

Analysis and Prospect of Traditional Tibetan Settlement Landscape Knowledge Mapping Based on the Citespace Method

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Abstract—Based on the periodical papers of CNKI database from 2001 to 2020 and the information visualization analysis software Citespace, this paper makes a visual analysis of the study of Tibetan settlement landscape in China, and draws the knowledge mapping of Tibetan settlement research, such as author, cooperative network, organization, core keywords and so on. The results show that the number of research papers on Tibetan settlement landscape in China is relatively small, and the overall growth is unstable; the research authors and institutions are mainly concentrated in the southwest, and university organizations are the backbone of research in this field; the research method is single, and the content mainly focuses on the style and features of residential houses, protection and renewal, tourism development and habitat research; Geographic location, history and politics, inheritance, protection and development, policy and current affairs are the main factors that affect the development of Tibetan settlement landscape. The landscape differences of Tibetan settlements in different regions are significant; at present, the inheritance of Tibetan settlement culture is weak, the landscape distortion is serious, and the public lacks protection consciousness. Under the background of the policy of rural revitalization, based on the literature review and analysis, this paper looks forward to the sustainable development of Tibetan settlement landscape, and puts forward that the research of Tibetan settlement landscape should achieve multi-disciplinary integration, and the innovation of research methods and the diversification of practice paths are the development direction in the future.

Keywords—Tibetan settlement landscape, Visual analysis, Citespace, Knowledge Mapping, Landscape architecture

I. INTRODUCTION

Settlement is the initial place of human activities, it is not only a gathering place for people to live, rest and carry out various social activities, but also a place for people to work and produce, usually including rural settlements and urban settlements [1]. Traditional settlements contain rich aesthetic values and cultural heritage, which are the witness of the changes of the times and the material carrier of national cultural life. The Tibetan settlements^① are mainly concentrated on the Western Sichuan Plateau on the Tibetan-Yi Corridor^②. This is a transitional zone for cultural integration and exchange between the northwest ethnic groups going south and the southern ethnic groups going north. The Tibetan settlements in Sichuan belong to the type of mountain plateau settlement, which is more diverse and integrated Features. With the rapid development of tourism in ethnic areas, driven by the economy and the impact of

foreign culture, the ethnic cultural characteristics of the Tibetan settlement landscape have been seriously lost. In the report of the 19th CPC National Congress in October 2017, the Party put forward the rural revitalization strategy and vigorously promoted the construction of beautiful villages, which provided new ways and opportunities for the development of traditional settlements in ethnic minority areas.

The phased induction and summary of the research results of ethnic settlements is helpful to grasp the research situation as a whole, but the previous reviews and prospects of ethnic settlements are mostly based on the qualitative carding of literature. And there is great subjectivity in literature selection and classification standards, hot spot tracking and direction control. Therefore, this paper uses the Citespace software system in bibliometrics as a research means to show the relationship between the development process and structure of scientific knowledge [2], and to construct a visual knowledge mapping system for Tibetan settlement research to sort out the research hotspots, research frontiers and evolution laws in this field, so as to provide innovative space for follow-up research.

II. DATA SOURCES AND RESEARCH METHODS

A. The data source

Taking CNKI as the data source, using the bibliometrics and statistics function of CNKI and Citespace analysis software, the research papers on Tibetan settlement landscape published from 2001 to 2020 are searched on the topics of Tibetan settlement, Tibetan village and Tibetan landscape. 944 literatures were retrieved, and 692 papers with the lowest superficiality and relevance were excluded. Finally, 302 valid literatures were obtained as samples for this data analysis. The main research object in the literature is Tibetan settlement landscape in western Sichuan. There are few studies on Tibetan settlements in other areas. Each sample includes author, title, institution, time, keywords and abstract information. The retrieval time is October 5, 2020. All documents are exported to Citespace by reworks for processing.

B. Analysis tools and methods

Visualization is based on the computer as a medium, through the interactive analysis of abstract data and information, the visual and recognizable graphics and texts are obtained, and the internal scientific knowledge structure

^① The settlements referred to in this article refer to Tibetan rural settlements except for individual settlements in Tibetan towns.

^② The concept of "Tibet-Yi Corridor" was proposed by the famous Chinese anthropologist Professor Fei Xiaotong in 1979.

relationship, development trend and evolution law are explored to enhance the cognition of abstract information Degree [3], so that cumbersome data can be expressed through concise graphical language. Through the analysis of the node size, network connection degree, and the end point of the line segment in the knowledge mapping, various information such as the research evolution law, the relationship between the research content, and the research field hot spots are summarized. The information visualization tool used in this article is CitespaceV software, version 5.7.R1.64-bit.

