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Landscape Feature Extraction and Floristic Division of Traditional Villages in the Minjiang River Basin*

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ABSTRACT: Traditional villages reflect the integration and collision of cultures from many aspects such as culture, function and site selection, and reflect the cooperation and struggle between man and nature. They hold outstanding historical, cultural, artistic, scientific and social values, and are important carriers of national culture. As an important birthplace of civilization in the southeastern region of China, the Minjiang River Basin has profound historical and cultural accumulation. The unique, diverse and abundant traditional village resources in the basin embody the Fujian traditional culture with distinctive local characteristics. In order to accurately identify the landscape characteristics of traditional villages in the Minjiang River Basin, the research first introduces the concept of landscape gene similarity on the basis of landscape gene theory, and quantitatively evaluates the similarity of traditional village landscapes, which reduces the influence of subjective judgment in the process of landscape gene extraction, strengthens the repeatability of the conclusions, and makes the results more accurate. Secondly, based on five batches of Chinese traditional village lists, field visits and literature review, 111 national traditional villages with complete data and well preserved in Minjiang River Basin are determined as research objects. Finally, based on the dialect and folk beliefs, the cultural characteristics of the villages are judged, and the landscape characteristics of the villages are described based on the characteristics of the residential landscape. Six types of indicators that can best reflect the characteristics of village landscape are selected to construct the index system. By calculating the similarity of each traditional village landscape and combining with spatial statistical analysis, the traditional villages in Minjiang River Basin are divided into 9 landscape regions and 4 landscape sub-regions as a whole, and construct the landscape gene map of traditional villages in Minjiang River Basin. Through the calculation of the similarity between the traditional village landscape and spatial statistical analysis, the traditional villages in the Minjiang River Basin are divided into 9 landscape areas and 4 landscape sub-areas, then mapping the landscape gene map of traditional villages in Minjiang River basin. The results show that there are differences in landscape gene composition of traditional villages in different regions in Minjiang River Basin. Based on the differences of landscape gene among traditional villages in Minjiang River Basin, combined with the administrative division and landscape gene similarity, traditional villages in Minjiang River Basin can be divided into 9 landscape areas and 4 landscape subareas which include Hakka courtyard area, Shaojiang Courtyard area, Central Fujian Courtyard area, Central Fujian enclosed building area, Eastern Fujian enclosed building area, Eastern Fujian mixed area, Southern Fujian compound area and Northern Fujian compound area, Northern Fujian gabled roof courtyard area, Northern Fujian mixed roof courtyard area, Shaojiang independent courtyard area and Shaojiang combined courtyard area. The similarity of landscape genes between two adjacent landscape areas was higher than other areas. To some extent, this is due to the role and influence of natural conditions, cultural customs and social economy in

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different periods. Among them, the natural conditions affecting the residence form and construction of the overall arrangement of the choice of material, culture affects the residential spatial structure characteristics such as shape, function partition, the social and economic conditions determine the scale and fineness of dwellings. Any change of conditions will produce different morphological characteristics of residential buildings, major historical events are important catalysts for this transformation process, which can accelerate or slow down the entire process. In the future, the research will take the major historical events that affect human activities in the watershed as the time node, analyze the development and evolution laws of buildings in different periods, and conduct in-depth analysis and exploration of this conclusion.

KEY WORDS: Minjiang River Basin; traditional villages; landscape gene; landscape area

Introduction

China, with its vast territory, diverse ethnicities, and complex natural conditions, has given rise to traditional villages that embody the wisdom and labor of the local ancestors, in order to meet their survival needs and reflect the abundant natural resources, diverse folk cultures, and religious beliefs. With their characteristic residences, from the felt tents that accompanied the nomadic tribes in their migratory lifestyle to the courtyard houses that embody agricultural culture; from the grand courtyards of the Jin and Huizhou merchants, which represent social status and wealth, to the Hakka tulou buildings which emphasize defense functions and clan relationships; from the cave dwellings in the loess plateau to the stilt houses nestled halfway up the mountains and by the water, traditional villages showcase the cultural integration and collision from various aspects such as custom, functionality, and site selection, and reflect the cooperation and struggle between humans and nature, and possess significant historical, cultural, artistic, scientific, and social values, making them an important carrier of national culture.

