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Exploration of the Landscape Gene Characteristics of Traditional Villages along the Jinzhong Section of the Wanli Tea Road from the Perspective of the Village Temple System

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Abstract: Traditional villages along the Jinzhong section of the Wanli Tea Road possess unique geographical locations and cultural heritage, showcasing a rich variety of cultural landscapes. Among these, village temple buildings play a crucial role as the core of spiritual and belief life in traditional villages. In the context of rapid urbanization and modernization, a new perspective is needed to thoroughly explore the deeper connotations of cultural landscape characteristics in traditional villages along the Wanli Tea Road, particularly by examining the composition and inherent features of their landscape genes. This study employs landscape gene theory, using the village temple system as a lens to identify and analyze the landscape genes of traditional villages along the Jinzhong section of the Wanli Tea Road. Based on the results, a genealogy and a map of landscape genes are constructed to clearly and effectively present the typical characteristics and expressions of these genes in a logical and visual manner. The findings indicate the following: (1) The village temple system in traditional villages along the Jinzhong section of the Wanli Tea Road is closely related to the formation and expression of their landscape genes and can play a critical role in the protection and transmission of cultural landscapes. (2) As important nodes along the historical trade route, the landscape gene characteristics of these villages reflect their unique natural environments and historical development trajectories, illustrating the deep intertwining of commercial activities and local cultural landscapes. (3) This study establishes a replicable research framework that is not only applicable to local studies but also provides valuable references for broader cultural landscape research.

Keywords: the Wanli Tea Road; China; Jinzhong; traditional village; landscape gene; village temple system; cultural landscape

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1. Introduction

In the history of China, the Wanli Tea Road has played a significant role as a crucial channel for commercial trade with the world through the medium of tea (Figure 1). It has also served as an important transportation corridor for cultural exchange, mutual learning, and reference with countries around the world [1–4]. The traditional villages along this route are vital carriers of the historical and cultural heritage of the Wanli Tea Road. They hold profound historical memories and bear witness to the intersection of history and reality. These villages embody the essence of ancient Chinese foreign commerce, trade, and cultural exchanges, possessing rich scientific research and economic value [5–7]. However, with increasing urbanization and modernization, many traditional villages along this route are encountering challenges such as blocked cultural inheritance, rampant commercialization, and limited sustainable development [8–13], leading to an increasingly homogenized village cultural landscape [14–17]. One of the fundamental reasons is the neglect of the

importance of the genetic aspects of the village landscape and the lack of profound exploration of the village's unique landscape genes [18,19].

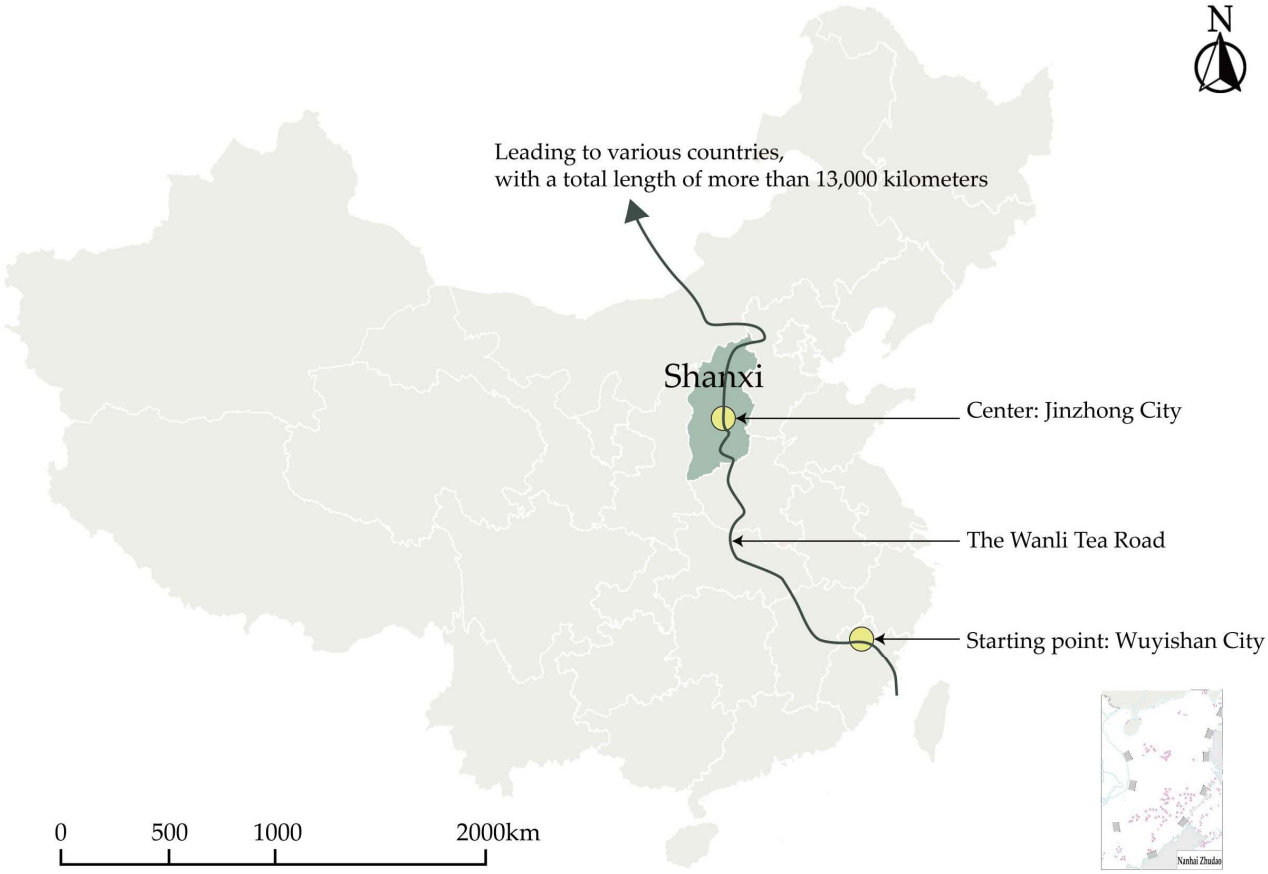


Figure 1. The location of the Wanli Tea Road in China (source: drawn by the author).

A cultural landscape refers to the result of human activities superimposed on the basis of natural landscapes [20–22], encompassing both material and non-material aspects. It embodies the activities and unique characteristics of human society within specific historical, geographical, and cultural contexts [23,24]. The concept of "genes" originates from the field of biology, serving as the fundamental unit for genetic inheritance in organisms and playing a dominant role in controlling biological traits [25,26]. The so-called landscape gene is a unique and hereditary cultural factor, which is an indispensable basic unit in the formation of a specific cultural landscape. It is passed down from generation to generation and distinguishes itself from other cultural landscapes. Not only does it play a crucial role in shaping a particular cultural landscape, but it also serves as a key factor in identifying this cultural landscape [27]. The theory of landscape genes combines theories and insights from disciplines such as biology, geography, architecture, and ecology, providing a solid theoretical basis and favorable tools for exploring the formation, evolution, and inheritance characteristics of traditional village cultural landscapes in depth.

The cultural landscape of traditional villages is shaped by several key elements, including residential buildings, village temples, public spaces, natural landscapes, the overall environment, and diverse cultural elements [12,28,29]. These elements together form the spatial structure and cultural fabric of the village, maintaining its uniqueness and providing the necessary support for its development and continuity, allowing it to preserve its historical and cultural essence amid modernization [30,31]. Among these elements, village temple buildings play a crucial role as the spiritual and religious centers of traditional villages [32,33]. The village temple buildings discussed in this paper encompass temples, ancestral halls, and other buildings that have served or currently serve belief functions dur-

ing certain historical periods. These buildings serve not only as the material public space of the village but also as the bearers of its rich historical and cultural heritage [34,35]. The village temple system is the entirety formed by the various village temple buildings within the village, regardless of their current state of preservation. It bears witness to the continuous changes and cultural heritage in the long history of the village, while also reflecting to a certain extent the unique cultural landscape genetic characteristics of the village.

Therefore, thoroughly exploring the profound connotations of the cultural landscape features of traditional villages along the Wanli Tea Road, understanding the manifestations of their landscape genes from specific perspectives, and analyzing their unique internal characteristics are key actions toward ensuring the long-term development of these villages. These efforts not only help protect and preserve the cultural essence of these traditional villages in the face of modernization challenges but also provide valuable insights for modern conservation practices and landscape planning [36–38], thereby promoting their sustainable development.