III. STATISTICS AND ANALYSIS

A. Post time distribution

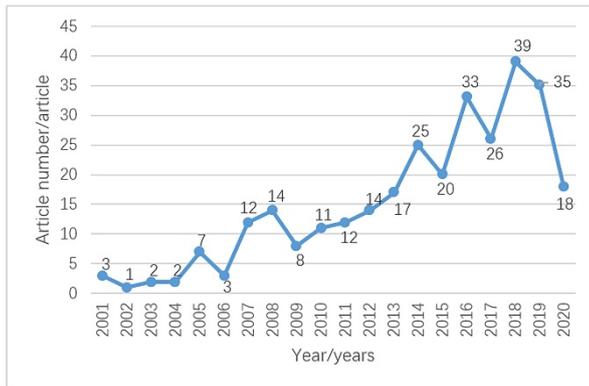


Figure 1. Distribution curve of published age of literature related to Tibetan settlement

The number of articles published in Tibetan settlement landscape in China is relatively small, showing an unstable increasing trend, and the number of articles has increased significantly after 2007, indicating that the study of Tibetan settlement landscape has gradually attracted the attention of domestic scholars. From the point of view of the development stage, the development of Tibetan settlement landscape in China has gone through three stages: the preliminary development stage, the steady development stage and the rapid growth stage (figure 1). In the preliminary development stage from 2001 to 2006, a total of 18 papers were published, and the research points were mainly focused on the evolution and inheritance of settlements, traditional architecture and ecological characteristics of settlements. It involves landscape ecology, geography, architecture, religion, history and so on. In the steady development stage from 2007 to 2011, a total of 57 articles were published, which increased the perspectives of fengshui and psychology, and carried out further research on settlement landscape and religious belief, residential architecture, tourism development and other aspects. Especially after the May 12 Wenchuan earthquake in 2008, the thinking on the post-disaster reconstruction of Tibetan settlements made the volume of articles reach the peak at this stage. In the period of rapid growth from 2012 to 2020, the number of papers has suddenly increased to 227, and the research content is more comprehensive, focusing on landscape space and conservation development, architectural change and conservation renewal, culture and tourism integration, habitat and so on. The research direction is closely related to national policies and current affairs, such as national parks, digital technology, community tourism, etc., especially after rural revitalization was proposed as a national development strategy in 2017, the volume of papers on Tibetan settlement landscape research reached its peak in the

following year, and gradually introduced quantitative methods, quantitative and qualitative combination, which is an important change in research means.

B. Analysis of the author and cooperation network

The data of 302 valid literatures were transformed into Citespace software to generate the author's co-cited clustering knowledge mapping (figure 2). There were 322 nodes, 188 links and 0.0036 network density in the map. According to the formula for calculating the number of articles published by the core authors of Price law, the formula is: $m=0.749\sqrt{n_{max}}$, where m value is the lowest number of articles published by the core authors, and n_{max} is the number of papers published by the most authors. Theoretically, the number of articles published by the core authors should account for half of the total amount of all articles [4]. After calculation, the core authors in this field can be obtained: the author with the largest number of articles is Li Junhuan, with a total of 7 articles, which can be obtained as $m=1.98$, rounded to 2, indicating that the author with more than or equal to 2 articles in this field can be regarded as the core author. According to the statistical literature, there are 53 authors with more than or equal to 2 articles, and the total number of articles published is 125, accounting for 39.3% of the total literature, which is much less than half of the total number of articles (Table I). Among them, authors with more than 4 articles published articles accounted for 12.87% of the papers. Most scholars have only solitary articles, which have not been studied in depth. A small number of highly productive authors have become the dominant force in the field of research. The settlement space morphology, traditional residential protection updates, Scenic road maintenance planning is a hot issue that these scholars have paid attention to in recent years.

From this data analysis, it can be concluded that (1) in the field of Tibetan settlement landscape research, there are few core authors, most scholars stay at the preliminary exploration level, and the research has not formed a complete knowledge system; (2) The network density value is only 0.0036, the cooperation intensity between scholars of different teams is low, and the academic relationship has become the bond of cooperation among a few scholars. The scholar cooperation network presents the overall characteristics of small concentration and large dispersion, and no strong cohesion has been formed research team.

