

Construction and Characteristic Analysis of the Landscape Gene Map of Traditional Villages in Huanggang City

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Abstract

Traditional villages are a profound condensation of regional landscapes and traditional cultures. From the perspective of landscape genes, selecting, refining, and summarizing the landscape characteristics of traditional villages, and deeply analyzing their landscape features and cultural cores, is an important direction and entry point for studying traditional villages. This paper, based on the concept of landscape genes, takes 49 traditional villages in Huanggang City as the research object, analyzes the landscape characteristics of traditional villages in Huanggang City, and constructs a landscape gene map, providing theoretical and material support for the gene activation, village tourism development, and sustainable development of traditional villages in Huanggang City.

Keywords

Traditional Villages; Landscape Genes; Map Construction; Characteristic Analysis; Huanggang City.

1. Introduction

Since the proposal of the rural revitalization strategy in the report of the 19th National Congress of the Communist Party of China in 2017, rural work has focused on five major aspects: "industry, talent, culture, ecology, and organization." In 2012, the Ministry of Housing and Urban-Rural Development, the Ministry of Culture, the Ministry of Finance, and other departments jointly launched the appraisal work of traditional villages, and so far, six batches of a total of 8155 villages have been released as national-level traditional villages.

The research on traditional villages in China can generally be divided into three stages: ① Before 2006, the domestic focus was on the evolution of villages, spatial form, and landscape, etc. Peng Yigang discussed the impact of natural and social factors on the formation of traditional villages [1], Liu Peilin systematically elaborated on the spatial intention and cultural landscape of ancient Chinese villages [2], and Zhang Zuqun and other scholars constructed an evaluation index system for the landscape of traditional settlements in China [3]. ② From 2006 to 2016, traditional villages became a hot topic of research, and the focus turned to tourism development. Xu Chaojun and others used the travel cost method to scientifically estimate the recreational use value of Fenghuang Ancient City [4], and He Xiaolie analyzed the negative impact of the tourism industry on traditional villages and proposed protection strategies [5]. ③ After 2017, the research on traditional villages began to introduce different disciplines. Li Bohua and others analyzed the development patterns of traditional villages from the perspective of the living environment [6], Zhu Xuanbo and others proposed development ideas for villages from the perspective of government, enterprises, and villagers' joint construction and sharing [7], and Liu Anle and others used tools and mathematical statistical models such as ArcGIS and SPSS to explore the distribution patterns and characteristics of traditional villages [8].

The research on the landscape genes of traditional villages was proposed by Liu Peilin in 2003, and over the years, a complete landscape gene identification system and map construction system have been gradually constructed, and the landscape genes of traditional villages of ethnic minorities in China have been identified and compared [9-11]. Hu Zui, on this basis, proposed an object-oriented landscape gene classification model (OOCPLG), systematically summarizing the identification patterns and basic operational procedures of landscape genes [12], and through the application of GIS technology, constructed the landscape gene map of traditional villages in the south, further enhancing the scientific and application value of landscape gene theory [13]. Subsequently, domestic scholars' research on the landscape genes of traditional villages has become more extensive. Xin Fushen, from the perspective of cultural geography, based on the landscape gene classification method of subject, attachment, mixture, and variation, extracted and identified the landscape genes of Huizhou traditional villages [14]. Zhao Wenlin, from the perspective of cultural ecology, constructed the landscape gene information chain and landscape gene map of Futian Town traditional villages, and then proposed related strategies for their protection and development [15], and Yang Liguang analyzed the landscape genes of ethnic minority traditional villages from the perspective of perception evaluation [16].

Overall, domestic landscape gene theory focuses more on practice, with many identifying, extracting, and constructing maps of landscape genes in traditional villages, and there are also explorations from multiple disciplines. However, current research on the analysis and application of landscape gene identification results is not in-depth, and there is still a gap in the data of traditional village landscape genes in China.

This paper will refine and summarize the landscape genes of traditional villages in Huanggang City from the identification and extraction of landscape genes, and deeply analyze their landscape characteristics and cultural cores by constructing a landscape gene map, providing effective support for the gene activation, village tourism development, and sustainable development of traditional villages.

