

Analysis of Research Hotspots and Trends in Agricultural Landscapes from 1986 to 2025

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Abstract

This study takes agricultural landscapes as its research object and conducts a visual analysis of relevant domestic literature using keywords such as "agricultural landscape" and "farmland landscape." It reveals that research on agricultural landscapes has shown an upward trend from 1986 to 2025, reaching a peak in 2019 before slightly declining. The hotspots, trends, and future directions of research are primarily concentrated in landscape design, rural landscapes, and landscape ecology. This study aims to provide theoretical support and practical guidance for the sustainable development of agricultural landscapes.

Keywords

Agricultural landscape; bibliometric analysis; research hotspots; trends

1. Introduction

1.1. Research Background

As a key component of agrarian culture, the sustainable use of agricultural landscapes holds significant importance for the sustainable development of rural areas and agriculture. With the acceleration of urbanization^[1], rural landscapes are undergoing drastic changes and facing numerous challenges, making research on agricultural landscapes an increasingly focal area in academic circles.

1.2. Research Objectives and Significance

This study aims to comprehensively analyze literature in the field of agricultural landscapes to identify research hotspots, trends, and future directions, providing theoretical support for the conservation and optimization of agricultural landscapes. By analyzing the evolutionary trajectory of agricultural landscape research, this study seeks to clarify future research directions and contribute to the implementation of rural revitalization strategies.

1.3. Research Methods

A bibliometric analysis of literature related to agricultural landscapes in the CNKI database was conducted using visualization techniques such as co-occurrence analysis of keywords, timeline analysis, and cluster analysis to identify research hotspots and trends. By combining content analysis of literature and policy orientations, this study explores future research directions.

Bibliometric analysis is a research method based on mathematics and statistics that quantitatively analyzes literature and its various features. Using CiteSpace[2] software, this study adjusts relevant parameters to reveal the development status and changes in scientific structures through knowledge maps.

The literature review method involves examining, organizing, and analyzing existing literature to explore social behaviors, relationships, and phenomena. It is characterized by non-reactivity, indirectness, historicity, and flexibility.

The method is a reasoning approach that generalizes from specific cases or sub-arguments to derive general conclusions. It identifies common characteristics among multiple specific examples or sub-points through sorting and analysis, forming new knowledge and theories.

2. Data Sources

To systematically analyze academic progress in the field of agricultural landscapes, this study selects relevant literature published from 1986 to 2025 in the CNKI database. The selection criteria include keywords such as "agricultural landscape" and "farmland landscape" to ensure the literature aligns closely with the research theme. This study aims to provide a comprehensive and accurate foundation for subsequent academic discussions and data analysis, ultimately offering robust theoretical support for the sustainable development of agricultural landscapes.

3. Research Results

3.1. Ecological Functions and Biodiversity Conservation of Agricultural Landscapes

Agricultural landscapes not only serve as the foundation for agricultural production but also play a vital role in biodiversity conservation. Research indicates that biodiversity in agricultural landscapes is significantly influenced by land use patterns[3][4], landscape structures[5][6][7], and management[8] practices. For example, studies of European agricultural landscapes have found that[9] species richness is positively correlated with the area of semi-natural habitats, while the use of chemical fertilizers is negatively correlated with plant and bird diversity. This suggests[10] that the ecological functions of agricultural landscapes are closely related to their structural complexity[11], and the protection and restoration of semi-natural habitats are critical for enhancing biodiversity[12].

Additionally, the heterogeneity of agricultural landscapes has a significant impact on biodiversity, particularly in terms of ecosystem service provision[13][14]. A "landscape-wide" perspective[15] should be adopted in agricultural landscape management to comprehensively consider ecological processes at both local and broader scales, providing theoretical support for ecological management.

3.2. Landscape Design and Multifunctionality of Agricultural Landscapes

Agricultural landscape design is not only concerned with aesthetics but also integrates ecological functions[16], economic benefits, and social and cultural values. Among 229 articles on landscape design, research primarily focuses on agricultural tourism landscape design, followed by landscape design in rural construction. For instance, starting from 2007, studies explored[17] the key points of designing rural ecological leisure spaces. By 2013, research concentrated on the of agricultural sightseeing parks and plant landscaping. By 2018[18][19], the scope of research expanded to include affiliated green spaces and agricultural complexes[20], encompassing multiple types such as agriculture and facility agriculture. By 2023[21][22], research on agricultural landscape design had evolved to focus not only on showcasing agricultural scenery but also on integrating ecological, urban planning, cultural, and digital optimization perspectives[23][24][25].