TABLE I STATISTICS ON THE TOP FIVE ARTICLES PUBLISHED BY AUTHORS OF TIBETAN SETTLEMENT LANDSCAPE RESEARCH

Serial number	Author	Volume	Percentage of total papers
1	Li Junhuan	7	2.32%
2	Li Wei	6	1.99%
3	Liu Run	4	1.31%
4	Zhang Yan	4	1.31%
5	He Quan	3	0.99%
Subtota			7.92%



Figure 2. Cooperative network of high-yield authors in the study of Tibetan settlement landscape

C. Statistical Distribution of Publishing institutions

Based on the data analysis of the research institutions that published the literature, the figure has a total of 154 nodes, 60 links and a low network density of 0.0051 (figure 3). From 2001 to 2020, there are 90 research institutions that published documents, including 62 colleges and universities, 8 research institutes, 10 companies, and 10 social government organizations. According to Table II, the top five institutions for the number of research papers are all universities, and the total number of articles published accounts for 26.16% of the total. Among them, the top three are Southwest University for Nationalities, Xi'an University of Architecture and Technology, and Chengdu University of Technology, with 27, 24, and 11 articles respectively. From the perspective of secondary institutions, the study of Tibetan settlement landscape is mainly focused on the colleges of architecture, tourism, urban planning, and history.

TABLE II STATISTICAL TABLE OF THE TOP FIVE PAPERS PUBLISHED BY TIBETAN SETTLEMENT LANDSCAPE RESEARCH INSTITUTIONS

Serial number	Organization	Number of posts	Account for the total proportion of papers
1	Southwest Minzu University	27	8.94%
2	Xi'an University of Architecture and Technology	24	7.95%
3	Chengdu University of Technology	11	3.64%
4	Sichuan University	10	3.31%
5	Northwest Normal University	7	2.32%
Subtotal			26.16%



Figure 3. Co-occurrence map of high-yield institutions in the study of Tibetan settlement landscape

From this, we can see that the research of the core publishing institutions is mainly focused on the natural science theories such as urban planning, architecture, environmental science, and the perspective of humanities and social studies in geography, history and other aspects is

complex and shallow. It is mainly the cooperation between the core institutions in the same field, the lack of horizontal communication, the low intensity of cooperation, and the failure to realize the real cross-disciplinary cooperation in urban planning, architecture, society, geography and ethnic groups. The research institutions are mainly concentrated in the southwest, while the eastern and other regions are loosely distributed, showing obvious regional clustering characteristics as a whole.

D. Analysis of keyword knowledge mapping

High-frequency keywords actually imply the research focus, hot spots, trends and other information of specific areas or topics, and keyword co-occurrence analysis can reveal the commonality and differences of these implied information [5]. Point size and keyword size are positively correlated with keyword research popularity, and the number of connecting lines represents the intensity of keyword co-occurrence. The greater the number of connecting lines, the greater the intensity of keyword co-occurrence.

1) Co-occurrence map analysis of keywords

In the Tibetan settlement keyword co-occurrence knowledge mapping (figure 4), the number of network nodes is 387, the number of connecting lines is 549, and the network density is 0.0074. The data shows that the connection strength of each keyword is weak, and the research direction is scattered. Traditional villages, traditional settlements, Jiaju Tibetan village, Jiarong Tibetan, appear in the top 4. Judging from its first year, the key words such as protection and development, traditional houses and traditional settlements appeared relatively late, which is closely related to the proposal of the rural revitalization strategy in 2013, and the national policy has a strong guidance for the development of this field (Table III). Betweenness centrality can dig out the key nodes that play a strategic role in the whole network. The stronger the betweenness centrality of a keyword is, the more information flow between keywords it controls [6]. From Table III, it can be concluded that the highest betweenness centrality value is 0.28, the key word is Jiarong Tibetan, followed by traditional villages of 0.15 and traditional settlements of 0.10. The Jiarong Tibetan area is located in the Hengduan Mountains area on the eastern edge of the Qinghai-Tibet Plateau. It is located in the Tibetan-Yi Corridor for multi-ethnic cultural exchanges in the southwest and northwest. The special geography and ethnic integration of the high mountain valleys allow the Jiarong Tibetan to retain complete and unique cultural characteristics [7], It also integrates the cultural colors of the Han, Yi and Qiang ethnic groups, and reflects the inherent ethnic characteristics, regional characteristics and high cultural tolerance of the Chinese Tibetan landscape, making the Jiarong Tibetan settlement landscape extremely valuable for research and important in the Tibetan settlement landscape status. From the high-frequency keywords, the research perspective is characterized by regionality, culture and space-time. From a regional point of view, attach importance to the study of Tibetan settlements in the whole region, such as Amdo Tibetan area, and analyze the characteristics of different Tibetan branch settlements, such as Jiarong Tibetan, Baima Tibetan and so on. Based on the perspective of time and space, this paper discusses the evolution of Tibetan settlement environment and the protection and renewal in the process of urbanization. The key words in the outer edge, such as tourism, development, sustainable development and so on, are the new direction and new point of view of the

development in this field, and the research has a certain extensibility.