2. Research Background

2.1. Research Process

Traditional villages in China are widely distributed, and there are significant differences in their terrain, customs, architectural forms, and settlement concepts, so there are many directions for the classification of their landscape genes. Currently, there are two widely used classification methods: ① Dichotomy. According to importance, it is divided into main genes, attached genes, mixed genes, and variant genes, or according to external performance, it is divided into dominant genes and recessive genes; ② Characteristic Deconstruction Method. The landscape gene is divided into architecture, culture, environment, layout, etc. In practical application, the dichotomy has shortcomings in adaptability, expandability, and hierarchy, so this study uses the characteristic deconstruction method for research, and according to the research principles and methods proposed by Liu Peilin, Hu Zui, and others, establishes the identification, extraction, and map construction process for the landscape genes of traditional villages in Huanggang City, see Figure 1.

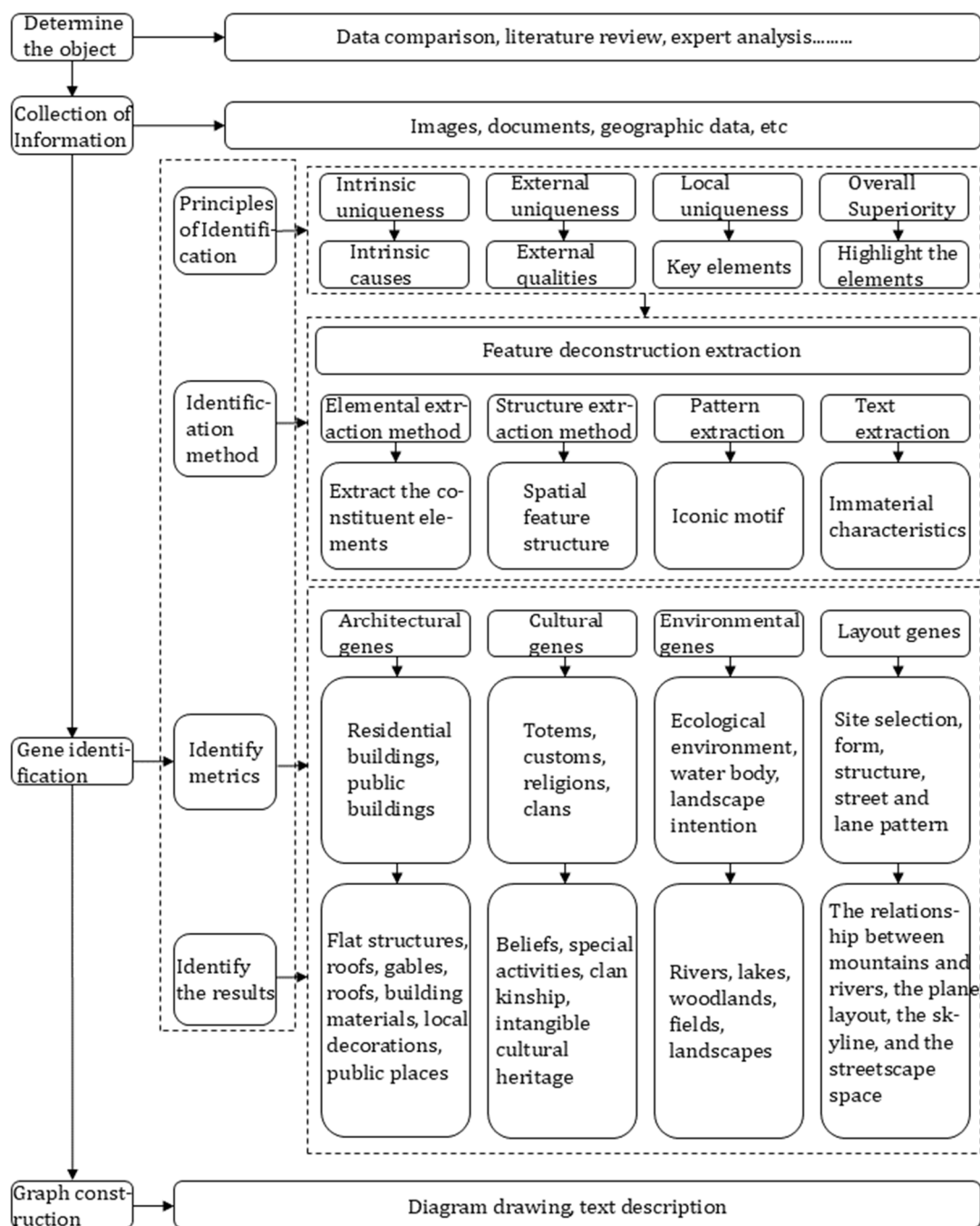


Figure 1. Research Process of Landscape Genes in Traditional Villages of Huanggang City