To date, scholars in the fields of architecture, cultural geography, and landscape architecture have conducted comprehensive research on traditional villages from the perspectives of village revitalization and human habitat. This research can be broadly categorized into three levels of scale. At the micro-scale, the focus is on villages with distinct architectural features. An Xianlou, based on the Beautiful Countryside Project, proposed a paradigm of principles for the preservation of traditional villages through landscape transformation and cultural heritage conservation [1]. Liu Xingya provides, by distilling the historical and cultural elements of the Beierbao Village in Tianjin, a basis for subsequent transformation and improvement of the village [2]. At the meso-scale, the re-

search focuses on a specific type of village with typical regional and cultural characteristics. Wen Ruilin summarized the characteristics of traditional Huizhou residential streets and alleys, including their winding and intricate spatial layout, integration of architecture with nature, and significant regional cultural elements, through literature compilation and on-site investigations [3]. Li Xueping analyzed the thermal environment and heat transfer effects of sunken cave dwellings in the Guanzhong area in winter by constructing a thermal evaluation system, providing a basis for spatial transformation of sunken cave dwellings [4]. At the macro-scale, the research focuses on traditional villages within specific administrative regions or cultural landscape systems. Ma Yu explored the spatial distribution characteristics and settlement features of 550 traditional villages in Shanxi Province from a basin perspective using ArcGIS 10.2 tools [5]. Yu Jing summarized and organized the spatial differentiation characteristics of traditional villages in the Wuling Mountain region using a geographic detector [6]. In recent years, with the deepening of the research, how to integrate the resources of the traditional villages and make full use of their regional advantages in culture has become an important direction for their development. In this context, Liu Peilin proposed landscape gene theory, which analogizes the landscape characteristics of settlements to “genes” in biology. It compares the development and changes of settlement landscapes to genetic inheritance and mutation. By considering geographic environment, cultural background, architectural landscape, and building materials as the factors for floristic division, southern traditional villages are divided into eight settlement landscape regions and 40 landscape sub-regions [7]. Building upon landscape gene theory, Zheng Wenwu introduced the concept of landscape gene similarity, quantitatively evaluating the similarity of settlement landscapes by

comparing the similarities and differences in landscape characteristics. This approach reduces the subjective judgment in the process of extracting landscape genes, strengthens the repeatability of conclusions, and produces more refined and rational results [8].

Overall, there is currently limited research on landscape floristic division of traditional villages, with qualitative analysis being the main research method and limited integration of quantitative analysis. Additionally, both subjective evaluations based on scholars' perceptions and objective deductions based on computer analysis suffer from issues of inconsistent evaluation criteria and fuzzy boundary delineations. Based on this, the present study utilizes dialects and folk beliefs as criteria to identify cultural characteristics of villages and take the residential landscape features to describe the landscape characteristics of villages, aiming to explore the landscape floristic division of traditional villages in the Minjiang River Basin. This research is to provide new insights for the cultural lineage research, classified protection, and regional integrated development of traditional villages in the Minjiang River Basin.

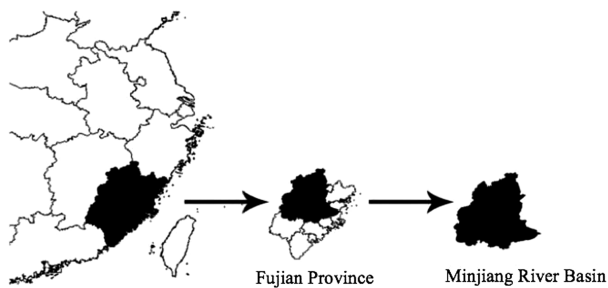


Figure 1 Overview of the Study Area

1 Study area, data sources, and research methods

1.1 Study area

The Minjiang River Basin is located in the northern part of Fujian Province, with a length of 356 km from north to south and a width of 283 km from east to west. It covers an area of 60,992 km² and includes six cities and thirty counties, supporting over one-third of the population in Fujian Province. The basin is rich in traditional villages, with a diverse range of types. From 2012 to the present, a total of villages here have been included in the national list of traditional villages, among which 111 villages have

