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## Research Status of Terrace Cultural Landscape Based on Citespace (Postprint)

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### Abstract

Terrace farming represents an agricultural adaptation strategy through which human societies harmonize with natural environments and topographical conditions. In recent years, driven by economic development and the expansion of tourism, the conservation of terrace cultural landscapes has increasingly garnered scholarly attention. This study systematically retrieves relevant literature from the China National Knowledge Infrastructure (CNKI) database, selects highly pertinent publications, and employs CiteSpace software to extract prominent keywords, analyze author affiliations, and identify key research terms within the field. The paper synthesizes existing research, provides commentary on publication trends concerning terrace cultural landscape conservation, and summarizes findings across multiple dimensions including policy, science and technology, and tourism. Finally, it proposes future conservation strategies and policy recommendations for terrace cultural landscapes.

### Full Text

### Preamble

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### Research Status of Terrace Cultural Landscape Based on Citespace

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### Abstract

Terrace farming represents humanity's adaptive response to natural conditions and topographical constraints. In recent years, with economic development and

the growth of tourism, the protection of terrace cultural landscapes has gradually entered public consciousness. This paper retrieves relevant literature from CNKI, selects highly pertinent studies, and uses CiteSpace to extract hot keywords, authors, and institutions in this research field. The study summarizes and critiques the volume of literature on terrace cultural landscape protection, reviews developments from policy, scientific/technological, and tourism perspectives, and proposes future protection policies for terrace cultural landscapes.

**Keywords:** Terraced fields; Landscape; Cultural landscape

## Introduction

Cultural landscape refers to the composite landscape formed through intentional human modification of natural landscapes to meet specific needs, reflecting the comprehensive geographical characteristics of a region. Terraced fields constitute a type of cultural landscape that embodies millennia of human wisdom. To address food security challenges, ancient peoples constructed terraces in hilly areas, representing the crystallization of agricultural practice. China pioneered terrace construction, with its terraces primarily distributed across mountainous regions south of the Yangtze River, concentrated in Guangxi, Yunnan, and Guizhou. These areas feature abundant rainfall and mountainous water resources, exemplified by the Ailao Mountain terraces in Yunnan and the Longji rice terraces in Guangxi. As achievements of human ingenuity, terraces have been recognized as important agricultural cultural heritage in China. By the end of 2021, eight terrace systems had been designated as nationally important agricultural cultural heritage sites.

Today, vigorous tourism development in terrace regions generates economic benefits but simultaneously causes varying degrees of damage to these landscapes. This paper analyzes and synthesizes the overall context and trends in terrace cultural landscape protection research in China in recent years, aiming to provide theoretical references for conservation efforts.

## Current Research Status in This Field

### Data Sources

The data for this study derive from Chinese-language literature in the CNKI periodical database. Over the past 15 years (2007-2021), we searched for literature related to terrace cultural landscape protection using the keywords “terrace,” “landscape,” and “cultural landscape,” limiting the scope to all journal publications. We then screened articles based on search results, removing studies with low relevance and master’s theses. Using CiteSpace V5.7.R2, we processed hotspots and trends in terrace cultural landscape research over the 15-year period and generated knowledge graphs.

### Analysis of Publication Volume in Related Fields

The annual distribution of literature shows a generally upward trend in publications on terrace cultural landscape. The number of CNKI journal articles increased steadily from 2007 to 2021, with a surge point in 2014 when 37 articles were published, indicating a sharp rise in research interest. Publication numbers continued to grow steadily thereafter, with only a slight decline in 2017. In 2017, General Secretary Xi Jinping's report at the 19th CPC National Congress emphasized the concept that "clear waters and green mountains are as valuable as mountains of gold and silver," leading to increased research on terraces in 2018, with publications rising to 47. The number reached a new high of 56 in 2019, as shown in [Figure 1: see original paper].

### Author and Institutional Distribution Analysis

Using CiteSpace software, we identified the main publishing institutions as the School of Tourism and Geography at Yunnan Normal University, the Institute of Geographic Sciences and Natural Resources Research at the Chinese Academy of Sciences, the University of Chinese Academy of Sciences, the School of Tourism at Guilin University of Technology, and the School of Landscape Architecture at Beijing Forestry University. The analysis reveals that institutions with high publication volumes are primarily universities, with some research institutes also showing significant attention, as illustrated in [Figure 2: see original paper].