2.2. Overview of the Research Area

Huanggang City is located in the eastern part of Hubei Province, at the junction of Hubei, Henan, Anhui, and Jiangxi provinces, with a geographical advantage of "connecting the east and the west, vertical through the north and the south, unique in the middle, and reaching the sea through the river." It also integrates the multi-cultural elements of Wu, Chu, and Han. The terrain is generally sloping from north to south, with the Dabie Mountains in the east, hills in the middle, and a narrow plain and lake area in the south, with rich and diverse landforms. This paper analyzes the natural geographical characteristics and spatial distribution of traditional villages in Huanggang City through platforms such as the website of the Ministry of Housing and Urban-Rural Development, the National Basic Geographic Information Center, and

the Geographical Spatial Data Cloud of Hubei Province Digital Village Information Platform, as well as the ArcGIS10.5 software.

2.3. Distribution Characteristics of Traditional Villages in Huanggang City

Huanggang City has a total of 49 national-level traditional villages, which are mainly distributed densely in the north and sparsely in the south. In terms of administrative divisions, most are distributed in Hong'an County, Macheng City, and Luotian County, and two high-density core areas are formed at the junction of Macheng City and Luo'en County in the northeast direction, and at the junction of Macheng City and Hong'an County in the southeast direction. In terms of elevation, most are distributed near the Dabie Mountains in the northeast, with a few in the southern plain area, specifically 1 plain, 30 hills, and 18 mountains. In terms of the relationship between traditional villages and roads and rivers, there are 18 traditional villages within the 800-meter buffer zone of rivers, and 42 traditional villages within the 800-meter buffer zone of roads, with a more obvious distribution along roads, see Figure 2.