In response to the issues mentioned above, extensive research has been conducted both in China and abroad, yielding a range of significant results. Early on, foreign scholars introduced the concept of "genes" in the study of settlement landscape characteristics, exploring the hidden common factors in the spatial layout of settlements [39,40] and demonstrating a new research model [41]. There are also scholars who believe that landscape is the complex external morphological foundation of urban and rural settlements, and that it can extract the morphological gene of historical townscapes [42,43]. The aforementioned foreign research has, to some extent, provided important support for the development of landscape gene theory and laid its theoretical foundation.

In China, Liu Peilin was the first to propose the concept of landscape gene in his research [44], and gradually developed it into the theory of landscape genes. In recent years, the related research content of landscape genes in China has become relatively rich and complete under the leadership of Liu Peilin and others. It mainly includes the identification and extraction methods of landscape genes in traditional villages [45], the study of landscape gene information chain theory [27], the construction of landscape gene maps [46,47] and genealogy [48,49], variations of landscape genes [50,51], and the protection and inheritance of traditional villages based on landscape gene [52]. As the cultural characteristics of Chinese villages, the village temple system formed by village temple buildings is mainly concentrated in China, and its related research results are also relatively rich, including the architectural features of village temple buildings [35], the specific classification of the belief culture carried by village temple buildings [53], historical development [54], and regional distribution [55]. They also include the relationship between village temple buildings and village form development and their spatial combination [56].

Based on this, this paper applies landscape gene theory, focusing on traditional villages along the Jinzhong section of the Wanli Tea Road from the perspective of the village temple system. The main objectives are as follows: (1) Analyze the characteristic expression of landscape genes from a unique perspective. (2) Clarify the composition and typical characteristics of landscape genes in a logical and graphical manner. (3) Expand the research scope of landscape genes, providing new theoretical foundations and perspectives for the cultural preservation and overall renewal of traditional villages in the region.

2. Materials and Methods

2.1. Study Area and Sample

The Wanli Tea Road is an international commercial road that emerged in the Qing Dynasty after the Silk Road, primarily dominated by Shanxi merchants, spanning over 13,000 km [3,56]. Within Shanxi Province, as the origin of Shanxi merchants, the Wanli Tea Road is divided mainly into two major routes: the Xi Road and the Da Xi Road. These two routes intersect in Qi County, Jinzhong City, and then develop northward, forming an overall '人' shape [57] (Figure 2).

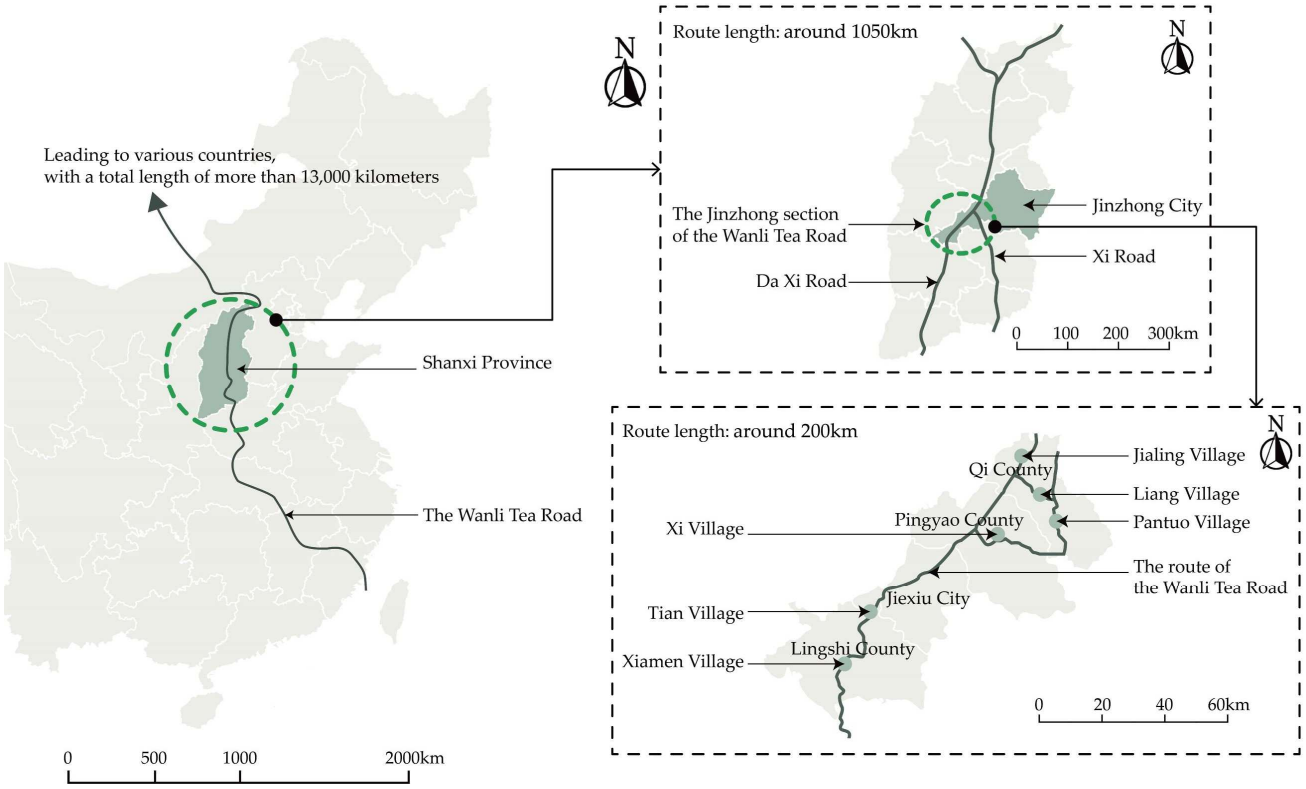


Figure 2. Research area and village distribution (source: drawn by the author).

The area under the jurisdiction of Jinzhong City, as the central region of the Wanli Tea Road in Shanxi Province, not only holds a particularly important geographical position, but also carries the commercial culture formed by Shanxi merchants, who are the main force of the Wanli Tea Road [58,59]. It possesses significant historical and cultural resources with valuable research value.

The Jinzhong section of the Wanli Tea Road mentioned in this article consists of four administrative divisions: Lingshi County, Jiexiu City, Pingyao County, and Qi County. It includes the Xi Road, Da Xi Road, Qi County Branch Road, and Pingyao County Branch Road. Six traditional villages along this route have been selected as research samples due to their rich history and culture, distinct regional characteristics, and significant value for reflecting the interaction between the village temple system and village landscape genes. These villages are included in the list of Chinese traditional villages: Xiamen Village, Lingshi County; Tian Village, Jiexiu City; Xi Village, Pingyao County; Jialing Village, Qi County; Liang Village, Qi County; and Pantuo Village, Qi County. (Figure 2).

2.2. Research Methods

This study integrates various methods, primarily employing landscape gene identification and analysis and Landscape Gene Map Expression. The detailed research process is shown in Figure 3, aiming to thoroughly identify and analyze landscape gene characteristics, providing an accurate foundation for the research.

2.2.1. Landscape Gene Identification and Analysis

This study adopts the perspective of the village temple system, based on the four fundamental principles of landscape genes proposed by Liu Peilin: intrinsic uniqueness, extrinsic uniqueness, local uniqueness, and overall superiority [27] (Figure 4). It also references the feature deconstruction extraction method summarized and refined by Hu Zui et al. [45] to establish a specific, identifiable, and operable index system for more

effectively identifying and extracting the landscape genes of traditional villages along the Jinzhong section of the Wanli Tea Road (Table 1).