High-yield authors include Jiao Yuanmei, Wu Zhongjun, Min Qingwen, Liu Xin, and Liu Chengjing. As shown in [Figure 3: see original paper], Professor Jiao Yuanmei of Yunnan Normal University occupies a central position and has collaborated with numerous authors. Professor Jiao specializes in landscape ecology, cultural geography, remote sensing, and GIS, making substantial contributions to terrace landscape ecology research. Professor Wu Zhongjun of Guilin University of Technology examines residents' perceptions and the impacts of community-based agricultural cultural heritage tourism in Longji terraced landscapes, offering innovative insights for the field. Min Qingwen, a researcher at the Institute of Geographic Sciences and Natural Resources Research, focuses on ecological agriculture, agricultural cultural heritage protection, and ecosystem service functions, providing valuable perspectives on terrace ecological protection. The visualization reveals that while some authors have formed excellent research teams, overall collaboration remains insufficient. Strengthening cooperation between universities and institutions would facilitate better academic exchange on terrace cultural landscapes.

### Analysis of High-Volume Journals

From 2005 to 2019, *Green Science and Technology* published the most research on terraced landscapes with nine articles, followed by *Chinese Landscape Architecture* and *Acta Ecologica Sinica* with seven articles each. Journals such as *Landscape Architecture* and *Chinese Journal of Ecology* are also important

venues in this field, as shown in [Figure 4: see original paper]. The disciplines most engaged with terraced landscape research are landscape architecture and ecology.

#### Journal Analysis Chart

The Journal	Quantity
Journal of Green Science and Technology	9
Chinese Landscape Architecture	7
Acta Ecologica Sinica	7
Landscape Architecture	-
Chinese Journal of Ecology	-

#### Keyword Co-occurrence and Research Topic Cluster Analysis

Keywords, repeatedly mentioned in titles, topics, abstracts, or full texts, serve as retrieval markers and concentrated reflections of research topics. Their frequency indicates the popularity of specific research areas. To summarize research hotspots, we imported CNKI data into CiteSpace, set the time slice to one year, and used keywords as network nodes. The keyword co-occurrence network for terrace cultural landscape literature identified 36 keywords with frequency greater than 4, as shown in [Figure 4: see original paper]. After removing three keywords highly similar to the research topic (“terrace,” “landscape”), the top five keywords were: Hani terraces (68 occurrences), cultural landscape (28), agricultural cultural heritage (22), terraced field landscape (18), and landscape pattern (16). Additionally, “Hani” and “World Heritage” were common keywords. Recent scholarship has increasingly focused on “rural revitalization” and “traditional villages.”

The top 20 prominent keywords from 2006 to 2021 are shown in [Figure 5: see original paper], which displays keyword salience. Higher salience indicates greater influence during a given period. The top ten keywords are: surface water, terrace culture, Hani terrace culture, Yuanyang County, tourism, soil and water conservation, terraces, Hani nationality, and Wuling Mountain area. This demonstrates that scholars prioritize terrace culture, ecological protection, and tourism.

#### Research Trends

To analyze research trends in terrace cultural landscape, we adjusted the visual layout to a TimeZone map, which reveals how keyword frequencies change over time and indicates developmental trajectories. The time series analysis of public space vitality literature derived from CNKI data shows that circular nodes represent keywords, with larger circles indicating higher frequency changes. Overall, “Hani Terraces,” with the highest average rate of change and early appearance in the literature, received the most attention from early scholars. Over time, due

to policy initiatives promoting rural economic development and natural landscape protection, research focus has gradually shifted toward keywords such as “sustainable development” and “rural revitalization,” reflecting current conditions and conservation measures for China’s terrace cultural landscapes, as shown in [Figure 6: see original paper].

## **How to Protect the Cultural Landscape of Terraced Fields**

### **Policy Measures for Terrace Cultural Landscape Protection**

Terraces constitute important agricultural cultural heritage in China, and some renowned terrace systems are listed as Globally Important Agricultural Cultural Heritage or World Heritage sites, necessitating government policy intervention for protection. Weak policy implementation contributes to terrace cultural landscape degradation. Scholars such as Hu Weifang, Zhang Yongxun, and Wang Wei have studied the agricultural cultural heritage of Fujian United Terraces using landscape ecology principles and methods, suggesting improvements through eco-tourism and mutual compensation mechanisms between villagers and government. Zou Fangfang, Wang Wei, and Hu Minjie have identified problems and opportunities in local socioeconomic development, offering recommendations on infrastructure construction, agricultural sustainability, and tourism enhancement. Li Junming and Deng Min examined the landscape protection mechanism of Longji rice terraces, analyzing internal protection mechanisms and tourism threats to terrace agricultural culture, proposing solutions through benefit distribution mechanism reform and infrastructure strengthening. Following Hani terraces’ World Heritage listing, Yan Haiming and Xie Li argue that “standardized diversity” can help similar cultural heritage sites.