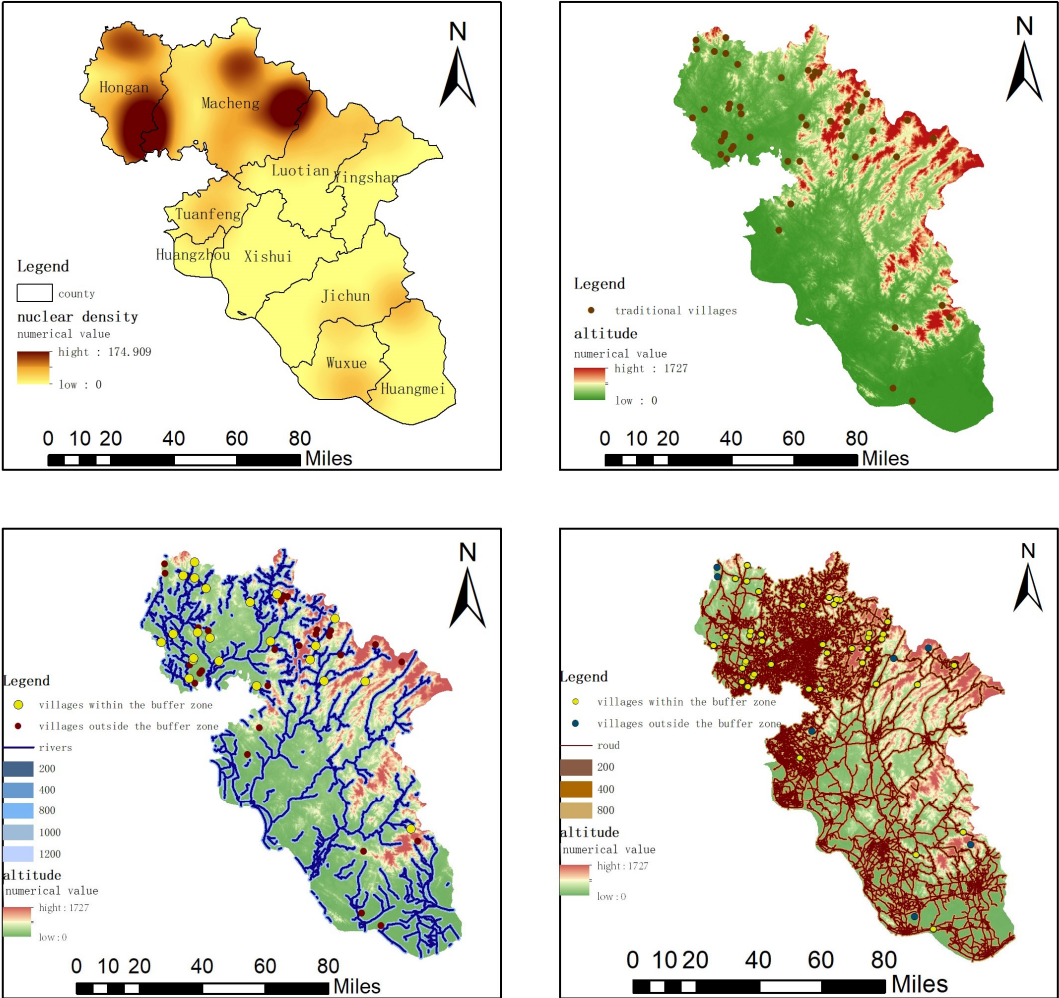


Figure 2. Distribution Map of Traditional Villages in Huanggang City

3. Identification of Landscape Genes in Traditional Villages of Huanggang City

3.1. Site Selection and Layout

Traditional villages in Huanggang City are mostly distributed in the mountainous and hilly areas of the Dabie Mountains, thus fully creating a landscape selection pattern of relying on

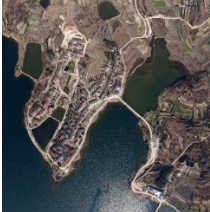
mountains and living by water. Liu Peilin summarized the intentional elements of traditional village site selection into four aspects: landscape intention, environmental intention, auspicious avoidance intention, and ecological intention [17], and Sun Yanqiu summarized the relationship between village spatial form and mountain environment, believing that the spatial form of traditional villages has ecological adaptability and self-organizing nature [18]. Therefore, based on the relationship between mountains and waters of traditional villages, this paper divides them into four types: ① Fengshui Type. Built against the mountain, surrounded by mountains on two or three sides, with distant peaks echoing, facing the fields, with a Fengshui pond at the village mouth, presenting a pattern of "field-water-village-mountain", such as Lianhua Village in Baliwan Town, Hong'an County. Some villages, due to large height differences, are distributed in a terraced pattern along the mountain, with terraced fields falling in front of the village, such as Panjia Yuan Village in Bai Miaohe Township, Luotian County. ② Landscape Protection Type. One side relies on the mountain, with rivers winding around or mountain streams running through the village from east to west, which can use the mountain to establish a natural barrier and rely on water sources to ensure irrigation and domestic water, such as Tongjia Chong Village Fuling Wo. There are also villages that directly embrace reservoirs and live by water, such as Liujia Dawan Village in Fuzihe Town, Macheng City. ③ Winding Ribbon Type. Villages are built directly along the road, winding and circling along the road and mountain, resembling a ribbon falling in the mountains, such as Dongchong Village in Huangtugang Town, Macheng City. ④ Plain Settlement Type. Villages are built in relatively flat areas, which are convenient for farming and living, with several ponds scattered around, interwoven with fields, such as Fuxing Bay in Fuzihe Town, Macheng City. Some villages are directly built by the lake, surrounded by water on three sides, with fields around, such as Liaozong Tai Village in Wushazhai Village, Shifosi Town, Wuxue City.

The spatial layout of the village is closely related to its site selection pattern. Based on the common "negative Yin and positive Yang" Feng Shui concept in China, most villages are clustered, ring-shaped, or crescent-shaped around the village mouth Fengshui pond or square, reservoir, and some villages live along the river and road, following its winding into a mountain strip distribution, or exist in its twists and depressions in a finger-like shape. Larger villages are divided into different aggregation areas, which are scattered in a star-like or flake-like shape. Plain-type villages have a more regular shape, generally distributed in an irregular or strip shape, see Table 1.

3.2. Lane Space

Due to rural construction and tourism development in recent years, traditional villages in Huanggang City generally have rural roads or even highways passing through, but there are usually only one or two east-west and north-south main roads for basic traffic use. The village interior is connected by alleys, which link the residences, relatively independent, yet interconnected, fully reflecting the family relationships based on blood ties in the architectural layout. The village paths are often naturally formed by treading on yellow soil, with wild grass on both sides, full of rural flavor. Or paved with bluestone blocks, with high and low bluestone walls on both sides, forming a deep and quiet bluestone alley, naturally piled into steps in places with large height differences, slowly stepping down. Some villages like Xiaoqiyan and Dongchong Village also have wind and rain corridors on the alleys to provide shelter for pedestrians from wind and rain, forming a unique street space.