3.3. Cultural Value and Heritage Conservation of Agricultural Landscapes

TAgricultural landscapes are not only products of natural and human activities but also serve as vital carriers for cultural heritage. Mayordomo-Maya and Hermosilla-Pla emphasize that agricultural landscapes hold significant cultural heritage value and should be incorporated into national and local cultural policy frameworks. For example, Spain has designated its agricultural landscapes as cultural heritage, achieving sustainable utilization through landscape evaluation and conservation measures.

In 2006, the research team led by Min Qingwen proposed the agricultural heritage project to protect agricultural biodiversity, traditional agrarian culture, and unique, environmentally adapted agricultural landscapes. They emphasized the need for careful study of protection and development strategies[26]. By 2011, research on the protection and safeguarding of agricultural heritage had begun to emerge. By 2016[27][28], studies focused on the relationship between protection and utilization, highlighting the importance of agricultural heritage in achieving the strategic goals of the United Nations Food and Agriculture Organization. By 2021[29], agricultural heritage had been integrated with ecological conservation[30][31], and research into the protection of agricultural heritage[32] had begun. Recent studies have emphasized the role of local residents in agricultural heritage conservation,

promoting their proactive involvement in daily[33].

3.4. Policy Support and Management Challenges

Agricultural landscapes not only serve as the foundation for agricultural production but also provide essential ecosystem services, such as pollination, natural pest control, soil and water conservation, and biodiversity protection. The sustainable development of agricultural landscapes heavily relies on policy support. The Common Agricultural Policy (CAP) of the European Union has significantly influenced agricultural landscape management. For instance, Simon Jakobsson's research indicates that agricultural subsidies influence farmers' management decisions, particularly regarding tree planting and landscape heterogeneity. However, policy effectiveness varies by region and requires adjustments based on local conditions[34].

Effective agricultural landscape management also requires scientific data and knowledge support. For example, Susan M. Capalbo and others highlight the critical role of data, knowledge, and institutional arrangements established by governments and non-governmental organizations in supporting agricultural landscape management.

Additionally, agricultural landscape management faces numerous challenges, including land use changes, climate change, and market fluctuations. Research emphasizes the need for interdisciplinary collaboration, involving ecologists, landscape designers, policymakers, and farmers, to achieve a balance between ecological, economic, and social benefits.

4. Discussion and Prospects

4.1. Deepening Research on Agricultural Landscape Formation and Agrarian Civilization Inheritance

This study explores strategies to enhance the ecological and economic value of agricultural landscapes while preserving traditional agrarian culture. Comprehensive considerations of local natural environments, socioeconomic conditions, and farmers' cultural cognition are essential. For instance, strengthening research on the historical and current status of agricultural landscapes in mountainous areas can clarify their uniqueness and value. Efforts should be made to preserve traditional agrarian culture by establishing exhibition areas and experience bases to attract visitors and scholars, thereby boosting local economic development. Additionally, modern ecological agriculture concepts should be promoted, such as organic farming, to improve the ecological benefits of agricultural landscapes and achieve sustainable agricultural development. Furthermore, government and societal support, including financial investment, policy support, and talent cultivation, is crucial for implementing these strategies.

4.2. Expanding Research Dimensions and Innovating Research Methods

Future research should transcend the analysis of specific landscape elements and adopt a multi-scale, multi-factor approach. For example, combining macro-level ecosystem services with micro-level species diversity can help understand interactions and influences at different scales. Additionally, analyzing agricultural landscape evolution mechanisms considering the combined effects of socioeconomic and natural environmental factors can provide theoretical support for management policies.

Innovative research methods can incorporate advanced technologies such as remote sensing, GIS, and machine learning to enhance research efficiency and accuracy. Remote sensing enables rapid acquisition of land surface information for spatial pattern analysis, while GIS supports geographic information management and spatial analysis, revealing ecological processes and service functions. Machine learning can identify data relationships and predict future trends. Integrating these technologies can deepen our understanding of agricultural landscape patterns and provide scientific evidence for sustainable development.

5. Conclusion

This study systematically analyzed research hotspots and trends in agricultural landscapes using CiteSpace, revealing their interdisciplinary characteristics and policy-driven mechanisms. Future research should further explore agricultural landscape patterns, ecological service functions, and agrarian civilization inheritance to promote sustainable agricultural landscape development and provide theoretical support and practical guidance for rural revitalization strategies.

Additionally, interdisciplinary collaboration is essential to integrate knowledge and methods from ecology, geography, sociology, and economics into a comprehensive research framework. By comprehensively exploring the multifunctionality, ecological value, and interactions of agricultural landscapes with socioeconomic systems, more holistic and in-depth scientific evidence can be provided for their protection and sustainable development. Furthermore, emphasis should be placed on the application of research outcomes, transforming theoretical findings into actionable management measures and practical solutions to enhance the real-world impact of agricultural landscapes in rural revitalization efforts.

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