complete and well-preserved documents and data. The fusion and integration of southern and northern cultures, as well as ethnic minority cultures, are manifested in the traditional villages through architectural forms, materials, and other means, making them highly valuable for research (Figure 1).

1.2 Data sources

The basic information on settlement landscapes was mainly collected from the existing 111 national-level traditional villages in the Minjiang River Basin, which have the complete and well-preserved data. These villages reflect the unique characteristics of the regional landscape of traditional settlements and serve as typical samples for collecting landscape features in this study. Relevant data primarily came from field surveys, mapping, and research literature, such as local county chronicles, books and theses on Fujian's traditional villages and residences, etc. Some basic data were provided by the Fujian Provincial Department of Housing and Urban-Rural Development, as well as relevant government departments including the housing and planning bureaus and cultural heritage bureaus of various cities and counties.

1.3 Research methods

1.3.1 Landscape genetic theory

Landscape genetic theory posits that the landscape features of traditional villages are the result of the combined effects of natural conditions, social culture, village layout, and architectural landscapes. These features can be divided into material landscape genes and non-material landscape genes based on their manifestations. Material landscape genes include overall layout, roof shape, gable wall shape, facade type, and plan form, among others, totaling 25 subcategories across 7 main categories. Non-material landscape genes can be generalized into two categories: folk beliefs and historical culture [9]. As research has progressed, scholars have found that architectural structures are mainly influenced by endogenous cultural factors within ethnic groups as to display various features, while village layouts are mainly shaped by natural conditions, exhibiting site-specific spatial characteristics. There is no absolute correspondence between the two [10].

Therefore, to avoid excessive complexity in village typology, this study, based on the landscape genetic theory with combination of previous research, mainly from the perspectives of social-culture and architectural landscape, with dialect zones as the foundation of social culture [11, 12] (Figure 2), selects six architectural landscape elements, including roof shape, gable wall shape, color features, (with/without) enclosing wall, facade style, and plan form, to extract the landscape features of traditional villages in the Minjiang River Basin.

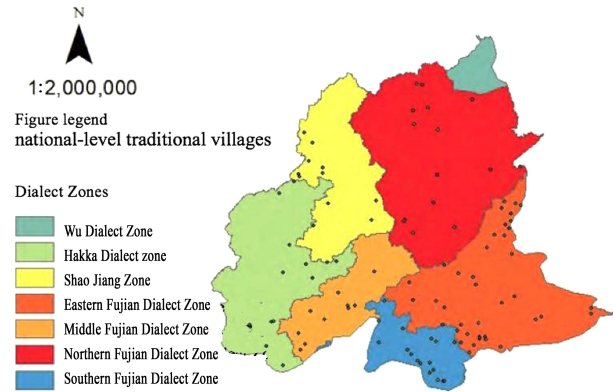


Figure 2 Spatial distribution characteristics of traditional village in Minjiang River Basin

Table 1 Architectural landscape elements and attributes of traditional villages in the Mingjiang River Basin

Atlas classification	Indicators	Sub-indicators(Weights)	Attribute of indicators
Architectural landscape elements	Facade features(0.7)	Roof shape(0.3)	Xuan Shan roof (overhanging gabled roof), Ying Shan roof (gabled roof), Xie Shan roof (gable and hip roof), Wu Dian roof (hip roof)
		Gable wall shape(0.16)	Stepped gable wall, Arched gable wall, Wuxing gable wall (five elements gable wall), Herringbone gable wall
		Enclosing wall(0.04)	With enclosing wall, Without enclosing wall
		Facade style(0.2)	Tubao-style (earthen castle style), Stilt-style, Courtyard-style
	Color features(0.1)	/	Yellow, White, Red, Gray
	Plan features(0.2)	/	Complex-style, Independent-style, Weilou-style (compound style/enclosed building style)