Table 1. Site Selection Characteristics of Traditional Villages in Huanggang City

Site type	Spatial layout	Type diagram	A representative traditional village	Feature description	Live photos
Feng Shui Type	Lumpy shape		Lotus Mountain Village	It is built against the mountain, and is distributed in clusters with the feng shui pond at the entrance of the village as the core.	
	Annular shape		Dongyuan Village	It is distributed in a circular form with Feng Shui Pond as the center, and it may also appear as multiple centers due to multiple Feng Shui Ponds.	
	Stepped shape		Panjiayuan Village	Falling step by step with the height difference, there are many steps in the village, and the fields are terraced.	
Landscape Protection Type	Lumpy shape		Dongchong Village	According to the family reunion. With the feng shui pond as the core, it is deformed with the road.	
	Fingers shape		Poria cocos nest	It is distributed in the depression of the road or water body, and the overall centrality is weak.	
	Crescent -shape		Liujia Dayuan Village	Surrounded by reservoirs, the shoreline and mountains are distributed in relatively gentle places.	
Winding Ribbon Type.	Banded around the mountain shape		Ximahe Village	Scattered along the stretch of roads or rivers, the whole looks like a streamer lingering in the mountains.	
Plain Settlement Type	Irregularities shape		Fuxing Bay	Due to the flat terrain and the free shape, the density of houses is high.	
	Strip-like shape		Xie Dian Ancient Village	It extends from land to water to form a strip of water, and it is also divided into multiple strips depending on the area or shoreline.	

3.3. Environmental Style

Because traditional villages are mostly located in deep mountains and forests, with a long history, there are many ancient trees and famous woods, and there are ancient forests left in the world, becoming the unique landscape style of the village. In the construction of the village and the construction of utensils, stone is generally used more, which is more wear-resistant than wood and can also be preserved in the world after the erosion of time. Therefore, there are many ancient stone mills, ancient grinding plates, and other agricultural utensils in the village, as well as ancient wells, ancient pavilions, ancient bridges, and other living structures, and some villages also have ancient city walls, ancient gate towers, and ancient stone carvings, highlighting their unique cultural heritage and long history.

3.4. Architectural Form

Huanggang, due to its unique geographical location, is inevitably influenced by the multi-cultural elements of Jingchu culture, Wu Yue culture, and Hui-style architecture, and also has obvious traditional Chinese clan system and the concept of the unity of heaven and man, showing a unique architectural style.

In terms of plane layout, most traditional villages in Huanggang City are distributed in mountainous areas, so the residences are mostly single-row three-bay, with a shallow depth, and there are also enclosed courtyards, single-entry courtyards, or three to five bays. Some larger family or ancestral hall buildings use closed courtyard patio courtyards as units, and the architectural form is more solemn, arranged along the vertical axis, with the front hall and rear bedroom, surrounded by two sides, heavy doors and separate households, and most of the traditional village buildings in Huanggang City are "one house with multiple patios", such as the "five in a row, one at the head, two patios" layout in Dahechong Village.

Brick carvings and hanging flower door heads are supplemented with exquisite wood carvings and stone carvings, and the door towers are exquisite and elegant, decorated with black and white patterns, or carved with bats, flowers, etc. Other parts of the building also have carvings of dragons, phoenixes, figures, eight dragons playing with beads, eight immortals, fishing, reading, and other auspicious patterns.

To accommodate the humid and hot climate of summer and the cold of winter, the houses are often constructed with elevated plinths, with neatly arranged stone blocks as the foundation, and walls built from blue bricks, supplemented in some parts with adobe. The lintels above the slot gates are adorned with carved stone beams, and small windows are opened for ventilation. In addition to these features, the eaves are decorated with brick corbels, and under the eaves, there are paintings of water, mountains, and figures. The brick-carved pendant flower gateheads are complemented by exquisite wood carvings and stone carvings, making the gatehouses exquisite and elegant, decorated with black and white patterns, or carved with bats, flowers, and other auspicious symbols. Other architectural details also feature carvings of dragons, phoenixes, figures, eight dragons playing with a pearl, the Eight Immortals, and scenes of fishing, woodcutting, farming, and reading, among other auspicious designs.

In Huanggang City, the traditional villages' public buildings, which are predominantly characterized by their strong clan identity, often feature ancestral halls as the central structures. Additionally, due to the rich red culture, there are numerous memorial halls, martyr monuments, and various office sites from the revolutionary period. Beyond these, buildings such as temples, auditoriums, and paper-burning towers are preserved due to customs and religious beliefs. The architectural style of these historical sites and relics is more rigorous and orderly, with spaces that are more inward and enclosed, and adorned with exquisite decorations. However, some of these structures have suffered damage due to long-term neglect. More recent constructions, such as those associated with the red culture, exhibit a more

simplistic style, with spaces that are more open, or have been directly rebuilt as tourist attractions.