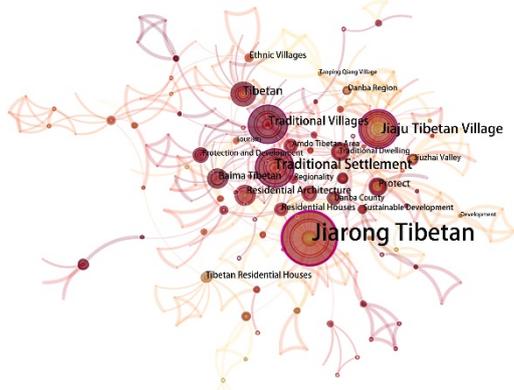


Figure 4. Knowledge mapping of keyword co-occurrence in Tibetan settlement

TABLE III TOP 15 HIGH-FREQUENCY KEYWORDS OF TIBETAN SETTLEMENT LANDSCAPE AND THEIR FIRST YEAR

Serial number	Keywords	Frequency	Betweenness centrality	First year
1	Jiarong Tibetan	24	0.28	2005
2	Traditional Villages	17	0.15	2011
3	Traditional Settlement	16	0.10	2013
4	Jiaju Tibetan Village	15	0.09	2007
5	Tibetan	12	0.09	2001
6	Settlement	9	0.04	2011
7	Baima Tibetan	9	0.06	2013
8	Residential Architecture	8	0.05	2005
9	Protect	8	0.09	2009
10	Traditional Dwelling	8	0.05	2014
11	Protection and Development	7	0.02	2016
12	Rural Settlement	6	0.02	2013
13	Amdo Tibetan Area	6	0.01	2014
14	Residential Houses	6	0.03	2004
15	Danba County	6	0.03	2005

2) Cluster Analysis of keyword Co-occurrence Map

In order to better show the relationship between the hot topics of Tibetan settlement landscape research, based on the knowledge mapping of keyword co-occurrence, the Timeline map is further clustered (Figure 5). Set the K value of the Show the largest K Clusters option in Citespace to 8, and get 8 clusters, namely # 0 traditional villages, # 1 Jiarong Tibetan, # 2 ethnic villages, # 3 Baima Tibetan, # 4 West Sichuan Tibetan, # 5 regional, # 6 folk culture, # 7 Gannan Tibetan Autonomous Prefecture.

a) Tibetan dwellings are typical representatives of traditional village landscapes

The regional architectural culture in Tibetan dwellings, which lasted for thousands of years, is the collective memory of Tibetan people, which contains unique customs and national emotions formed in the long-term historical development [8]. In traditional village landscape research, folk houses have the longest time limit and are the core content of the Tibetan landscape. The research is mainly carried out around the shape of folk houses, historical origin, and building renovation and protection. In the context of the historical development of folk houses, from the focus on folk houses and natural environment in 2005 to the architectural culture and national inheritance in 2010, and then to focus on the protection and renewal of residential buildings after 2014, reflecting the development of residential houses from single landscape elements to multi-disciplinary comprehensive

research stage. The function of Tibetan folk houses has changed from the early emphasis on defense to residence, supplemented by tourism supply. In the past 10 years, due to the stimulation of tourism and the modernization of residents' life, more Tibetan settlements have the phenomenon of convergence of cultural characteristics and lack of architectural vocabulary. The overall style tends to be Han nationality and modernization, while the coexistence of new and old buildings and the diversification of architectural styles [9]. The overall style tends to be Sinicized and modernized, while new and old buildings coexist and architectural styles are diversified [9]. In terms of residential renewal and protection, starting from the research perspectives of cultural geography, tourism, and residents' perception, the use of earthquake-resistant technology, ecological building technology, and digital technology for residential protection, while optimizing local industrial models, transforming spatial functions, and conducting sustainable residential reconstruction. By using the method of graph theory, this paper analyzes the size, attribute, structure, material and color of Tibetan settlement residence such as Jiaju Tibetan village, Seergu Tibetan village, Jiuzhai Valley Tibetan village and so on. It is revealed that as the material carrier of national and local man-land relations, social relations and ideology, the construction rules are gradually accumulated and internalized in the process of long-term adaptation and evolution [10]. Folk residence is the product of the humanistic consensus of gathering natural elements and national feelings, which deeply emphasizes the important position of folk residence in the Tibetan settlement landscape.