Public participation proves crucial for terrace cultural landscape protection. Yan Guotai, Ma Rui, and Zheng Guangqiang studied Hani terraces cultural landscape through community participation, analyzing dilemmas in community involvement and constructing a conceptual model for community participation in World Heritage protection, validated through practice. Wu Zhongjun’s research on tourism impacts on Longji rice terraces cultural landscape identifies problems including changes in villagers’ planting patterns, conflicts between tourism development and terrace cultivation, and benefit distribution issues. Scholars advocate addressing these challenges through government intervention and public participation.

Successful local policies offer valuable references. Chen Koudan, Chen Zhiyuan, and Zheng Yan found that Taiwan’s Bayan settlement experience could inform Fujian United Terraces development, providing inspiration for local farming culture design. Chen Koudan and colleagues also noted that many Taiwanese rural communities have revitalized local development through PuMen sustainable design concepts, using Bayan settlement as an example to enlighten agricultural landscape tourism development in China. Cheng Haifan, Zhang Pan, and Zhu Liangwen researched local community participation, style and environmental

renovation, and management safeguard measures through Hani terraces, offering recommendations for departmental management and technical assistance. Liu Ruiqi and Ye Xi conducted field investigations and case analysis of Hani Folk Village in Dengkou, Honghe Prefecture, identifying local landscape problems and proposing suggestions for increasing terrace resource utilization, cultural inheritance, infrastructure strengthening, and landscape planning. Gravagnuolo Antonia and Varotto Mauro analyzed emerging terrace restoration practices from a circular economy perspective, discussing how to restore the positive role of terrace landscapes in modern society.

These studies demonstrate that while local governments have implemented terrace cultural landscape protection policies, these remain imperfect. Effective implementation of people-benefiting policies is essential for terrace cultural landscape conservation.

### **Science and Technology Promoting Ecological Protection of Terrace Cultural Landscape**

Technological development plays a significant role in monitoring and ecological protection of terraced landscapes. Geographic Information Systems (GIS) represent a specific and crucial spatial information system. Scholars employ GIS to study terrace cultural landscape protection. Zhang Kanfeng, Jiao Yuanmei, and Liu Xin analyzed visual landscape sensitivity of Hani Terraces using GIS technology, dividing the core heritage area's visual landscape into four zones for differentiated protection planning based on relevant factors. Zong Luping, Jiao Yuanmei, and Li Shihua used field investigation, interviews, and GIS mapping analysis to study rural settlement landscapes and evolution in Hani Terraces Heritage Area, offering terrace protection recommendations. Zhou Zongjun, Bao Jigang, and Weng Shixiu used GIS technology to extract local land use type information from Honghe Hani terraces to investigate government intervention effects. Zhao Dongmei, Jiao Yuanmei, and Qiu Yingmei applied the MaxEnt model with GIS grid analysis to study landslide susceptibility in Hani Terraces' core area, providing ideas for sustainable development and disaster monitoring/prevention.

High-resolution remote sensing technology also proves valuable. Zheng Wenwu, Liu Peilin, and Zhou Yimeng used high-resolution remote sensing images to extract information from Ziquejie terraces in Xinhua County, Hunan Province, employing landscape pattern index analysis to study local human-environment relationships. Wang Chenli, Xu Dan, and Lin Wenpeng used high-resolution satellite remote sensing images to monitor cultural landscape heritage elements before and after application in Honghe Hani Terraces, analyzing land cover status and change trends while exploring the feasibility and reliability of remote sensing methods for heritage element change monitoring. Li Wanyuan, Tian Jia, and Ma Qin used remote sensing image supervised classification technology with Google Earth Engine (GEE) support to monitor loess terrace dynamics, demonstrating efficient and accurate long-term, large-scale monitoring on the

GEE cloud platform. Yang Rongjuan, Liu Yang, and Min Qingwen used Landsat satellite remote sensing images to study landscape evolution characteristics of dry-farming Shiyuan terrace agricultural cultural heritage sites in Shexian County, Hebei Province, discussing driving factors of landscape evolution.

Yucong Miao, Yanling Huang, and Shengfeng Luo analyzed tourist landscape perception and characteristics through high-frequency vocabulary and semantic network analysis, identifying problems in rural eco-tourism area landscape planning and proposing planning recommendations.

In summary, 3S technology (GIS, RS, GPS) and computer network technology dominate terrace protection research. GIS serves as the primary tool, with RS and GPS providing support, while computer network technology integrates with modern communication skills to form information systems for social modernization, employing various technologies in combination.