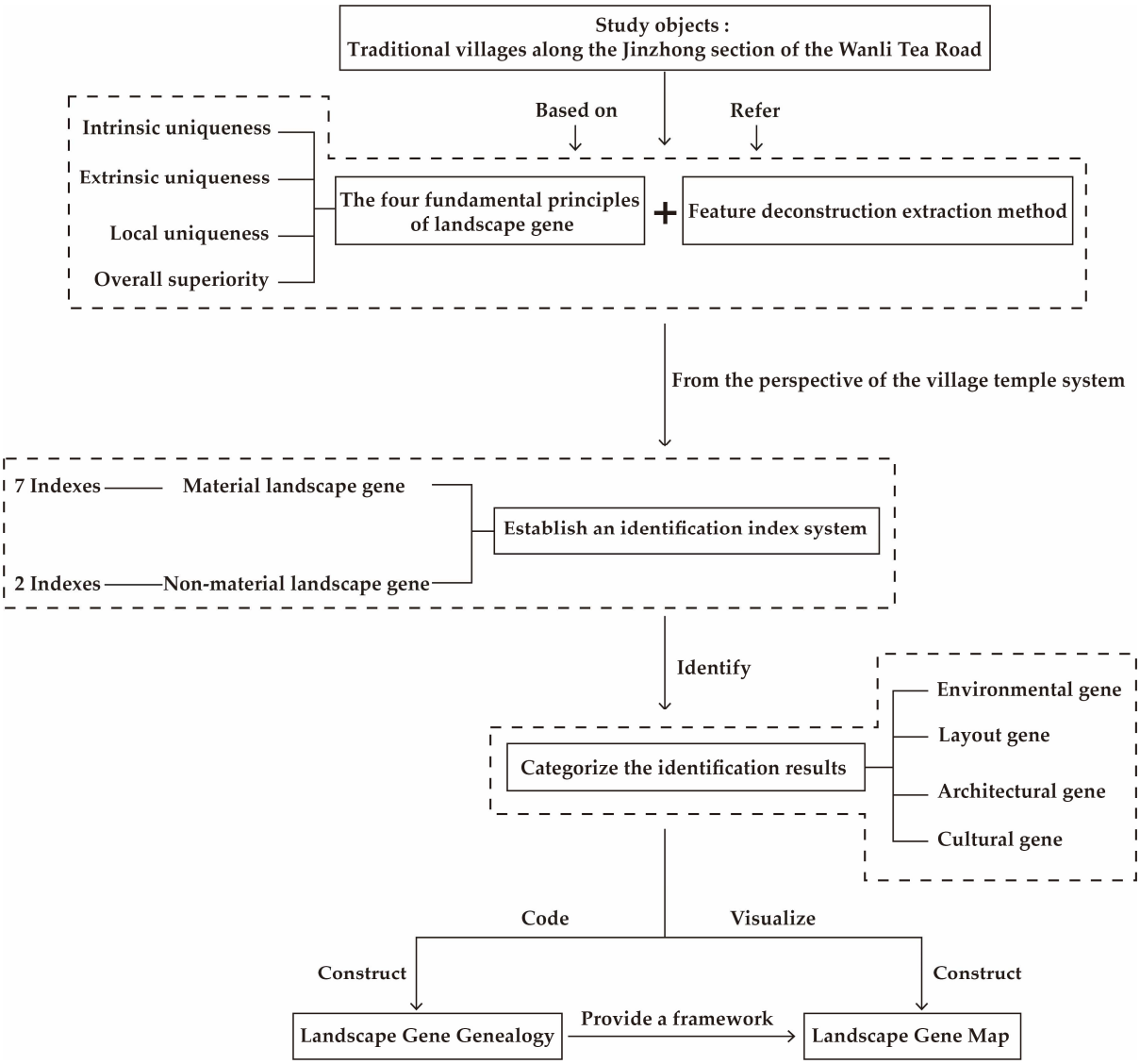


Figure 3. Schematic diagram of the research process (source: drawn by the author).

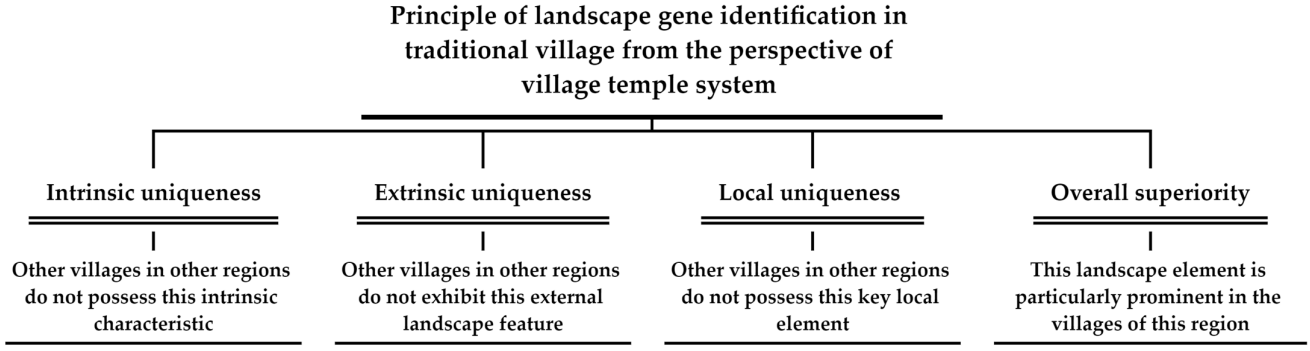


Figure 4. The principle of landscape gene identification in a traditional village from the perspective of the village temple system (source: drawn by the author).

Table 1. Landscape gene identification index system for traditional villages along the Jinzhong section of the Wanli Tea Road from the perspective of the village temple system (source: drawn by the author).

Identification Range	Landscape Gene Category	Identification Index	Index Interpretation
Traditional villages along the Jinzhong section of the Wanli Tea Road	The material landscape genes	Mountain and water elements	The natural mountain and water features surrounding the village temple buildings. They reflect the overall mountain–water pattern of the village.
		Cultural environmental elements	The elements related to history, culture, and social customs surrounding village temple buildings.
		Site characteristics	The elevation of the site where the village temple buildings are located reflects the topographical features of the village.
		Morphological characteristics	The morphological layout of village temple buildings reflects the overall morphological layout characteristics of the village, such as cluster-shaped and strip-shaped forms.
		Building layout	The combination characteristics of village temple buildings.
		Building construction	The typical design or construction characteristics of village temple buildings, such as roof forms and the use of materials.
		Building decoration	The typical decorative patterns found throughout village temple buildings.
	The non-material landscape genes	Belief culture	The religious or spiritual beliefs embodied in village temple buildings.
		Cultural activities	The forms of activities related to the belief culture embodied in village temple buildings.

The specific steps are as follows:

(1) First, the landscape genes of traditional villages along the Jinzhong section of the Wanli Tea Road are divided into two categories: the material landscape genes and the non-material landscape genes.

(2) Starting from the material landscape genes and the non-material landscape genes, and from the perspective of the village temple system, a landscape gene identification index system is established, resulting in 9 specific identification indexes.

(3) Landscape genes are identified according to the index system, and based on the characteristics of the identification results, the method of "merging categories with similar characteristics" [45] is applied. The identified landscape genes are then merged and categorized into four major groups, environmental genes, layout genes, architectural genes, and cultural genes, which are analyzed in depth.

2.2.2. Landscape Gene Encoding

Based on the perspective of the village temple system, the identification results of the traditional village landscape genes along the Jinzhong section of the Wanli Tea Road are classified and encoded. The specific coding method refers to "Classify and Codes for the National Land Information" (GB/T 13923-92) [60] as well as the theory of "N-level coding".

In this study, the landscape genes are divided into four levels: major category, subcategory, minor category, and unit. The encoding is carried out using a combination of uppercase English letters and numbers, with each level from "major category" to "unit" adding one digit to the code. The major category uses uppercase English letters, while the subcategory, minor category, and unit add numbers to the uppercase English letters. For the minor categories that cannot be further subdivided, the number "0" is used for coding, while the rest are coded using numbers "1–9". The above method establishes a relatively systematic, clear, and intuitive landscape gene coding model (Figure 5), laying the foundation for building the lineage of traditional village landscape genes along the Jinzhong section of the Wanli Tea Road from the perspective of the village temple system.

