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EVALUATION OF RURAL ECOLOGICAL ENVIRONMENT DEVELOPMENT BASED ON THE ANALYTIC HIERARCHY PROCESS

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Abstract

Evaluating the development level of the rural ecological environment is essential for promoting sustainable rural revitalization and improving environmental quality. This study develops a comprehensive evaluation framework for assessing rural ecological environment development using the Analytic Hierarchy Process. An index system consisting of four main dimensions as: ecological environment, ecological economy, ecological protection, and ecological living was established, including 16 representative indicators related to forest coverage, livestock waste treatment, fertilizer and pesticide application, drinking water quality, rural income, and ecological agriculture. Indicator weights were determined through expert consultation and consistency testing, while gray relational analysis was applied to evaluate the contribution and correlation degree of each indicator. The results indicate that ecological economy exhibited the highest weight (0.4839), followed by ecological environment (0.2736), ecological living (0.1371), and ecological protection (0.1054). Among the individual indicators, fertilizer application, livestock manure treatment rate, and drinking water qualification rate showed the strongest influence on rural ecological environment development. The findings reveal that excessive agrochemical use, insufficient ecological protection measures, and inadequate rural environmental infrastructure remain the main constraints affecting sustainable rural development. Based on the evaluation results, targeted improvement measures are proposed, including optimization of environmental monitoring systems, promotion of ecological agriculture, application of advanced monitoring technologies, and enhancement of rural environmental governance mechanisms. The proposed evaluation framework provides a practical decision-support tool for assessing rural ecological environment quality and supporting sustainable rural development strategies.

Key words: development level, hierarchical analysis method, rural ecological environment

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