b) The development of tourism promotes the sustainable development of the concepts and methods for the protection and renewal of Tibetan settlements in Sichuan

In the cluster of Tibetans in western Sichuan, protection and renewal is the perspective of continuous in-depth research and sustainable development. The renewal of settlement environment is urgent due to the factors such as tourism development, urbanization process, rural revitalization policy, and regional culture weakness. The focus of protection has changed from the effective maintenance of residential buildings to the renewal of urban landscape in Tibetan areas to the planning and construction of traditional settlements, which has completed a gradual systematic and comprehensive process from the construction of micro-place spirit to the organization of meso-landscape elements and then to macro-scientific function planning. The development of settlement tourism changes from a single static landscape as tourism resources to a two-way tourism development model characterized by static scenery and dynamic cultural landscape. It is emphasized that the living Tibetan artificial landscape is the external material support of the core of Tibetan culture and a continuous local context coexisting with people's production and life. It is proposed that the protection and development need government guidance, residents' participation and social support, and relevant protection policies should be formulated from the perspective of landscape ecology. Especially after the May 12 earthquake, the Tibetan area in western Sichuan was seriously affected, and the spatial geography and cultural background of different regions were different. Post-disaster reconstruction often adopted the method of landscape difference renewal, and tourism was used to promote regional economic development.

c) Jiarong, Baima and Gannan Tibetan settlements are the key research objects.

Jiarong Tibetans are mainly distributed in the Jinchuan River Basin and Dadu River in the west of Qionglai Mountain. The settlement form is mainly mountainous settlement, which is characterized by centralized layout. The stone pillbox building is the symbolic building of Jiarong Tibetans and a typical representative of the three-dimensional cultural landscape of the plateau [11]. Exploring the roots of the Jiarong Tibetan national culture, emphasizing that the development of settlement landscape needs to be combined with the inheritance of local culture from the perspective of cultural symbols and landscape genes. The digital technology is used to quantitatively analyze the space, and the feature graphic method is used to transform the real landscape of the settlement into a schema language. Baima Tibetans mainly live in the Baima River Basin, Tielou Township, Wen County, Gansu Province, and Pingwu County and Jiuzhaigou County in Sichuan Province. The traditional village type is mainly mountain settlement, the traditional residence is represented by the earth wall fir board house, and the spatial form is monomorphic. How to maintain the inheritance of belief space while improving living comfort is the main problem to be solved in the development of Baima Tibetan traditional village, and the research on the organization, origin and analysis of space composition is still a little weak. It is the main reason for the predicament of village development [12]. Emphasize the importance of intangible cultural heritage, especially the authenticity, diversity and rheology of some intangible cultural heritage, put forward the concept of song and dance landscape, endow the landscape with a brand-new and more vital concept, and propose that the combination of intangible cultural heritage and tourism is the new development trend of village tourism in recent years. Gannan Tibetan Autonomous Prefecture is located in the southwest of Gansu Province, the transitional area between the northeast edge of the Qinghai-Tibet Plateau and the western Loess Plateau. Religious belief has an important influence on the location of the settlement in Gannan. The settlement group is located in the watershed space composed of mountains, usually composed of several villages and a group of monasteries along the river [13]. In Gannan Tibetan settlements, monasteries are important landscape nodes, which play a central guiding role. The historical length, grade and scale of monasteries fully affect the surrounding village

pattern, showing a close symbiotic relationship with the settlements, which makes the settlements have strong endogenous cohesion. At the same time, Gannan is a safe ecological barrier between the two plateaus. It has a special ecological strategic position, but there are environmental problems such as soil erosion and ecological fragility. Therefore, the construction of scenic byway is a unique model put forward in the research of this area, which takes the rural settlement as the bottom and the scenic byway as the pulse to construct a landscape architecture model with the organic combination of settlement, farmland, ecological space and scenic byway. From the perspective of rural to regional development and overall interests, horizontally optimize the allocation of various elements such as economy, society, population, agriculture, education and ecology, and vertically optimize the allocation of elements now and in the future. Promote the extension and expansion of tourism development, tourism management, and ecological environment protection from point to surface to solve many contradictions between the landscape and various aspects [14].

