the research on the status and potential of natural resource utilization. The evaluation of the rationality of natural resource utilization in rural areas is relatively rare, and its connotation and evaluation criteria are still to be discussed. Under the macro scale, the results of natural resource utilization evaluation have insufficient support and service for the decision-making of natural resource allocation management in rural areas, and it is difficult to provide directions and objectives for the scale, intensity, structure, layout and efficiency control of natural resources in rural areas.

II IDEA DESCRIPTION

The rational use of natural resources refers to the development and utilization of natural resources according to local conditions. It matches the natural resource endowment conditions in terms of scale, intensity, structure, layout and efficiency, and is suitable for economic and social development needs in order to seek the best economic benefits. Ecological and social benefits enable coordinated development of the social economy and population, resources and environment. The goal of rational development and utilization of natural resources in rural areas is consistent with the goal of sustainable use of natural resources.

1 Evaluation index system construction

According to the characteristics of social economy, water and soil resources, ecological and environmental systems, multi-factor correlation, realization mechanism diversity, regional differences and specialities, according to the principles of science, operability, systemicity and dynamics, The target layer - the criterion layer - the factor layer - the indicator layer, constructs the rationality evaluation index system of natural resources development and utilization in rural areas from the four dimensions of scale intensity, structure, layout, efficiency and benefit. .

(1) Reasonable evaluation of scale intensity: It mainly considers whether the development and utilization of natural resources in rural areas matches the amount of natural resources, whether there are problems such as

over-exploitation of natural resources, and whether the minimum ecological demand can be guaranteed to maintain its basic ecological functions. Available evaluation indicators include natural resource utilization rate, natural resource extraction rate, etc.

(2) Evaluation of structural rationality: Considering the supply and consumption of natural resources in rural areas, whether the supply scale and structure of resources are compatible with natural resource endowment conditions, whether the current supply of natural resources meets the daily needs, and natural resources are in agriculture and industry. Whether the distribution of different industry questions is compatible with the scale of the industry.

(3) Evaluation of rationality of layout: mainly considering whether the development and utilization of natural resources in rural areas has better guided the rational layout of national economic and social development, whether it conforms to relevant industrial development policies, whether natural resources development and utilization are sufficient and reasonable, and whether shipping functions are Get effective play and so on.

Evaluating the rationality of efficiency and efficiency: mainly considering whether the regulation of natural resources in rural areas has improved the efficiency of national economic growth, and whether it has effectively guaranteed the living needs of urban and rural residents.

2 Calculation and evaluation of individual indicators

According to the connotation of rational development and utilization of natural resources, a comprehensive evaluation index system is established to quantify various evaluation indicators. The indicators under the two dimensions of scale intensity and efficiency are directly accessible to the statistical data; the evaluation indicators under the two dimensions of structure and layout need to be calculated by the coordination index model. The degree of coordination index is the degree of functional matching between the various elements within the system or system. It is currently used for the coordination evaluation of resource environment and social economy. According to the sub-systems of natural resources and economic and social systems and their internal characteristics, combined with the classification research of coordination degree model, this paper selects two coordination degree calculation models to scientifically reflect the rationality of natural resources development and utilization structure and layout system (Huang et al.2016).

Resource development and utilization structure coordination degree for the characteristics of the natural resources development and utilization structure system in rural areas, reference to the principle of coefficient of variation, the construction coordination degree calculation formula:

$$C = \left\{ \frac{f(x) \times g(x)}{\left[\frac{f(x) + g(x)}{2} \right]^2} \right\}^k \quad (1)$$

In the formula, C is the degree of coordination, $0 \leq C \leq 1$; $f(x)$ and $g(x)$ respectively represent different constituent elements within the system to be evaluated; k is the adjustment factor (≥ 2), In this paper, the value of k is 2. Theoretically, the smaller the dispersion between $f(x)$ and $g(x)$, the larger the C value and the higher the degree of coordination. $C=1$, The system reaches the optimal coordination state; $C=0$, Serious system imbalance.

Based on the evaluation and grading of various evaluation indicators under various dimensions, a fuzzy

comprehensive evaluation model is established to comprehensively and quantitatively evaluate the rationality of natural resources development and utilization in rural areas, which is consistent with the multi-level and multi-factor characteristics of natural resource systems, avoiding the It is difficult to assign weights due to the large number of evaluation factors. Since the boundaries between “reasonable coordination” and “unreasonable disharmony” are not objective, the degree of membership in fuzzy mathematics is used to quantitatively describe the degree of “reasonable coordination”, and the evaluation threshold is more realistic. In this paper, the fuzzy comprehensive evaluation of the dimensions of scale, intensity, structure, layout, efficiency and benefit is carried out, and then the evaluation results of four dimensions are re-evaluated to obtain a multi-level fuzzy comprehensive evaluation for evaluating the rationality of natural resources development and utilization in rural areas. result.