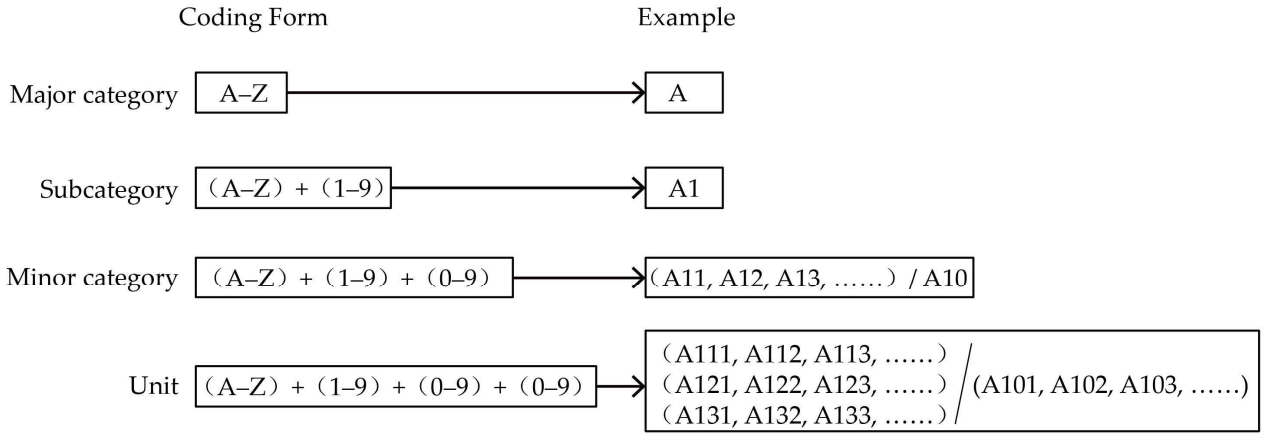


Figure 5. Landscape gene coding model (source: drawn by the author).

2.2.3. Landscape Gene Map Expression

The landscape gene map used in this study is not a traditional geographical map but an innovative analytical tool that employs visual language to explore and represent landscape genes. Its core lies in abstracting, generalizing, and typifying the forms and patterns of landscape genes and presenting their essential characteristics through visualized images [46], enabling a more comprehensive understanding.

Essentially, the landscape gene map constructed in this study is a visual framework based on the landscape gene genealogy, designed to explain and express landscape gene characteristics. It presents complex elements in a structured, visualized, and easily understandable manner [47]. This method is particularly suited for capturing the abstract qualities of landscape genes and presenting their complexity in an intuitive form.

From the perspective of the village temple system, this study constructs a landscape gene map for traditional villages along the Jinzhong section of the Wanli Tea Road. This map is not just a representation of geographical features but uses diagrammatic expression to clearly and effectively showcase the typical characteristics and expressions of landscape genes, facilitating a deeper understanding of their structural composition.

2.3. Data Source

The data used in this article mainly come from the following sources:

(1) Between July 2023 and July 2024, the research team conducted multiple field visits to the study area. Key interviews were conducted primarily with elderly villagers or individuals responsible for village heritage preservation (Figure 6), collecting information on village temple buildings, the Wanli Tea Road, village history and culture, the natural environment, and landscape resources. Additionally, the team utilized drone aerial photography, map marking, and image capture to gather relevant preliminary research materials. These efforts aimed to ensure the accurate identification and analysis of landscape gene characteristics from the perspective of the village temple system, providing a solid foundation for this study.

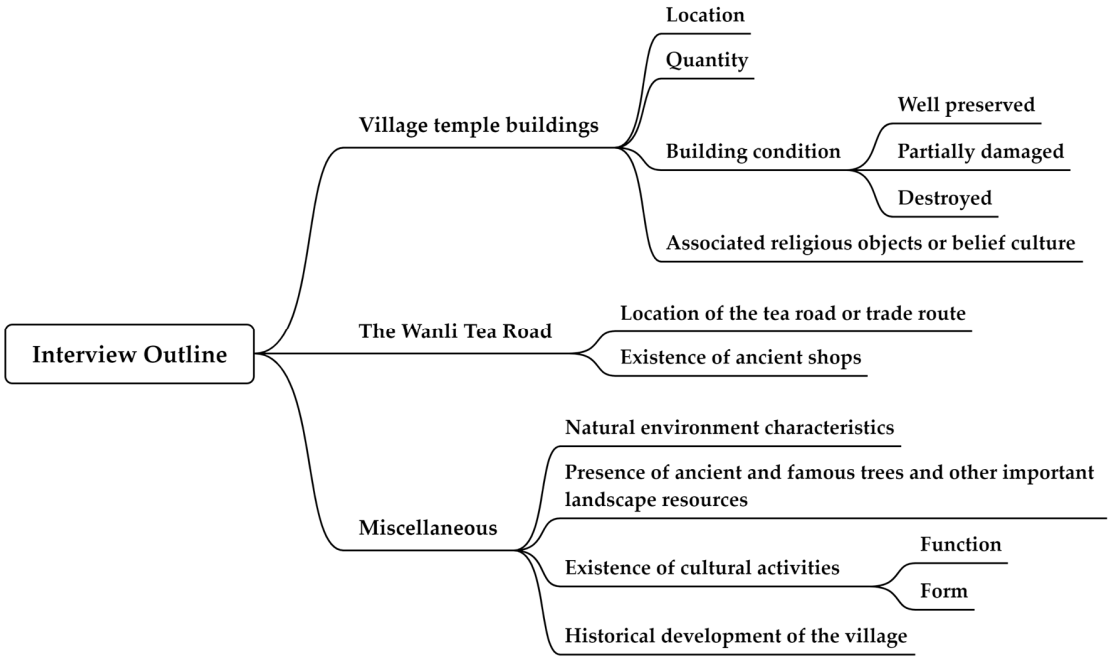


Figure 6. Interview outline (source: drawn by the author).

(2) Historical background, policies, and cultural heritage information related to the Wanli Tea Road and the protection of traditional villages were obtained through internet resources, books, and related literature. These materials include research papers, professional books, local chronicles (such as county and village chronicles for each region and village), and traditional village atlases. These sources provided essential historical and cultural context, aiding in the analysis of the evolution of certain landscape genes over time and further supporting the identification and classification of landscape genes.

(3) Some of the basic maps and elevation data in this article were sourced from platforms such as Google Earth, OpenCycleMap, and Tencent Maps, and were processed using software like ArcGIS 10.8. These data were primarily used for the foundational analysis of environmental genes and layout genes, supporting a deeper interpretation of the environmental composition, topographical features, and morphological layout of the study area, providing a solid data basis for landscape gene analysis.

3. Results and Analysis

3.1. Identification and Analysis of Landscape Genes

Using the aforementioned methods, the landscape genes of traditional villages along the Jinzhong section of the Wanli Tea Road were identified. The results can be primarily categorized into four main types: environmental genes, layout genes, architectural genes, and cultural genes. Additionally, this study has created distribution maps for the landscape genes of these traditional villages, with some elements that can be represented in the figures, allowing for a more intuitive display of their overall characteristics (Figure 7).

3.1.1. Environmental Genes

In the village temple system, various types of village temple buildings serve as important public spaces within the villages and also constitute an integral part of the villages. The surrounding environment often reflects the significant environmental characteristics of the villages in a more intuitive way. From the perspective of the village temple system, the environmental genes of traditional villages along the Jinzhong section of the Wanli Tea Road can be divided into two categories: mountain and water environment and cultural environment.