1.3.2 Landscape gene similarity

Landscape gene similarity is an important criterion for determining the similarity between different villages' landscapes. It is generally believed that the higher the landscape gene similarity between two traditional villages, the more similar elements they share. Therefore, the similarity of landscape genes can be measured by the ratio of the number of shared elements to the total number of landscape characteristic elements. The calculation formula is:

$$S_{ij} = F_s / F$$

S_{ij} represents the landscape gene similarity between traditional village i and traditional village j . F_s is the number of shared landscape characteristic elements, and F is the total number of landscape characteristic elements. $S_{ij} = 1$ indicates that the landscape characteristics of the two villages are identical. $S_{ij} \geq 0.5$ indicates a high similarity between the landscapes of the two villages. $S_{ij} < 0.5$ indicates significant differences in the landscapes of the two villages.

To ensure the continuity and relative consistency within the landscape division [13] of traditional villages

in the Minjiang River Basin, the process of dividing the landscape system is as follows: First, the importance weights of different architectural landscape elements are assigned through expert rating (Table 1). Then, villages within the same dialect zone are grouped together, with the architectural landscape complex which have the highest quantity in each group serving as a reference, and its characteristic is marked as 1, then calculate the landscape gene similarity of other villages in the region. In the calculation process, for landscape elements with more than one attribute, the corresponding scores are deducted proportionally based on the number of overlapping attributes. Furthermore, for villages with landscape gene similarity less than 0.5, they are re-grouped and the above steps are repeated until all villages within a group have similarity greater than 0.5. Additionally, to ensure the accuracy and scientific validity of the grouping, the reference village is removed on a group basis, and the above steps are repeated to progressively test the similarity between villages. If two villages have landscape gene similarity less than 0.5, and one village still exhibits good similarity in subsequent calculations, it is retained while the other village is removed and

the grouping is adjusted. If both villages have poor similarity, they are removed and the grouping is adjusted. Finally, under the premise of ensuring the grouping is compliant with requirements, adjustments are made to the villages in each group based on spatial proximity, with an aim to include villages from the same region in the same group.

Taking traditional villages in the Southern Fujian dialect zone as an example (Table 2), in terms of roof forms, Xuan Shan roof and Xie Shan roof are the main features. Therefore, their characteristics are marked as 1. Following this pattern, it can be determined that Shanping Village, Guiyang Village, Foling Village, and Gaoyang Village are the reference villages in the calculation of landscape gene

similarity. Based on the results of the landscape gene similarity calculation, it is initially determined that Wanzhai Village belongs to one group, while the other nine traditional villages belong to another group. Subsequently, during the progressive calculation and verification of landscape gene similarity between the two groups of traditional villages, it was found that compared to the original grouping, JianGuo Village, KuiCheng Village, and WanZhai Village have higher landscape gene similarity. Therefore, the grouping is adjusted to include WanZhai Village, JianGuo Village, and KuiCheng Village in one group, while the remaining seven traditional villages are placed in another group.

Table 2 Landscape features of traditional villages in southern fujian dialect zones