The multiplicative index model is used to comprehensively calculate the membership degree of each individual index. It is emphasized that only when all indicators meet the condition of “reasonable coordination”, the whole system can satisfy the evaluation of “reasonable coordination” conditions (Xu and Hu 2017). Calculate the rationality membership degree of the four dimensions of natural resources development and utilization in rural areas, and the rationality membership degree of the whole system. The specific formula is as follows:

$$L_c = \prod_{i=1}^n [f(c_i)]^{\varepsilon_i} \tag{2}$$

In the formula, L_c is the comprehensive membership degree; $f(c_i)$ is the membership degree of the single indicator; n is the evaluation index number; ε_i is the index weight of the first indicator. Because the evaluation index system constructed in this paper is relatively simple and systematic and direct, it is determined that the importance of each evaluation index to each dimension and each dimension to the whole system can be used to judge the rationality of the development and utilization of natural resources in rural areas. The higher the degree, the larger the value indicates that the rationality of the development and utilization of natural resources in rural areas is higher, and the scores of the previous texts can be classified according to the rationality level.

III RESULTS

The platform modeled in this paper is PAMAP GIS software, which realizes various mathematical relationship calculations through the Modeller module of the system (Zou 2017). According to the mutual relationship of various natural ecological factors, the grading magnitude and weight coefficient of each indicator are utilized.

$$index = \sum_{i=1}^a W_i \cdot C_i \quad (\text{In the formula, } W \text{ is the index value, } C \text{ is the corresponding index weight, and } i \text{ is the}$$

index of a certain subsystem.), The natural ecological subsystem index value, the social economic subsystem direct statement, and the farmland pollution subsystem are calculated separately. Then, based on the above three subsystem index values, the comprehensive quality index of natural resources is calculated.

According to the evaluation of the above evaluation indicators, the evaluation value of each evaluation index on the basic analysis unit is between 0 and 5. Based on a comprehensive analysis of the characteristics of the comprehensive quality index of natural resources in rural areas, the quality level of natural resources in rural areas will be Divided into 5 levels. According to the model calculation, the evaluation statistics are shown in Table 1.

Table 1 Comprehensive Quality Assessment Results	evaluation number	Area (hectare)	Area percentage (%)

of Natural Resources.quality level			
1	0-1	4748	1.97
2	1-2	6111	2.54
3	2-3	23120	9.61
4	3-4	89425	37.17
5	4-5	48978	20.36

It can be seen from Table 1 that most of the natural resources in the region are of good quality, and the order of the quality of natural resources is in line with the actual utilization of natural resources in rural areas.

IV DISCUSSION

As far as the current rational evaluation results of natural resources development and utilization are concerned, the degree of coordination and rationality are only relative values. Only in the comparative analysis of different region or time periods can the relative significance of quantitative evaluation results be reflected. The essence of the rationality evaluation of the exploitation and utilization of natural resources in rural areas is the analysis process combining certainty evaluation indicators with the evaluation criteria and influencing factors with uncertainty. Due to the endless development, the cyclical liquidity and rationality of natural resources There is no absolute standard, but is dynamic and changeable. Therefore, for the refinement of the evaluation unit of natural resources development and the improvement of the model method, the macro-control direction and countermeasures of scale intensity, structure layout, efficiency and benefit, naturally Many problems, such as the dynamic monitoring of resource development and rationality, and the coordinated development of the rural economy, have yet to be further studied.

V CONCLUSION

This paper starts from the four dimensions of scale and intensity, structure, layout, efficiency and efficiency. Based on the coordination degree index and fuzzy comprehensive evaluation method, the index system and model of rational evaluation of natural resources development and utilization were constructed. The degree of membership was used to quantitatively describe the degree of "reasonable coordination", and the rationality and objective evaluation of natural resources development and utilization in rural areas were solved. The lack of standards, artificially delineating the subjectiveness of the evaluation threshold is too strong. The experimental results show that the evaluation results are reasonable and can comprehensively reflect the coordination degree of natural resources development and utilization, resource endowment conditions, economic and social development needs, and ecological civilization construction requirements in rural areas, and grasp the system structure and space for the development and utilization of natural resources in rural areas. Differences, the formulation of rural natural resources development and utilization remediation protection planning, has a positive practical significance, more effective close to the requirements of macro-control management decisions in rural areas.

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