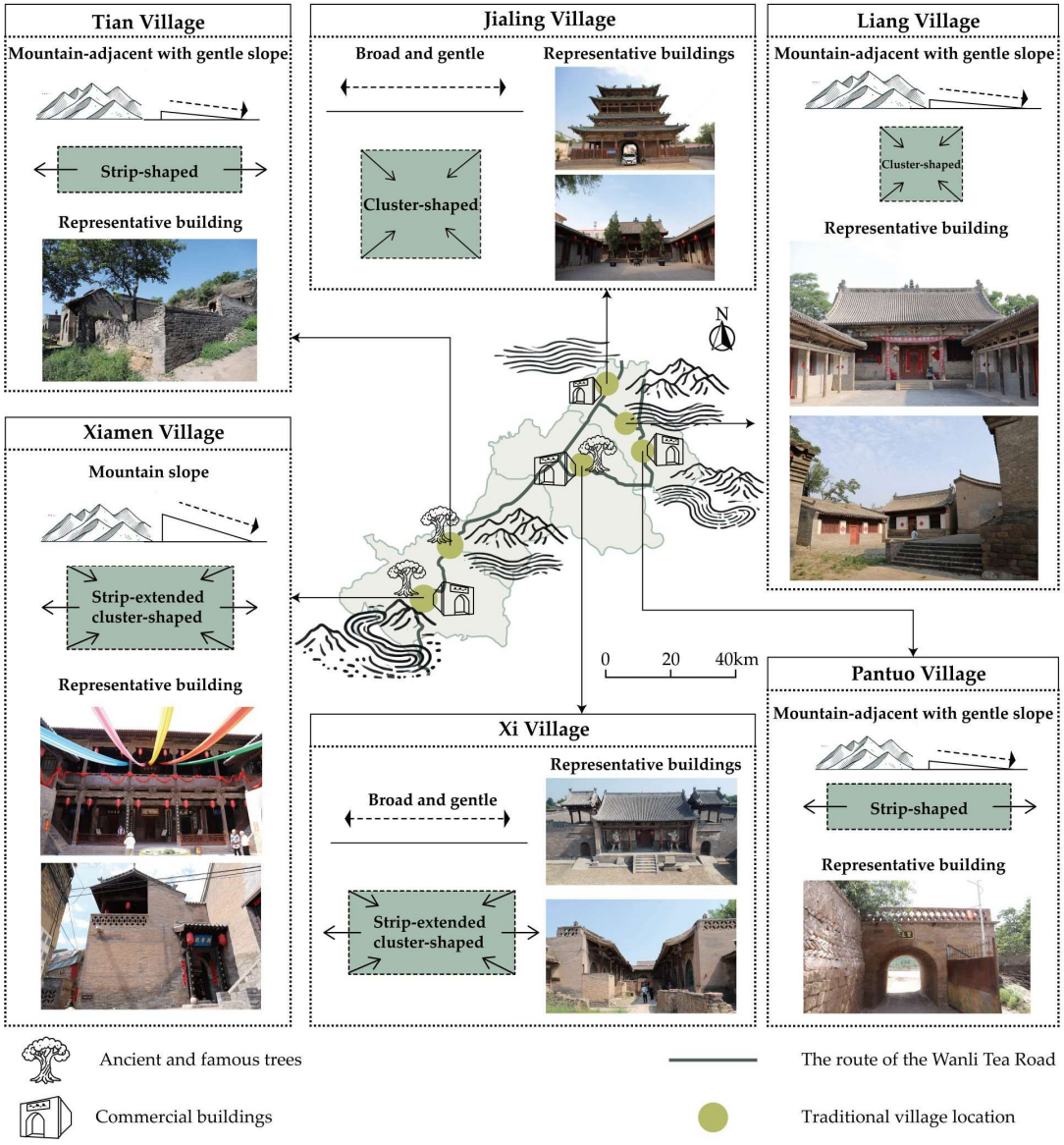


Figure 7. Distribution map of represented landscape genes in traditional villages along the Jinzhong section of the Wanli Tea Road from the perspective of the village temple system (figure source: drawn by the author; source of photos in the figure: taken by the author).

1. The mountain and water environment mainly includes three types: integrated with mountains and water, vast and open, and adjacent to water bodies (Figure 8).

(1) The integration of mountains and water: This is the most typical mountain and water environment in traditional villages along the Jinzhong section of the Wanli Tea Road. Within a certain environmental context, the surrounding area of village temple buildings is characterized by natural water bodies and hills. As a result, the villages present a harmonious mountain–water environment with their back against the mountains and facing the water, embodying the traditional Chinese ideal mountain–water pattern for settlements [61]. The village as a whole is backed by the mountains, which effectively shield it from the cold winter winds and resist adverse air currents such as sand and dust [62]. In addition, facing the water source not only welcomes cool breezes in hot summers to regulate microclimates, but also makes full use of the characteristics of water bodies to form a good ecological cycle [63], providing favorable environmental conditions for commercial activities along the Qing Dynasty's Wanli Tea Road, villagers' production and life, and the

development of villages. Such villages include Pantuo Village, Tian Village, Liang Village, and Xiamen Village.

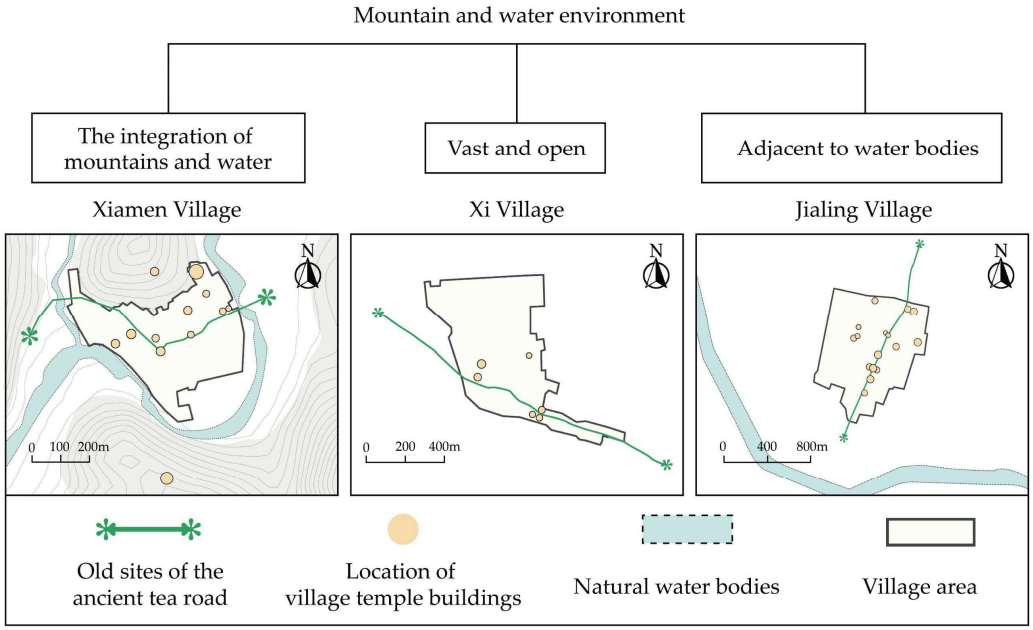


Figure 8. Schematic diagram of traditional villages and the mountain and water environment along the Jinzhong section of the Wanli Tea Road from the perspective of the village temple system (source: drawn by the author).

Taking Xiamen Village as an example, from the perspective of traditional Chinese geomancy, the mountain on the north side of the Land God Temple (2) is the Main Peak of the village back, also known as Lailong Mountain, which is the vein behind Lvliang Mountain, forming the "dragon vein" of Xiamen Village. To the west of Zhenwu Temple lies the peak of Right Assistant Mountain, which bears the image of the White Tiger. To the east of Wenfeng Pagoda stands the peak of Left Assistant Mountain, with an image resembling that of the Azure Dragon, while the southern mountain serves as the village's Fronting Hill. Additionally, to the south of Zhenwu Temple flows a tributary of Fenhe River, serving as a water source for the village [61] (Figure 9). The village thus forms a mountain and water environment, facing the mountains and embracing the waters. In winter, it provides warmth, while in summer, it offers coolness. The rich environmental resources create a pleasant ecological setting and a unique local microclimate for the village, making it a typical embodiment of an ideal mountain–water pattern.

(2) Vast and open: Within a certain environmental range, the surrounding area of various village temple buildings is relatively open, with no mountains or water. As a result, the villages present a vast and open type of mountain and water environment without large-scale natural mountains and bodies of water in the vicinity. Compared with the other two types, this type of village lacks the advantageous factors of natural mountain and water features, presenting a relatively monotonous overall environment. However, the absence of restrictions from mountains and water flow results in a gentle and open village terrain, providing convenience for production and living. These geographical conditions also reduce the risk of natural disasters. An example is Xi Village.

(3) Adjacent to water bodies: Within a certain environmental range, the surrounding area of each village temple buildings is only marked by natural water bodies such as rivers. As a result, the villages present a type of mountain and water environment with adjacent water bodies and relatively spacious surroundings, without mountainous or hilly terrain. The proximity of these natural water bodies plays a beneficial role in shaping the village landscape, improving the ecological environment, and facilitating daily production and living for villagers. An example is Jia Ling Village.

