ENLIGHTENMENT FOR RESILIENCE THEORY ON THE RURAL RESIDENTS LIVELIHOOD IN KARST MOUNTAIN AREAS

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Research background.

- Global environmental change. A series of increased extreme events and intensified human activities have caused livelihood systems to be subjected to various types, intensities and frequencies of pressure and disturbances, which not only exacerbated the instability and vulnerability of rural household livelihoods but also increased the demand for measures to improve the livelihood resilience (LR) of rural residents.
- Coupling of environment and livelihoods. There is a typically high correlation between environment and the livelihood. Impoverished areas and groups are usually concentrated in mountainous areas and ecologically fragile areas.

Research method. This research employs the Systemic literature review (SLR) approach to systematically and clearly determine, select, critically evaluate and summarize relevant research through five processes: ceremony, search, assess, synthesis and report.

Research results. The global distribution of research areas related to LR, which covers 32 countries and regions. They concentrated in East Asia, Central Asia, Southeast Asia, sub-Saharan Africa and other underdeveloped regions.

The overall number of publications on LR is increasing.

The research content of LR was primarily summarized and classified from three perspectives: concept and connotation (n=4), influencing factors (n=26) and evaluation (n=54).

Primary research progress. Resilience as a system attribute, necessitates that the system have the following capabilities: (1) the ability to withstand and still exist in the original steady state (i.e. maintain structure and function unchanged) despite change; (2) the ability to adapt to changes, restructure structures and develop functions to a more complete state, achieving the ability to improve system sustainability; (3) the ability to prepare for potential changes in the future

Existing research on the influencing factors of LR mainly focused on livelihood strategies and livelihood capital, revealing how adaptation strategies and capital act a part in the establishmen and enhancement process of LR.

Research results. The existing frameworks mainly include four categories: capital-based, definition-based, capacity-based and decomposition-based. The evaluation methods for LR involve disciplines such as sociology, statistics, and mathematics, and have gradually shifted from qualitative analysis to quantitative analysis, including not only pure qualitative analysis and modeling analysis, but also empirical measurement analysis combining multiple methods.

Critical scientific issues to be resolved.

1. The establishment of LR should not only consider individual and family scales but also incorporate elements such as community, culture, and power relations into its scope.

The magnitude of LR is influenced by a variety of factors, including both natural and human disturbance, as well as dimensions such as community, culture and power relations. The LR of rural residents is not only restricted by quantifiable economic and asset factors, but also depends on people's subjective initiative, community support, risk perception and socio-cultural background

2. Enhancing the LR should be based on dynamic analysis.

The LR of rural residents themselves are inherently continuous, and research on the resilience of short-term or cross-sectional data not only overlooks the sustainability of their

resilience, but also hinders the revelation of the interaction mechanisms between livelihood components and the role of each element in livelihood evolution.

3. Further improving research on LR in different types of ecologically fragile areas.

Ecological fragile areas are the most typical and intense areas of ecological environment destruction, as well as the areas with the most concentrated livelihood poverty problems. The fragile ecosystem and weak economic system lead to residents in these ecological fragile areas hovering on the margin of returning to penury and being susceptible to pressure and disturbances. Therefore, improving the level of residents' livelihood has turn into a major practical issue facing sustainable development in ecological fragile areas.

4. Establishing an evaluation framework for LR from the perspective of actors, combining multiple disciplines.

Establishing a framework for evaluating the LR should focus on the following aspects:

• Research should focus on the stance of actors, grasp the picture of the overall environment of the livelihood system of residents, and explore the social processes of researchers when facing disturbances and pressures.

• Vertically grasping the dynamic changes in LR, facing impacts and pressures, comprehensively analyzing the spatial interactions and time series relationships between different activity segments. And identifying and describing livelihood trajectories through individual spatiotemporal experiences, dynamically predicting the evolution rules of LR, and grasping the dynamics and complexity.

• Using interdisciplinary, comprehensive, and nonlinear methods to construct a LR evaluation framework with multidimensional perspectives and dynamic characteristics.

Research enlightenment. The typicality and particularity of the coupling between karst mountain environment and farmers' livelihood.

The Karst Mountainous Areas is identified as the most economically impoverished and most ecologically vulnerable areas in China. It has concentrated nearly 50% of the country's impoverished people, and is one of the areas with the highest concentration of impoverished people in China. Residents rely heavily on environmental resources for their livelihood.

Conclusion.

• Establishment of LR for rural residents in KMAs should be coordinated with ecological protection.

• Improving LR of rural residents in KMAs by developing agroforestry and diversifying non-agricultural income.

• A 'bottom-up' approach to construct a framework for analysing the LR of rural residents in KMAs

ЗАТРАТЫ ЭНЕРГИИ ПРИ ОСВОЕНИИ МЕСТОРОЖДЕНИЙ САПРОПЕЛЯ

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Сапропель – осадки пресноводных водоемов, образованные из отмерших растительных организмов, минеральных веществ биохимического происхождения и привнесенных минеральных компонентов, имеющие зольность не более 85% [1]. Сапропель обогащен органическим веществом, кальцием, фосфором, серой, микроэлементами, биологически активными веществами и поэтому широко применяется в земледелии,