Village name	Roof form	Color combinations	Gable wall (with/without)	Enclosing walls (With/Without)	Plan form	Facade style
Shuanghan Village	Xuan Shan roof, Xie Shan roof	white, red	without	with	complex-style	courtyard-style
Shanping Village	Xuan Shan roof, Xie Shan roof	white, yellow	without	with	complex-style	courtyard-style
Guiyang Village	Xuan Shan roof, Xie Shan roof	white, yellow	without	with	complex-style	courtyard-style
Foling Village	Xuan Shan roof, Xie Shan roof	white, yellow	without	with	complex-style	courtyard-style
Gaoyang Village	Xuan Shan roof, Xie Shan roof	white, yellow	without	with	complex-style	courtyard-style
Zengban Village	Xuan Shan roof, Wu Dian roof	white, yellow	without	with	complex-style	courtyard-style
Baitan Village	Xuan Shan roof, Xie Shan roof	white, yellow	without	without	independent-style	courtyard-style
Wanzhai Village	Xuan Shan roof	white, yellow	without	with	Weilou-style	Tubao-style
Jianguo Village	Xuan Shan roof, Xie Shan roof	white, yellow	without	without	Weilou-style	Tubao-style
Kuicheng Village	Xuan Shan roof, Xie Shan roof	white, yellow	without	with	Weilou-style	Tubao-style

2 Landscape gene extraction of traditional village in the Minjiang River Basin

To clarify the morphological characteristics of residential buildings in the basin and explore the typical land-

scape features of different types of residences, this study encodes various landscape elements and analyzes their correlations (Table 3).

Table 3 Correlation analysis of village landscape elements

	Roof form	Color combinations	Gable wall (with/without)	enclosing wall (with/without)	Plan features	Facade styles
Roof form	1	-0.143	0.853 **	0.187 *	0.055	0.141
Color combinations	-0.143	1	-0.157	-0.024	-0.196 *	-0.236 *
Gable wall(with/without)	0.853 **	-0.157	1	0.142	0.091	0.023
Enclosing wall(with/without)	0.187 *	-0.024	0.142	1	-0.419 **	0.135
Plan features	0.055	-0.196 *	0.091	-0.419 **	1	0.635 **
Facade styles	0.141	-0.236 *	0.023	0.135	0.635 **	1

The study reveals that the roof form is significantly related to whether there are enclosing walls or gable walls. In terms of roof form, the Xuan Shan roof is the basic feature of residential buildings in the basin, which reflects, combining together with Ying Shan roof and Wu Dian roof, Xie Shan roof, different architectural forms. Specifically, the residential buildings with Xuan Shan roofs usually lack prominent landscape features of gable walls, while

the residential buildings with Ying Shan roofs often display various forms of gable walls and enclosing walls.

Another set of landscape features consist of color, plan and facade features. Due to its location in the southeastern coastal region and distance from political centers, Fujian used to experience banditry and clan conflicts. To ensure the safety of settlements, the ancestors used earth, lime, and river sand as primary materials, mixed with

brown sugar, egg white, and glutinous rice water, to create a trinity mixture fill which was of great toughness and used to build the enclosing walls of buildings. This gave the Tubao-style and Weilou-style residential buildings landscape features dominated by yellow tones.

In general, the various architectural landscape elements in the basin interact and connect with each other, forming a unique architectural style. By analyzing their correlations, preliminary insights can be gained into the composition of landscape elements in different types of residences, leading to the identification of 5 main combination features: Xuan Shan roof + without gable walls, Ying Shan roof + gable walls, Weilou-style + Tubao-style + enclosing walls, Complex-style + Courtyard-style + enclosing walls, and without enclosing walls + Independent-style + Courtyard-style. These findings provide a basis for the subsequent floristic division of the landscape genetic map of traditional village in the Minjiang River Basin.

3 Floristic division of traditional village in the Minjiang River Basin

3.1 Results of the floristic division

Based on dialect zones, landscape genetic similarity calculations were conducted for traditional villages in the basin. With the naming of “dialect zone + typical village landscape feature,” the basin can be divided into 9 major floristic divisions and 4 sub-divisions (Figure 3).