Jiarong Tibetan and Baima Tibetan are located in the Tibetan-Yi corridor of ethnic migration and cultural integration, while Gannan is the gateway to the Qinghai-Tibet Plateau and the Tibetan area, which undertakes the important functions of economic, trade and cultural exchanges between the Tibetan area and the mainland. The Tibetan settlements in different regions all show the characteristics of regional marginality, ethnic fusion, and unique interpersonal relationships in production. With the change of the form of settlement organization and management, the adjustment of economic structure, the development of tourism and the improvement of living standards, the steady state of the original composition system and influence factor group of settlement landscape has been broken. Under the impact of modern society, the landscape service object changes from the inside of the settlement to the inside and outside of the settlement, and the landscape characteristics change from the internal binding force to the external traction force. Therefore, in the past ten years, many new perspectives and methods have been put forward to think about its inheritance and development, protection and utilization, and point out the direction for the practice of planning and design at the same time.

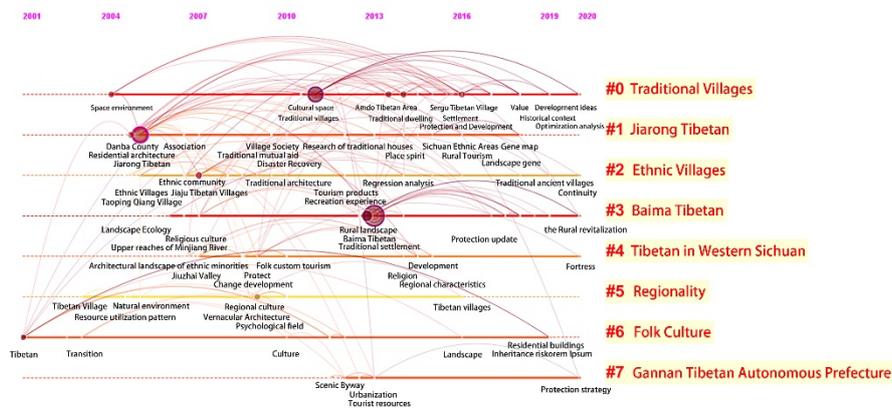


Figure 5. Timeline map of keyword co-occurrence in Tibetan settlement

3) Analysis of emergent words of key words

Emergent words refer to key terms whose frequency of

occurrence suddenly increases in a short time or whose frequency of use obviously increases [15], which can reflect

the frontier dynamics of research. In the 20 years of literature retrieval, the research time limit of Tibetan dwellings is the longest. The highest mutation intensity of Jiarong Tibetan is 5.49 from 2014 to 2020. The research of Jiarong Tibetan settlement landscape is very hot because of its commonness and characteristics of Tibetan settlement (figure 6). In recent years, with the construction of beautiful villages at the grass-roots level, the renewal and development of traditional villages has provided a diversified new perspective for the study of Tibetan settlement landscape based on the integration of landscape architecture, geography, tourism, sociology, cultural anthropology and other disciplines. This makes the research break through the previous single concept of Tibetan settlement landscape, and use quantitative methods such as landscape index method, multivariate statistics method and analysis method to explore the evolution model and driving factors of landscape pattern. It greatly enriches the three-dimensional content of the landscape.

Top 12 Keywords with the Strongest Citation Bursts



Figure 6. Chart of protruding words in Tibetan settlement

IV. CONCLUSION

A. The popularity of folk houses research is high, and protection and renewal is the key.

The most basic unit of the settlement is the folk house, and the survival wisdom in the folk house has become the basis for the development of Tibetan architecture with regional characteristics in the new era, and it is the source of useful inspiration for today's architects and planners [8]. The development of residential houses mainly studied spatial structure, architectural form, appearance design, religious beliefs, and gradually appeared in content related to protection and renewal, architectural adaptability, cultural inheritance, residents' living suitability, and ecological adaptability. The research perspective is constantly expanding, from the initial study of a single architectural discipline to a multi-disciplinary integration, specialization and comprehensive research. The natural environment and religious humanities have created the unique architectural form of Tibetan folk houses, while the arrival of modern civilization and the development of tourism have had a great impact on the traditional pattern of residential houses, resulting in the coexistence of new and old houses and chaotic features. It is necessary to explore the use of various methods for protection and renewal, such as non-survival, landscape difference renewal, reasonable reconstruction and so on. Therefore, how to maintain the dynamic balance between the national characteristics of folk houses and the cultural shock brought about by tourism development is the

key issue for the development of Tibetan settlements.