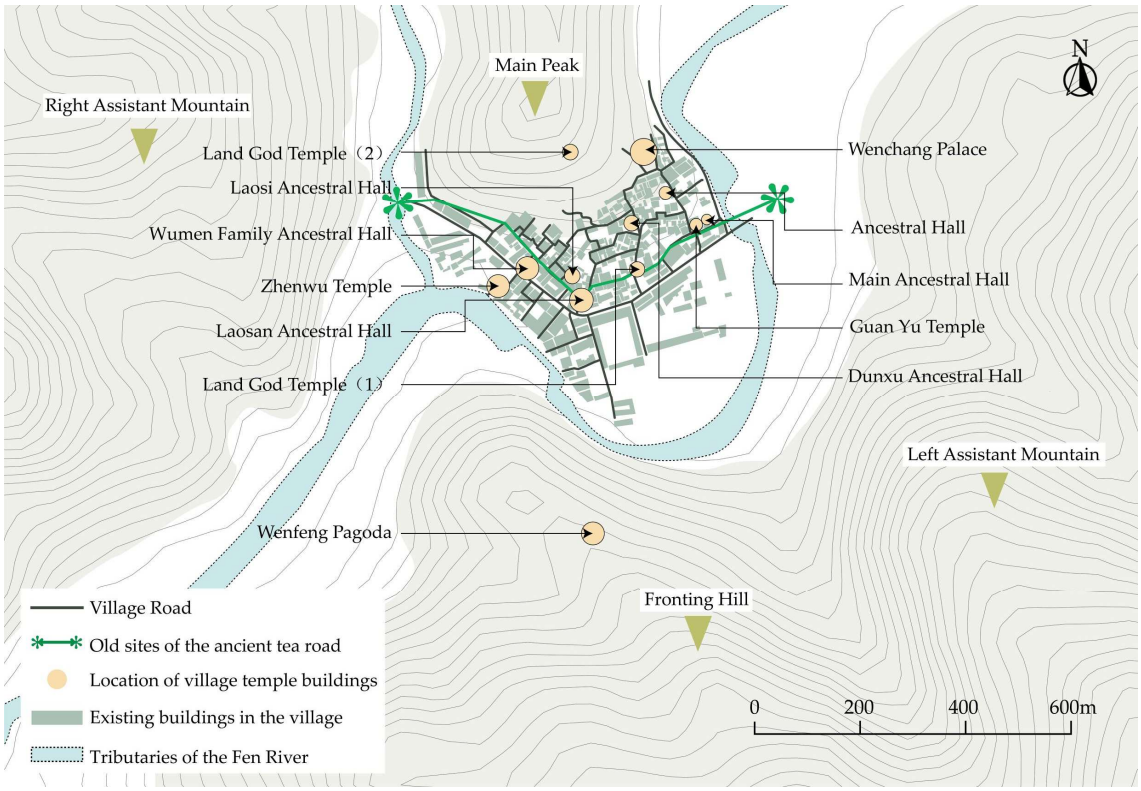


Figure 9. Schematic diagram of the mountain and water environment in Xiamen Village under the perspective of the village temple system (source: drawn by the author).

2. The cultural environment mainly refers to the elements related to historical culture, social customs, and other aspects in the villages, representing the historical heritage, spiritual and cultural characteristics, as well as various aspects of social life. From the perspective of the village temple system, the cultural environment of traditional villages along the Jinzhong section of the Wanli Tea Road is mainly manifested in three categories: ancient and famous trees near various village temple buildings, old sites of the ancient tea road, and commercial buildings.

Among the ancient and famous trees, the locust tree is the most diverse in species. Due to its tall and majestic shape, lush foliage, unique form, and long historical significance, it is often endowed with a mysterious aura and regarded as a sacred place where spirits reside in the village. The old sites of the ancient tea road and commercial buildings are not just existing material spaces, but also an important manifestation of frequent commercial exchanges along the Wanli Tea Road, showing the unique commercial characteristics of the village. They carry important historical and cultural information, which to a certain extent influences the development and form of the village.

3.1.2. Layout Genes

In China, there is a saying: "Every village has a temple, and without a temple, it is not a complete village [64]". This reflects the widespread emphasis on the village temple system in village construction and its crucial role in village layout and development. From the perspective of the village temple system, the layout genes of traditional villages along the Jinzhong section of the Wanli Tea Road can be divided into two categories: site selection and morphological layout. The site selection of the villages reflects the characteristics of how various village temple buildings are positioned. Since most village temple buildings were built in or before the Qing Dynasty, the overall layout of these systems closely mirrors the morphological layout of Qing Dynasty villages. As a result, the current village

layout evolves from the historical temple system layout, demonstrating the continuity of its influence.

1. The types of site selection mainly include broad and gentle, adjacent to the mountain and gentle, and mountain slope (Figure 10).

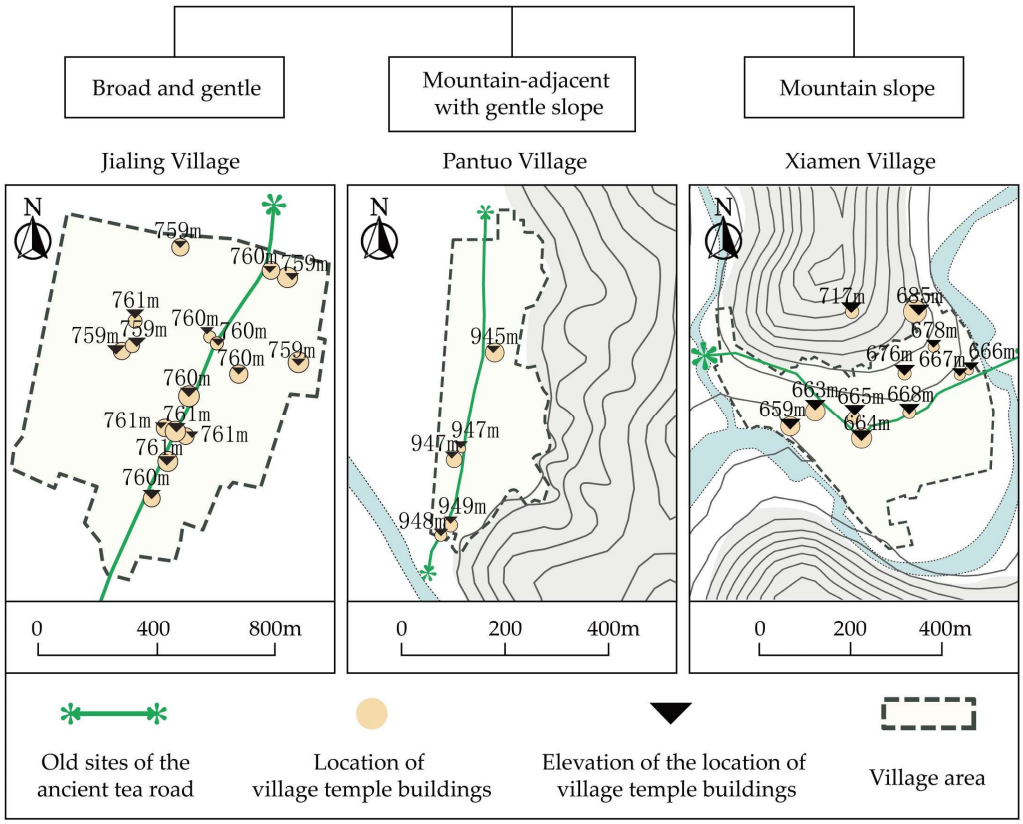


Figure 10. Schematic diagram of site selection types and typical examples of traditional villages along the Jinzhong section of the Wanli Tea Road from the perspective of the village temple system (source: drawn by the author).

(1) Broad and gentle: The village temple buildings are all located in areas with minimal undulations, where the terrain is gently sloping and without significant changes in elevation. The villages conform to the siting of the village temple buildings, exhibiting a broad and gentle-sloping type of location characterized by expansive surroundings and a gentle terrain. Simultaneously, the gentle and expansive terrain can bring about more convenient routes and transportation, facilitating the trade and transport along the ancient tea road during the Qing Dynasty, as well as commercial activities between villages. This has not only enhanced the efficiency of commercial trade but also promoted economic development among villages, such as in Jialing Village and Xi Village.

(2) Mountain-adjacent with gentle slope: Many village temple buildings are located near the mountain, situated in the foothills of a relatively gentle terrain with no significant changes in elevation. The villages conform to the site selection of various village temple buildings, demonstrating an adjacent and gently sloping location type. This type of site selection enjoys the advantages of natural protection provided by the mountainous terrain and a favorable ecological environment. Moreover, the overall topography is relatively flat and conducive to the production and livelihood of villagers. It also provides convenient geographical conditions for commercial trade activities along the Qing Dynasty's ancient tea road. Examples include Pantuo Village, Tian Village, and Liang Village.