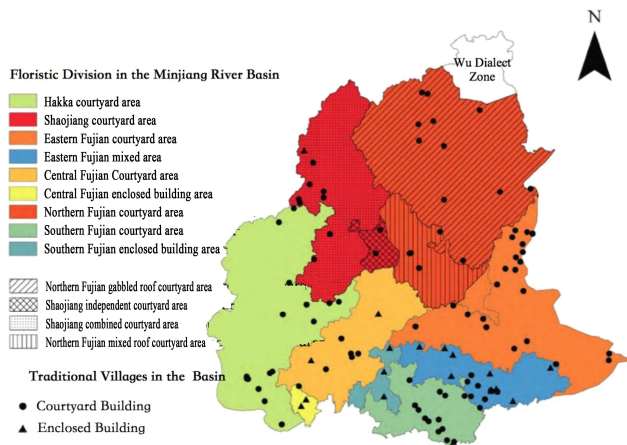


Figure 3 Floristic Division of Traditional Villages in the Minjiang River Basin

During the calculation, traditional villages with similar or identical landscapes manifested the spatially adjacent and clustered distribution characteristics. This conforms to the characteristics of floristic division, where landscape features are similar, cultural backgrounds are

shared, and geographical distribution is continuous and concentrated. It further validates the scientific nature of the conclusions. In terms of quantity, the region with the most traditional villages is the Eastern Fujian courtyard area, with a total of 21 villages. The Central Fujian enclosed building area has the fewest number of villages, with only 4. In terms of landscape features, the courtyard-style rammed earth residences dominated by yellow and white colors are a typical characteristic of village architecture in the basin and are distributed across various cultural regions. The Earthen-Castle residences, characterized by their main materials of rammed earth and gravel, are another architectural style found in traditional villages across the Middle, Eastern and Southern Fujian cultural regions.

In terms of landscape genetic similarity, Southern Fujian courtyard area has the highest internal landscape genetic similarity, reaching 0.97. The landscape sub-region of Northern Fujian gabled roof courtyard area has a relatively lower internal landscape genetic similarity of 0.78.

3.2 Extraction of typical features of landscape floristic divisions in the basin

The analysis and extraction (Table 4) of typical landscape features of different dialect zones based on the landscape genetic theory of “intrinsic uniqueness, extrinsic uniqueness, local uniqueness, and overall dominance” [15] were conducted to explore their formation mechanisms.

3.2.1 Hakka cultural region

Rammed earth and brick were the main materials used, and courtyard-style residences with white-washed walls were the basic type of traditional village landscape in the Hakka cultural region. The Hakka people are an ethnic group formed through migration, and after several generations of long-distance migration from north to south, their kinship and clan concepts were strengthened and consolidated through struggles with nature and society. To meet the needs of Hakka people living together as extended families and worshipping their ancestors, the “nine halls and eighteen wells” style residences evolved from courtyard-style residences. In terms of culture and folklore, due to the isolation of villages in remote mountains with limited external interactions, they have retained the customs, dress, and culture of the northern regions over time. They are regarded as the “living fossils”

for the study of ancient Central Plains culture.

Table 4 Floristic division system of traditional village in Minjiang River Basin

Floristic division(similarity)	Sub-division(similarity)	Culture region	Landscape genetic feature
Hakka courtyard area(0.87)	/	Hakka culture	Xuan Shan roof, without gable wall, yellow + white, courtyard-style
Shaojiang courtyard area	complex courtyard area(0.88)	commercial and travel culture	Ying Shan roof, stepped gable wall, white + grey, courtyard-style
	independent courtyard area(0.85)	Monkey King culture	Xuan Shan roof, without gable wall, white + grey, courtyard-style
Central Fujian courtyard area(0.86)	/	multiple cultures	Ying Shan roof, without gable wall, yellow + white, courtyard-style
Central Fujian enclosed building area(0.88)	/	multiple cultures	Ying Shan roof, without gable wall, yellow + white, Weilou-style
Eastern Fujian courtyard area(0.83)	/	Agricultural culture, Marine culture	Ying Shan roof, stepped gable wall, yellow + white, courtyard-style
Eastern Fujian mixed area	/	/	/
Southern Fujian courtyard area(0.97)	/	She culture	Xie Shan roof, without gable wall, yellow + white, courtyard-style
Southern Fujian enclosed building area(0.89)	/	She culture	Xie Shan roof, without gable wall, yellow + white, Weilou-style
Northern Fujian courtyard area	mixed roof courtyard area(0.92)	Snake culture, Carp culture	mixed roof, without gable wall, yellow + grey, courtyard-style
	gabled roof courtyard area(0.78)	Tea culture, Zhu Xi culture	Ying Shan roof, stepped gable wall, yellow + white, courtyard-style