B. National policy authorities play an important leading role in the study of settlement landscape

In decades of development, with the people as the center, various policies have been put forward, such as the three rural issues, western development, rural revitalization, and poverty alleviation, to protect the lives of ethnic minorities and encourage the development of tourism to drive Tibetan economic development. Tibetan settlement landscape presents a high degree of integration, inclusiveness, diversity, ecology, integrity, full of construction wisdom and national characteristics. However, with the influx of tourists and the impact of foreign culture, the traditional way of life of the village has gradually changed, such as the change of gravity inside and outside the settlement, the disappearance of defensive function, the decrease of the purity of national characteristics and so on. Therefore, dialectically view the double-edged sword effect of national policy to promote tourism development on settlement landscape. On the one hand, with the improvement of regional economic development and living standards, Tibetans take the initiative to reshape their own culture and change ethnic cognition, and improve their awareness of cultural heritage protection under the background of the new era; on the other hand, tourism development is mostly led by the government standardized and unified planning and design homogenized the scenic spots and gradually blurred the cultural boundaries. All these have put forward new opportunities and challenges for the development of Tibetan settlements.

C. The research object is typical, but the regional large-scale research is relatively lacking

The research mainly focuses on the micro-scale level represented by typical samples, and the meso, macro or multi-scale is rarely involved. Tibetan areas are mostly located on plateaus. High mountains and turbulent rivers divide the Tibetans into multiple branches, making Tibetan settlement cultures in different regions present a strong closure. The research objects are mainly Jiarong Tibetans, Baima Tibetans, Gannan Tibetans, Amdo Tibetans and other settlements. Among them, the well-developed settlements such as Jiaju Tibetan Village and Seergu Tibetan Village are used as representatives of small areas for in-depth research. However, there are few studies on villages in Kangba Tibetan and Tibetan areas, which can not form a more complete research system of settlement landscape in Tibetan areas. The overall cultural symbols and landscape language of the settlement need to be summarized.

D. Insufficient quantitative research and lack of scientific data support

The specificity and convergence of regional settlement landscape coexist at the same time, and the marginalization of backward areas is obvious, which brings a variety of complex factors for the study, which is difficult to study. In the past, the main research methods were literature collation, questionnaire surveys, field surveys, in-depth interviews and other research methods to conduct qualitative analysis of landscape elements, spatial relationships, humanistic spirit, and scene creation. Research results are mostly two-dimensional drawings such as residential plans and building facades. Statistical data such as field surveys are the mainstay, three-dimensional space research is insufficient, and the research on the landscape elements of buildings, plants, roads,

and water systems are relatively separated, and a complete landscape system research has not been formed. With the emergence of high-definition imaging technology, low-altitude information acquisition technology and virtual reality technology, quantitative research has gradually gained attention, but the scope of application is relatively limited, and the research conclusion lacks strong support from scientific data.

E. In the process of practice, the contradiction between protection and development is still outstanding, and artificial and random factors still exist

At present, there are few empirical studies in the study of Tibetan settlements in China, blindly using the research results of non-ethnic areas and relying on subjective experience to design. Tibetan settlements, especially traditional settlements, are obviously different from other regions in terms of protection and renewal status, urbanization process, natural geographical conditions and regional cultural background. It is difficult to effectively implement them by applying research results from other regions or copying existing methods and strategies. The research results from different starting points have not formed a system, and the practical guidance is very limited. Local people's insufficient understanding of the historical and cultural nature of the landscape has led to insufficient spontaneous protection and the gradual loss of cultural heritage materials. With the progress of urbanization, great changes have taken place in social consciousness, national culture, settlement spatial structure and family organization under the influence of foreign cultures such as Han nationality and Qiang nationality. This makes the landscape homogenization of some villages obvious, the authenticity of the landscape has been destroyed, and many traditional villages with great protection and inheritance value are facing the misfortune of being destroyed. In addition, the Tibetan settlements in western Sichuan are located in an area with frequent natural disasters. After the disaster, traditional settlements inevitably face a series of problems such as the implementation of protection strategies, functional transformation or reconstruction, and the lack of scientific and effective protection planning basis will inevitably lead to design. The results of practice are questioned. Therefore, under the background of new urbanization, new rural construction and beautiful countryside, it is of great significance to protect the traditional national settlement landscape, protect the diversity of national culture and promote the sustainable development of social economy.