(3) Mountain Slope: The village temple buildings are mostly located in the sloping areas of mountain ranges, with relatively significant changes in elevation. The villages are designed to adapt to the selection of village temple buildings, demonstrating a moun-

tainous terrain and significant elevation differences. The layout of the ancient tea roads is situated in relatively flat areas for easy transportation. Meanwhile, the villages are built according to the natural slope of the mountains, with an overall terrain that has a noticeable incline, facilitating drainage and avoiding potential flooding disasters to some extent. This also creates a relatively diverse landscape with various environmental elements, as seen in Xiamen Village.

2. The main morphological layouts are cluster-shaped, strip-shaped, and strip-extended cluster-shaped.

(1) Cluster-shaped: Village temple buildings are mostly concentrated within a specific area of the village, presenting a scattered layout of the temple system, sometimes with a slight linear extension. The village's development follows the layout of the temple system, resulting in a compact, cohesive cluster-shaped structure. Examples include Jialing Village and Liang Village.

In Jialing Village, the ancient tea road runs through the middle of the village, with many village temple buildings concentrated in the central area. These buildings are arranged within a relatively regular grid of streets and alleys, presenting a scattered layout of the village temple system. Due to the commercial nature of the ancient tea road, there is also some linear extension along it. The village temple system layout reflects the morphological layout of Qing Dynasty villages. Landmarks such as the Guan Yu Temple on the north side, the Hushen Temple, Wudao Temple (2), and Xingfu Temple on the west side, Nainai Temple on the south side, and Wudao Temple (1), Kuixing Pavilion, and Three Officials Temple on the east side mark the boundaries of the ancient village. The village has expanded outward, particularly to the east and west, resulting in a more cluster-shaped layout rather than a strictly linear one following the tea road's north–south axis (Figure 11).

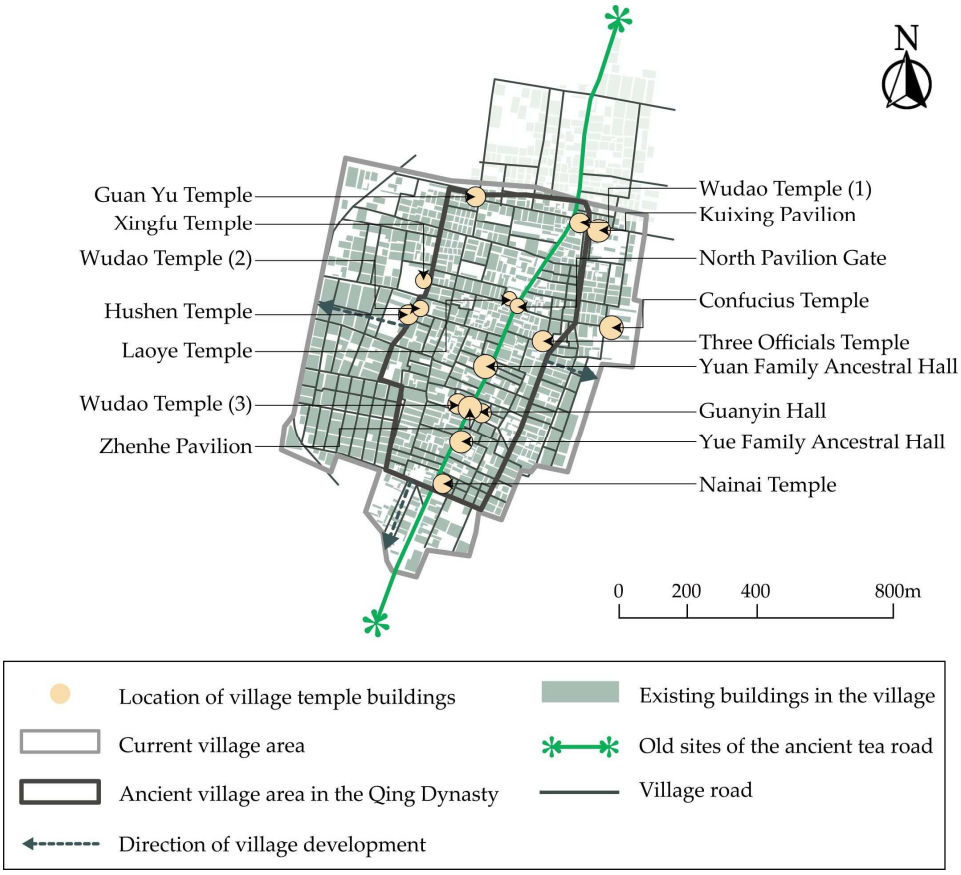


Figure 11. Schematic diagram of the morphological layout of Jialing Village from the perspective of the village temple system (source: drawn by the author).

(2) Strip-shaped: Village temple buildings are scattered within the village, forming a linear layout along the ancient tea road. The overall village layout follows the village temple system, resulting in a strip-shaped extension as the village develops. Examples include Pantuo Village and Tian Village.

In Pantuo Village, the ancient tea road runs through the village center, with most village temple buildings scattered throughout the village. These buildings are positioned within the compact, fishbone-shaped streets and alleys, forming a strip-shaped layout along the tea road due to its commercial influence. The layout of the village temple system reflects the Qing Dynasty's village layout. Landmarks such as Wenchang Pavilion at the Southern Gate and Huayan Temple on the northern side mark the village's boundaries. Over time, the village has expanded northward along the tea road, extending the scope of the village while maintaining its strip-shaped layout (Figure 12).

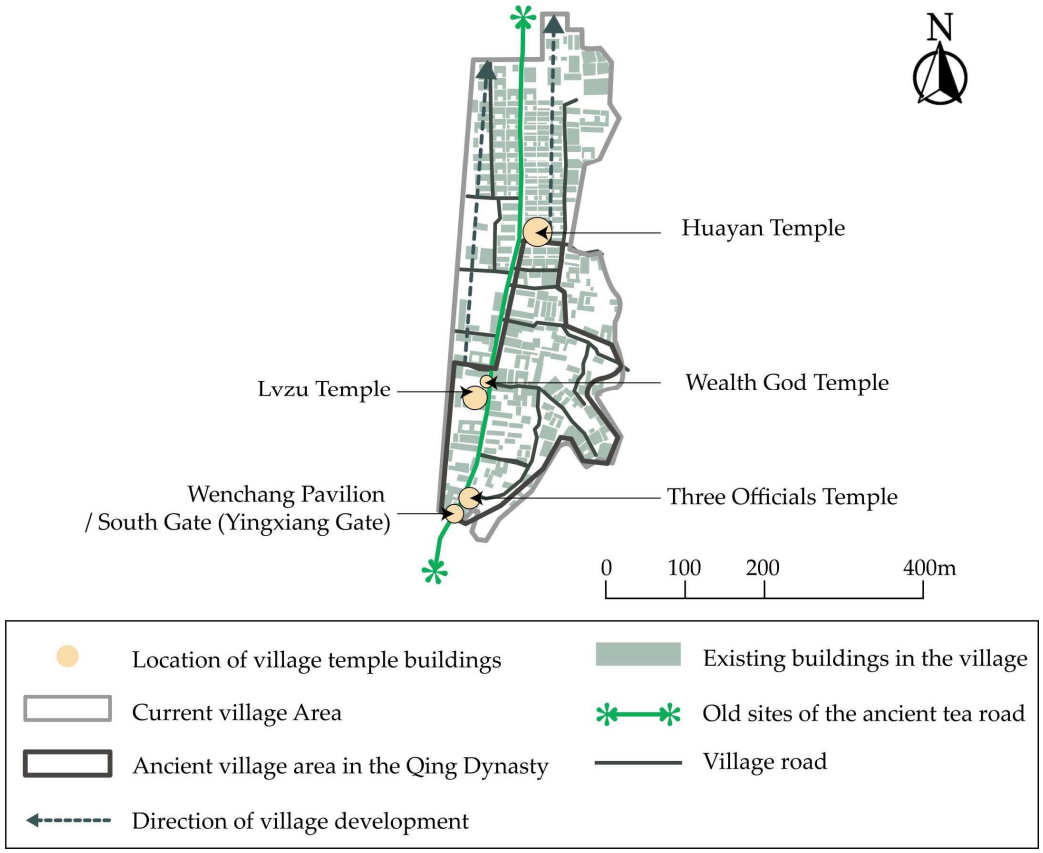


Figure 12. Schematic diagram of the morphological layout of Panduo Village from the perspective of the village temple system (source: drawn by the author).

(3) Strip-extended cluster-shaped: Similar to the cluster-shaped layout, temple buildings are concentrated but with strip-shaped extensions. The villages develop along the tea route, forming a cluster shape with strip extensions. Examples include Xiamen Village and Xi Village.