3.2.2 Shaojiang cultural region

In the Shaojiang cultural region, courtyard-style residences are predominant in the villages, and they can be further subdivided based on architectural forms into two major areas: The Shaojiang Xuan Shan roof courtyard area and the Shaojiang Ying Shan roof courtyard area.

Shaojiang Xuan Shan roof courtyard area: the main form in this region is the “atrium-style” residence with wooden structural support and walls made of a mixture of bricks and earth. Due to the small scale of the villages, the residences are centered around the atrium with relatively independent space as their feature. The cultural customs of the villages have been well preserved, with the “Monkey King culture” that has both Fujian and Taiwanese characteristics being the main representation.

Shaojiang combined courtyard area: this region was once a famous commercial and trading zone and an important transportation hub. To facilitate trade, wealthy merchants embarked on extensive construction in this area, forming a rich commercial and travel culture. Compared to regular residences, the residential buildings in the region are predominantly made of blue bricks. Based on the independent atrium-style residence, they are combined and expanded into larger “three entrances and nine halls” style residences. In terms of roof forms and gable wall shapes,

they exhibit distinct northern characteristics. Carvings and decorations mainly depict daily scenes, animals, plants, and folk stories, giving more intricate and vivid details compared to regular residences.

3.2.3 Central Fujian cultural region

Located in the inland area of Fujian Province and developed relatively late, the Central Fujian region is primarily populated by immigrants from other areas. Therefore, the tradition and architectural forms in this region reflect a fusion of multiple cultures. Just within the city of Yong'an alone, there are two main types of residences: courtyard-style and Tubao-style, scattered throughout. If subdivided based on scale, materials, and architectural forms, the variety would be even more diverse. Due to its location in the mountains with abundant timber resources, the residences in the Central Fujian region extensively use wooden structures for support, forming the architectural characteristic known as “thousand-pillar standing” in Central Fujian residences.

3.2.4 Eastern Fujian cultural region

The Eastern Fujian cultural region is adjacent to the East China Sea, with well-developed shipping routes. The traditional villages in this region exhibit different characteristics in its development corresponding to the rise and decline of maritime trade routes. Historically, to escape

continuous warfare, a large number of people from northern regions migrated to the south multiple times. The advantageous geographical location made Fuzhou the preferred destination for people who were migrating to Fujian along the coastal route. During the early period of migration, the immigrants combined northern architectural culture with local residences, adding exaggerated and diverse-shaped fireproof gable walls to the atrium-style dwellings. As the economic center shifted southward and the maritime Silk Road developed, a large number of businessmen and the gentry families settled in the region. During this period, the residences became larger in scale, and carvings, paintings, and plaster sculptures became more lively and exquisite. These formed the grand and meticulously crafted architectural characteristics of Eastern Fujian courtyard-style dwellings. During the Ming and Qing dynasties, there were frequent coastal invasions by foreign forces, and the Eastern Fujian region experienced significant warfare. To resist conflicts and protect their homes, villagers built enclosing walls using rammed earth and gravel, and erected watchtowers and forts around their residences for observation and defense. Most of the earthen castle complexes in the Eastern Fujian region were constructed during this period.

3.2.5 Southern Fujian cultural region

Based on architectural forms, the Southern Fujian cultural region can be divided into two major sub-regions: courtyard area and enclosed building area. In terms of cultural beliefs, the region is predominantly influenced by the She ethnic minority culture, exhibiting a combination of She and Han cultural elements. As the basin only encompasses a small portion of the Southern Fujian area, the architectural forms do not prominently feature the typical characteristics of Southern Fujian villages such as “red brick and red tile” or “fusion of Chinese and foreign elements.” Instead, the main architectural style is similar to that of Central Fujian residences which are primarily yellow-white overhanging gabled roof courtyard dwellings using rammed earth and wood as the main materials.