V. PROSPECT

A. Establish a landscape graphic language system to improve the overall cognition of Tibetan landscape

As a member of the research group of ethnic traditional settlement landscape, the author and team have actively explored the overall framework of traditional settlement landscape research in more than 10 years of teaching, research and practice [16-17]. From the current research situation, the settlement landscape lacks large-scale research and the overall cognition is unclear. Therefore, it is necessary to establish a graphical language system for the cultural landscape of the Tibetan settlement area, which can more intuitively and clearly understand the overall vocabulary and cultural core of the landscape. The Tibetan settlement landscape elements in the form of graphics, pictures, lines,

arrowheads and concise text to build a graphical language legend; use the schema method to sort out the relationship characteristics of various factors of the landscape to establish a more complete schema language framework. Through graphical language legends and schematic language frameworks, the relationship between the internal cultural connotation and external visual symbols of the Tibetan landscape can be reconstructed from a macro perspective.

B. Build a basic information database and broaden the exchanges between disciplines

Actively connect with intelligent research technologies and methods, make full use of the advances in information collection, integration, and processing of modern technologies such as GIS and BIM, build a systematic information data platform, and clarify related concepts, definitions, policies and regulations. Integrate historical, cultural, tourism resources and research quantitative data. On the one hand, the use of web pages, app and other forms for ordinary residents to provide landscape virtual visualization, information browsing and query, evaluation feedback and other functions; on the other hand, to provide professional scholars with scientific research database, heritage online database, research hotspot analysis, current affairs dynamic services and other functions. Landscape architects should break the traditional boundaries and barriers of disciplines, integrate the core resources of various disciplines, participate in group exchanges, and realize interdisciplinary exchanges.

C. Understand the generating factors of people's local identity and local attachment, propose scientific solutions for landscape optimization, and construct a reasonable development model of ethnic tourism

In the process of the development of settlement planning, the homogenization of landscape and the formal imitation of visual symbols make the settlement landscape gradually lose the connotation of national culture, and the residents are divorced from the settlement environment. Therefore, scholars should excavate the spatial evolution process and generation mechanism of Tibetan settlement landscape, clarify the interaction between different landscape elements and the traditional wisdom behind them, and analyze the genes of landscape culture. And understand the local feelings of Tibetans towards their hometown. Tourism development is based on the principle of maintaining the authenticity of the settlement landscape, analyzing the quality types of Tibetan settlement landscapes in different regions, highlighting high-quality landscape resources, and optimizing the content of the regional tourism industry. Through planning and policies to promote the cultural heritage and ecological protection of ethnic villages, standardize the tourism business activities of foreign-invested enterprises in ethnic villages and conform to the planning of development and construction [18]. And strengthen government leadership, formulate scenic spot tourism management policies, and actively guide the sustainable development of the local economy. Local residents, local governments and foreign tourists work together to build a reasonable development model of ethnic tourism.

D. The introduction of digital technology is devoted to the study of the activation of Tibetan settlement landscape.

With the changes of the times, the settlement landscape gradually fades away, and the cultural heritage is facing a crisis. Therefore, it is urgent to establish virtual archives of

intangible cultural heritage in the form of words, photos, videos and other carriers. Divide them according to their importance, and adopt different time stages, repair techniques and capital investment to effectively restore intangible culture. Combine AR technology, VR technology, digital interaction and other technologies to reproduce the lost cultural heritage. At the same time, architecture, environment, animals, plants and people are regarded as inseparable elements in the landscape environment ecosystem for active protection.

E. Attach importance to the research on the ecological security of Tibetan settlement landscapes, and provide scientific and effective protection planning basis in practice

Tibetan settlements in western Sichuan are located in areas with high incidence of geological disasters. Landslides, mudslides, earthquakes and other moments threaten the safety of settlements, and have disastrous destructive power to the natural landscape and cultural heritage of settlements. The research should be based on reality. Based on the landscape ecological security pattern, the causes, scale and consequences of geological disasters in different Tibetan areas are clarified. The theoretical knowledge of landscape ecology is introduced to study and construct the ecological infrastructure of disaster prevention and control at different levels. From the perspective of landscape architecture, this paper attempts to use landscape prevention and control measures to solve potential threat factors according to local conditions, to minimize the damage of geological disasters to Tibetan settlement landscape, and to increase the elasticity of settlement disaster prevention. The use of scientific planning means to make the traditional Tibetan settlement burst out new vitality.

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