### **Tourism Industry Optimization Promoting Terrace Cultural Landscape Protection**

Recent tourism development has brought terrace tourism into public view, but large visitor numbers have simultaneously damaged terrace cultural landscapes. Scholars have developed tourism industry optimization plans. Wang Ting, Hu Xinjun, and Qiu Yuxi analyzed overall tourism planning goals, principles, and concepts for Yunhe Terraces, proposing a three-system framework of “landscape + viewing + supporting” to enhance terrace cultural landscape tourism experiences.

Sustainable development has become a hot topic in terrace cultural landscape research. Geoffrey Wall, Sun Yehong, and Wu Ping studied sustainable tourism development in terraced landscapes, comparing tourism relationships between south-central Bali, Indonesia and Honghe Hani terraces in Yunnan, China. They proposed measures for Honghe Hani terrace tourism development across four dimensions: resources and accessibility, market and marketing, emphasizing that tourism development must prioritize sustainability. Dong Qian and Su Yang, researching sustainable tourism using Hani Terraces as a case study, argued that protecting large-scale living cultural heritage like Yunnan’s Hani Terraces requires preserving human-land relationships, offering recommendations at protection, development, and management levels.

Rural hollowing-out has emerged as a critical issue in terrace regions, as young people migrate for employment, leaving only elderly and children behind—posing significant challenges for local tourism development, primarily due to economic factors. Zhang Aiping, Zhang Jiaojiao, and Zhang Yongxun analyzed coupling characteristics between farmers’ livelihoods and agricultural land use through empirical investigation of Hani terraces, using coupling coordination degree and LOWESS fitting methods. They argued that agricultural cultural heritage protection should not only focus on land protection and utilization but also establish tourism-to-agriculture feedback mechanisms to increase agricultural production

supplementary income. Li Junming and Li Zhongbin researched Longsheng Longji Rice Terraces Scenic Area, exploring terrace landscape change mechanisms under tourism impacts from an economic perspective through participant observation and interviews, offering recommendations on construction and tourist number limitations. Wang Mei, Jiao Yuanmei, and Hua Honglian studied Honghe Hani Terraces, using questionnaires and interviews with mathematical statistical analysis to examine differences in local residents' perceptions and attitudes toward tourism impacts, revealing significant variations in tourism resources, management, and economic aspects. Addressing economic issues would attract more young people to related occupations and solve rural hollowing-out problems.

Nostalgia tourism has emerged as a new tourism form. Xie Yanjun, Yu Jia, and Wang Danping researched nostalgia tourism using qualitative and quantitative methods to study nostalgia and landscape relationships. Lin Qianqian and Zhao Qiaoyan studied Guilin Longji Terrace Scenic Area from a nostalgia perspective, conducting field investigations of different groups and proposing nostalgia tourism recommendations.

Liang Yan and Wang Hongsong proposed protection suggestions for Hani Terraces through landscape gene mapping, digital expression induction, and demonstration examples, combining landscape genes with digitalization to provide ideas for tourism product development. Chen Koudan proposed immersive design strategies for combined terraced field rural tourism by investigating tourist perception and participation behavior in agricultural cultural experiences. Guannan Zhu, Xiande Li, and Yongxun Zhang studied multi-stakeholder participation mechanisms in tourism management for maintaining important agricultural heritage systems, finding that coordinators, Dazhai village committees, and local governments were key management factors. Zhe Wang and Lawal Marafa studied landscape imagination and potential cultural conflicts in tourism based on social imagination theory, using Honghe Hani terraces as a case study. Jun Gao, Hongxia Lin, and Chaozhi Zhang collected data through participant observations and semi-structured interviews, finding that local governments, state-owned tourism enterprises, and hotel operators benefited significantly from regional tourism without sharing responsibility for heritage landscape maintenance. The authors argue that villagers play the most crucial role in maintaining cultural landscapes for contemporary and future Chinese citizens and tourists but face numerous constraints and obstacles.

## Existing Problems and Development Trends in This Research Direction

### Existing Problems

#### (1) Lack of a Comprehensive Terrace Tourism Policy System

The cultural landscape of terraced fields has suffered partly because relevant government policies do not align with public sentiment or are improperly imple-

mented. First, most Chinese terraces are located in southern mountainous regions with inconvenient transportation, making terrace tourism access difficult and disadvantageous for development. Second, regarding benefit distribution mechanisms with villagers, some local policies are inadequate, resulting in uneven interest distribution. This leads to low villager willingness to participate in terrace tourism construction, inability to retain local youth, and rural hollowing-out. While Longji rice terraces are now under policy control, terraces outside scenic areas are often abandoned because local residents prefer tourism employment over farming. Zhou Zongjun and colleagues' research on Hani terraces reveals similar trends of drought and abandonment in recent years.