3.2.6 Northern Fujian cultural region

The Northern Fujian region is rich in forest resources, and wood and rammed earth are the primary building materials. Based on the characteristics of residential landscapes, the region can be further divided into two sub-re-

gions: Northern Fujian mixed roof courtyard area and Northern Fujian gabled roof courtyard area.

Northern Fujian mixed roof courtyard area: this area is abundant in forest resources and home to various snake species. Over time, the local people have regarded snakes as divine beings and worshipped and offered sacrifices to them, giving rise to a unique snake culture. Architecturally, the combination of Xuan Shan roof and Xie Shan roof is the main characteristic of this region.

Northern Fujian gabled roof courtyard area: the main cultural influences in this area are Zhu Xi (a prominent Confucian philosopher) culture and tea culture. The establishment of academies and schools with the aim of promoting Zhu Xi culture is a typical feature of the villages in this region. “Tea culture” originated from Wuyi Mountain, where tea merchants flocked in ancient times. Due to the beautiful scenery of Wuyi Mountain and the demand for tea trade, wealthier merchants settled near tea roads, resulting in larger courtyard-style dwellings with beautifully shaped gable walls carved with intricate patterns. In terms of local architectural style, it combines elements of both the region and external influences.

Conclusion and discussion

This study focuses on national-level traditional villages in the Minjiang River Basin. Firstly, the main factors reflecting the landscape characteristics of village residences were determined through expert ratings, and corresponding weights were assigned based on their importance. Secondly, the landscape characteristics of traditional villages in the Minjiang River Basin were summarized. Finally, the concept of landscape gene similarity was introduced, and with the help of Arcgis, the traditional village landscape regions in the Minjiang River Basin were divided based on dialectical cultural areas. The results indicate that the main combinations of landscape elements are: Xuan Shan roof + no gable walls, Ying Shan roof + gable walls, Weilou-style + Tubao-style + enclosing walls, complex-style + courtyard-style + enclosing walls, no enclosing walls + Independent-style + courtyard-style. Based on the principles of continuity and relative consistency within the landscape regions, and considering the residential landscape features and folk beliefs, the Minjiang River Basin can be divided into 9 major landscape regions: Hakka courtyard area, Shaojiang courtyard area, Central Fujian courtyard area, Central Fujian enclosed building area, Eastern Fujian courtyard area, Eastern Fujian en-

closed building area, Eastern Fujian mixed area, Southern Fujian courtyard area, Northern Fujian courtyard area.

In the process of dividing the traditional village landscape regions in the Minjiang River Basin, the research discovered that the landscape gene similarity between two adjacent regions is higher, comparing to other regions. This is partly due to the influences and impacts of different natural conditions, cultural customs, and socio-economic factors during different periods. Among them, natural conditions affect the overall layout and choice of building materials for the residences; cultural customs influence the external appearance and spatial structure features such as functional dividing of the residences; and socio-economic conditions determine the scale and level of refinement of the residences. Any changes in these conditions will result in different morphological characteristics of the residences [16]. Significant historical events act as important catalysts in this transformation process, either accelerating or slowing down the process. In the future, the research will take major historical events, that have influenced human activities in the basin, as time nodes to analyze the development and evolution patterns of buildings in different periods, and further examine and explore this conclusion in depth.

Figure and table sources

Figure 1: <http://bzdt.ch.mnr.gov.cn>.

Figures 2 and 3: Compiled and drawn by the author based on information from reference [11].

Table 1: Compiled and drawn by the author based on information from references [7] and [9].

Tables 2-4: Compiled and drawn by the author based on the “Fujian Residential Buildings” and the “First, Second, and Third Batch of Traditional Village Listings in Fujian Province,” as well as field research.

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