3.5. Architectural Form

The traditional villages in Huanggang City are rich in cultural heritage. They absorb the essence of multiple cultures and integrate the characteristics of various cultures, forming a unique cultural landscape that is inclusive and diverse. Widely circulated stories of famous people and revolutionary stories highlight the red culture of Huanggang City, and Yan Dian He Cun in Qili Ping Town, Hong'an County, even has a classic red tourism road passing through the village. The pattern of facing mountains and waters, surrounded by mountains and waters, and the Feng Shui pond at the entrance of the village are deeply influenced by Feng Shui concepts, centered on ancestral halls, and the clan genealogies that have been preserved for many years are a profound reflection of clan culture.

Absorbing the cultures of Hubei, Henan, Anhui, and Jiangxi, and other regions, the traditional villages in Huanggang City have a hybrid dialect of Northern Hubei and Southern Henan, and there are famous Chu Opera, Hubei Drum, Flower Picking, Swing Gong Drum, Shadow Puppetry, and other operas, as well as lion dancing, lotus hammering, leaf scattering, good books, fish drum, and other songs and dances that have entered thousands of households. In terms of food, there are characteristic mountain dishes such as hanging pots, old rice wine, small hanging wine, soft Qiao Ba, black pork, black mutton, free-range chicken, wild bamboo shoots, and there are also water town flavors such as clear water fish, hitting glutinous rice, fish noodles, fish cake, Guanyin tofu, snowflake Ba, bean cake, and bean cake, and there are also a variety of crops and processed products such as chestnuts, peanuts, sweet potato dry, lotus root, yellow essence, wild kudzu powder, high mountain organic tea, camellia oil, and handmade oil noodles. In addition, some villages retain handicrafts such as embroidery, hand-embroidered products, weaving, and Tujia cloth shoes, which have become a part of their cultural industry.

4. Construction of the Landscape Gene Map of Traditional Villages in Huanggang City

Traditional villages in Huanggang City fully reflect the adaptation and utilization of nature, showing the traditional concept of the unity of heaven and man, and also convey the Feng Shui concept of being surrounded by mountains and waters, facing mountains and waters, which is a full condensation of the wisdom and culture of the local people, see Figure 3.

Site selection pattern: 1) Feng Shui Treasure Type. Backed by big mountains, surrounded by Feng Shui ponds or reservoirs, negative Yin reports positive Yang, gathers wind and gathers Qi, facing roads and fields relatively. 2) Landscape Protection Type. Relying on big mountains while having river channels or mountain streams, located at the turning point of rivers or roads, with natural defense and convenient transportation, and abundant resources. 3) Winding Ribbon Type. Directly distributed along the flow line of rivers or roads, convenient for transportation and water use, with small-scale gathering at Feng Shui ponds or turning points, but still showing a streamline shape. 4) Plain Settlement Type. Located in flat areas, living is more compact, surrounded by large ponds and fields, and some are directly built by the lake.

Layout form: 1) Distributed in a cluster, ring, or crescent shape around Feng Shui ponds or reservoirs. 2) Terraced distribution along the height difference of the terrain. 3) Distributed in a finger-like or mountain strip shape along roads or rivers. 4) Not affected by terrain, with a free boundary. 5) Extending from the land to the water front in a strip or strip block shape.

Lane space: 1) The space of the main road is relatively open, with house doors on the side, and the facade is mainly made of stone and brick walls, with cement or yellow soil on the ground. 2) The space of the semi-open path, with a large area of stone and brick forming the side space,

small doors and windows for ventilation, and the ground is dirt with natural weeds on both sides. 3) The scale of the alley is small, often made of bluestone slabs, deep and dark, some of which are built with wind and rain corridors above.

Environmental style: 1) Village water bodies. Due to Feng Shui and irrigation, living needs, Feng Shui ponds are often built at the entrance of the village, or adjacent to rivers, lakes, reservoirs, etc., and some villages still have ancient river courses. 2) Field shape. Scattered outside the village, most are opposite the main body of the village across the road, divided into strip fields, slope fields, and terraced fields according to the height difference. 3) Landmarks. Ancient trees and famous trees, ancient stone mills, stone mills, gate towers, etc.