### **(2) Ecological Destruction of Terraces**

Recent studies reveal ecological protection problems, including Yuanyang Hani terrace villagers abandoning rice cultivation for off-season vegetable planting in pursuit of economic benefits. This reduces paddy field area, decreases local biodiversity, and degrades terraced landscape value. Additionally, due to economic factors and labor transfer, some terraced land lies abandoned, causing serious slope collapse and land degradation that damages local ecosystem stability.

### **(3) Gradual Disappearance of Traditional Terrace Culture**

Improved village economic conditions have introduced new architectural styles, patterns, and materials that often create adaptability issues with surrounding geographical environments while meeting residents' new needs. For example, Hani terraces' traditional "mushroom houses" and Longji rice terraces' dry-fence buildings have gradually evolved into brick-tile dwellings, forming courtyard-style settlement structures. Currently, some new buildings' exteriors, styles, and materials closely resemble urban houses, destroying harmony between local architecture and surrounding terraced landscapes. Local culture faces loss risks, including dialects, songs, dances, and handicrafts. Young people are unwilling to learn terraced farming techniques or engage with traditional culture, leading to imminent loss of some traditional cultures.

## **Development Trends**

### **(1) Strengthen Tourism System Construction to Promote Terrace Cultural Landscape Protection**

Governments should introduce strengthened control policies to better integrate terrace cultural landscapes with tourism, enabling tourists to better understand these landscapes. By establishing special supervision and coordination departments for agricultural cultural heritage development, governments can effectively plan and guide infrastructure construction at heritage sites, preventing repeated rural infrastructure development and mismanagement damage. This can promote cultural tourism construction, develop terraced rural tourism and cultural creative industries, inject cultural soul, and form unique rural intellectual property systems. When necessary, consider appropriate tourist number restrictions to reduce excessive pressure on terrace ecological environments. To rationalize benefit distribution mechanisms, subsidies should be provided to

farmers working terraced fields, and profit distribution proportions should be readjusted. These farmers should not be treated as ordinary farmers; their income should be paid by tourism development companies according to labor volume, which can both increase farmers' income and enhance cultural self-confidence.

### **(2) Spontaneous Public Promotion of Terraced Landscape Protection**

Local people should be allowed to participate in terrace cultural landscape protection, as they better understand local conditions and can provide more effective conservation. Government departments need to provide policy support to protect community residents comprehensively, which can promote planning formulation while empowering government action. Moreover, in remote areas with unsound community organizations, smooth government promotion is even more essential. We must strengthen national self-confidence, protect China's important agricultural cultural heritage, and root terraced culture in local residents' hearts. As agricultural cultural heritage sites represent inseparable property of local residents, villagers also have their own cultural and political needs, hoping decision-makers and practitioners will incorporate their opinions and ideas into protection processes.

### **(3) Strengthen Ecological Protection to Promote Terrace Cultural Landscape Conservation**

Ecologically, we should vigorously strengthen supervision of terraced plants, primarily rice fields. On this basis, we can appropriately increase agricultural organism diversity, expand rice varieties, and enhance terrace biodiversity to support economic growth, help rice adapt to different environments, effectively prevent pest and disease threats, and resist extreme weather. Developing eco-tourism can enhance terrace tourism development sustainability through environmental protection education for tourists, helping reduce ecological damage caused by tourism. Tourist numbers in terraced scenic areas should be scientifically allocated according to eco-tourism capacity.

## **Conclusion**

This paper reviews relevant literature on terraced landscapes and, based on CiteSpace visualization of terrace cultural landscape information, analyzes and summarizes hotspots and trends from 2007 to 2021, during which document numbers have continuously increased. The study synthesizes terrace cultural landscape protection research across policy, science and technology, and tourism industry dimensions, proposing a series of recommendations. In recent years, increasing attention has been paid to terrace cultural landscapes, with some protection policies launched successively, though significant gaps remain. Future research should continue expanding depth and breadth in this field, strengthening cross-disciplinary integration to develop new theoretical explanations from sociological, geographical, management, economic, and ecological perspectives. Terrace protection can also provide foundations for sustainable development and promote research on similar landscape patterns. Through this systematic review,

this paper hopes to provide theoretical foundations and practical references for terrace cultural landscape research in China.

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