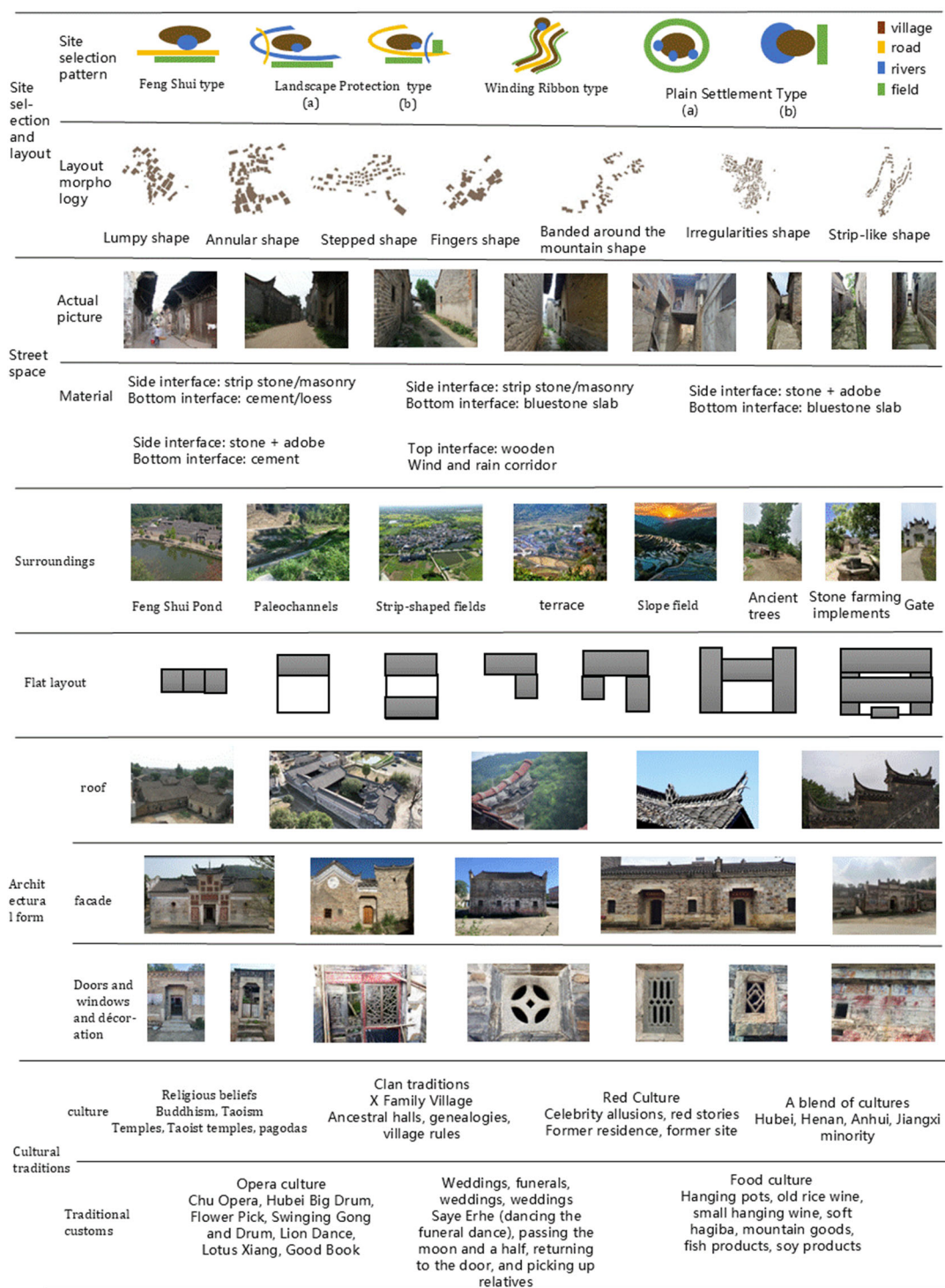


Figure 3. Landscape Gene Map of Traditional Villages in Huanggang City

Architectural form: 1) Plane layout. Courtyard style, one or two entries, with one or more patios, and there are also asymmetric open layouts with wing rooms and single-house courtyards. Smaller residences are laid out in a single row of three to five bays. 2) Roof. Single-eave hard mountain roof with blue bricks and small tiles, with upturned corners and dougong and eaves. 3) House face. Axisymmetric, slot door header, with carved blue brick lintels or Hui-style gate towers on the door, small windows for ventilation, blue bricks or adobe for walls, and stone strips for the base. 4) Local decoration. Stone carving, wood carving, painting, and other forms, with natural scenery, mythological allusions, and auspicious patterns as the theme. 5) Color. Based on the original color of local materials, green, white, light yellow, and red. 6) Public places. Pavilions, activity squares and activity centers, famous people's former residences, etc.

Cultural traditions: 1) Religious beliefs. Buddhism and Taoism are prevalent in the Dabie Mountains area, but there are few religious buildings in traditional villages in Huanggang City, and most of them are dilapidated for a long time. Only a few are preserved as scenic spots or small religious structures. 2) Clan tradition. The clan tradition is strong, with "big surnames" living in clusters in the village, and ancestral halls are often set up, and some villages still have clan genealogies. 3) Red culture. The revolutionary atmosphere is strong, with rich revolutionary sites, many famous people's allusions and former residences preserved. 4) Integrated culture. Due to the location at the junction of Hubei, Henan, Anhui, and Jiangxi, it is influenced by various cultures, and there are also settlements of ethnic minorities such as the Tujia people. 5) Opera culture. Chu Opera, Hubei Drum, Flower Picking, Swing Gong Drum and other operas, lion dancing, lotus hammering, good books and other songs and dances. 6) Marriage, funerals, and marriages. Leaf scattering, half-month and other sacrificial activities are also preserved, as well as customs such as meeting relatives and returning to the door. 5) Special diet. Hanging pots, old rice wine, small hanging wine, soft Qiao Ba, mountain products, fish products, bean products, etc.

5. Protection and Development Strategies

Hong'an County in Huanggang City is listed in the national demonstration list for the concentrated protection and utilization of traditional villages, but its planning projects only have Macheng City Fuling Wo Village, Xiaoqi Garden Village, Turtle Mountain Dongyuan Village, Xiedian Ancient Village and other villages that have completed upgrading and transformation, and most villages still have problems such as building abandonment, cultural loss, and lack of information. Therefore, in the protection of traditional villages in Huanggang City, protection and restoration can be carried out according to the "architectural genes-cultural genes-environmental genes-layout genes" in the map information.

The protection and restoration of buildings should increase their utilization rate and fully protect their characteristics of Jingchu and Hui-style interweaving. First, abandoned buildings, especially old sites and former residences, should be investigated, and tourism development should be guided by red culture or local culture. The characteristic old houses of villagers should be encouraged and guided for restoration, while paying attention to the color and material selection of buildings to ensure the unity of the overall architectural style of the village. The inheritance of cultural genes mainly relies on the dissemination of the crowd, especially crowd activities and place perception. Villages with high tourism development can carry out retro festivals in combination with traditional festivals, injecting vitality into traditional activities while attracting tourists to participate, creating a unique cultural IP. Villages with low tourism development can fully develop their characteristic industries, such as high mountain tea, camellia oil, old rice wine, etc., using modern means such as live broadcasting to open up sales, and also use live broadcasting to promote local traditional costumes and customs, laying the foundation for the development of the tertiary industry.

The environmental genes in the village are often more fixed, especially ancient trees, terraced fields, gate towers, etc., which are not easy to change or lose, but still need to be carefully maintained to avoid adverse effects due to economic development. A directory and protection plan for the environmental genes of the village can be customized, exploring the "punching point" while maintaining and restoring, making the village's symbolic environment truly go out of the village.

The layout form of traditional villages is often the crystallization of wisdom in traditional culture and a full practice of harmonious coexistence between people and nature. With the development of the times, the scale and layout of villages also change accordingly. Therefore, in the long-term planning and creation of villages, the original style should be fully valued, and the relationship between terrain and buildings should be handled to form a harmonious situation where "mountains, waters, forests, and fields" blend together.

In the protection of traditional villages in Huanggang City, in addition to looking at the classification of landscape genes, more consideration should be given to the linkage and interconnectivity of landscape genes, giving full play to the concentrated effect, and driving the overall development of traditional villages. The landscape genes of traditional villages in Huanggang City can be classified into several major areas according to factors such as geographical location, the degree of cultural preservation in the village, and the degree of industrial development. Feature tourism routes can be planned within the area to form tourism lines. Outside the area, they can echo each other and complement each other's advantages, using other well-known scenic spots to explore new formats and new model.

6. Conclusion and Discussion

This paper uses the research on the landscape gene map of traditional villages to classify the 49 traditional villages in Huanggang City, identify and extract their landscape genes, construct the landscape gene map, and propose protection strategies, which is helpful for the implementation of the concentrated protection plan of traditional villages and is also beneficial to retain the original and typical landscape characteristics in the upgrading and restoration of villages. However, this paper only summarizes and refines the overall landscape characteristics of traditional villages in Huanggang City and does not detail the individual villages, nor does it classify them into groups. The next step is to improve the landscape gene map, deeply analyze the landscape gene map of traditional villages in Huanggang City, and focus on the group division of landscape genes, the variation and restoration of landscape genes, and so on.

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