In Xiamen Village, the tea road runs through the northern part, with temples concentrated in the north, scattered within winding streets. Influenced by the tea road, the layout includes a strip-shaped extension. This reflects the morphological layout of Xiamen Village during the Qing Dynasty, with landmarks such as the Wenchang Palace on the north side of the ancient village, the Wumen family ancestral hall on the west side, and the Main Ancestral Hall on the east side marking the village's boundaries. The village has expanded while maintaining the cluster-shaped layout with strip extensions (Figure 13).

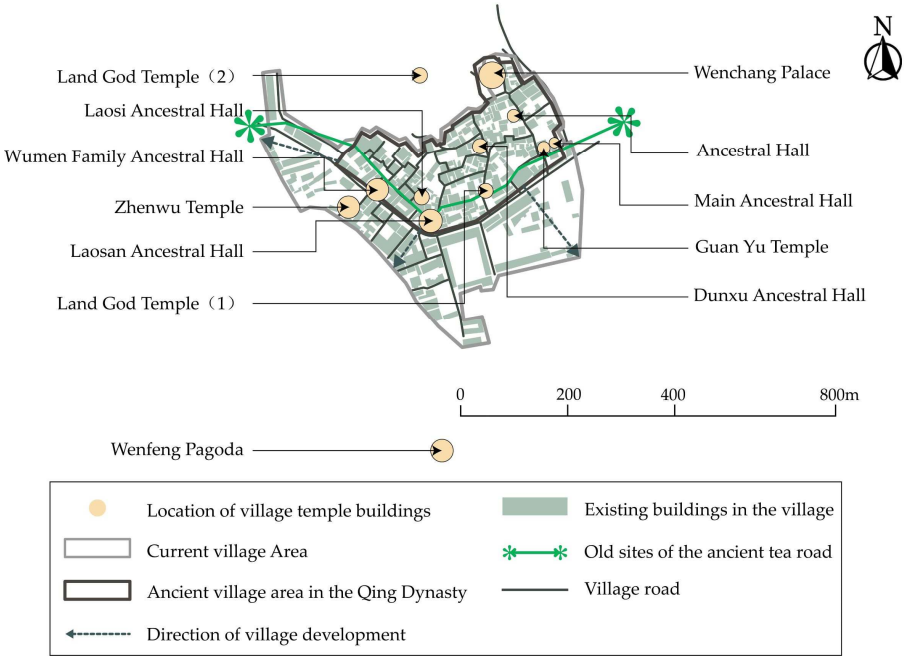


Figure 13. Schematic diagram of the morphological layout of Xiamen Village from the perspective of the village temple system (source: drawn by the author).

3.1.3. Architectural Genes

The various village temple buildings in the village temple system are important components of the public buildings in the village and their architectural features reflect a higher level of traditional village architecture, which is more exquisite compared to other traditional buildings. This highlights the local characteristics, embodying the unique traditional architectural features and personality of the local area. From the perspective of the village temple system, the architectural genes of traditional villages along the Jinzhong section of the Wanli Tea Road mainly focus on the existing village temple buildings, which contain rich historical information and possess significant research value (Table 2). These can be classified into four categories: combination forms, roof styles, building materials, and decorative patterns.

Table 2. Existing typical village temple buildings (table source: drawn by the author; source of photos in the table: taken by the author).

Temple Name	Current Status Photos	Associated Village
Guan Yu Temple		Xiamen Village
Qiao Family Ancestral Hall		Tian Village

Table 2. *Cont.*

Temple Name	Current Status Photos	Associated Village
Guan Yu Temple		Xi Village
Hushen Temple		Xi Village
Mao Family Ancestral Hall		Xi Village
Seven Buddhas Temple	 	Xi Village
Hushen Temple	 	Jialing Village
Wudao Temple		Jialing Village

Table 2. *Cont.*

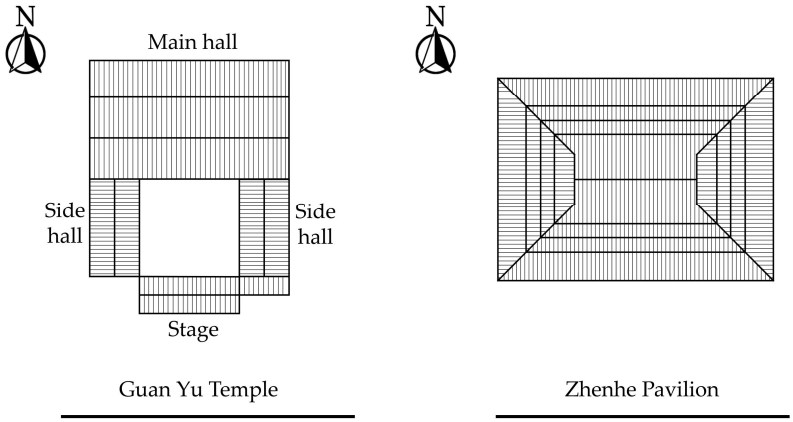
Temple Name	Current Status Photos	Associated Village
Zhenhe Pavilion		Jialing Village
Hongfu Temple	 	Liang Village
Yingxiang Gate (formerly Wenchang Pavilion)		Pantuo Village

1. There are mainly two types of combination forms: courtyard type and single-building type. Among them, the courtyard type is the most common, usually formed by enclosing different building spaces or courtyard walls. For example, Guan Yu Temple in Xiamen Village faces south and is surrounded by the main hall on the north side, the two side halls on the east and west side, and the stage on the south side (Figure 11). The monolithic type, on the other hand, possesses a strong sense of independence, with the building itself having clear individual boundaries and self-completeness. For example, the Zhenhe Pavilion of Jialing Village, originally the south gate of the village, sits on the south facing north and is a pavilion-type street crossing building with two visible floors and three hidden floors. It exists independently and has no other architectural elements combined with it (Figure 14).

2. There are six types of roof styles: flush gable roof, round ridge roof, flat roof, gable-end roof, gable-end hip roof, and pointed roof, among which the flush gable roof is the most common, the round ridge roof and flat roof are the second, and the other three types are relatively few. For example, the Land God Temple in Xiamen Village has a flush gable roof, and its Guan Yu Temple main hall has both a flush gable roof and a round ridge roof. The Qiao Family Ancestral Hall in Tian Village has a flat roof for part of it. The main hall of Hongfu Temple in Liang Village has a gable-end roof. The Zhenhe Pavilion in Jialing Village has a four-tiered eaves gable-end hip roof. The main hall of Guan Yu Temple in Xiamen Village has a flush gable roof and a round ridge roof. And the bell tower and drum tower of the Hushen Temple in Jialing Village have a pointed roof.

3. The village temple buildings are mostly made of wood, bricks, and stones. Wooden materials are mainly used for the load-bearing components of the buildings due to their lightweight nature, ease of processing, good plasticity, and shock absorption advantages, which meet the structural strength requirements. Brick and stone materials are commonly

used for wall surfaces to take advantage of their excellent sturdiness, fire resistance, and durability in order to ensure building stability.



Guan Yu Temple Zhenhe Pavilion

Figure 14. Plan schematic of village temple buildings in Xiamen Village (source: drawn by the author).

4. The decorative patterns and designs of village temple buildings are exquisite and rich in content, mainly including five categories: crane, dragon, rhinoceros, auspicious clouds, and flowers and plants. For example, the stage of the Guan Yu Temple in Xiamen Village features sparrow braces under the eaves, intricately carved with auspicious cloud and crane patterns. The central area of the sparrow braces depicts cranes and auspicious clouds intertwining, while the lower parts of the sparrow braces, where they connect with the columns, show cranes looking back (Figure 15). Additionally, the pillar head of the main hall of the Land God Temple is adorned with exquisite brick carvings of rhinoceros in a "Rhinoceros Looking at the Moon" design [65] (Figure 15). Another example is the Chiwen (ornament on the roof ridge) on the Zhenhe Pavilion in Jialing Village, styled as a dragon, and the ridge carvings of the main hall of the Hushen Temple in Jialing Village are decorated with flowers and plants.



The sparrow braces under the eaves of the stage of Guan Yu Temple



Brick carvings on the pillar head of the stage of the Land God Temple

Figure 15. Decorations of village temple buildings in Xiamen Village (source: drawn by the author).

3.1.4. Cultural Genes

The village temple buildings carry rich cultural and religious significance, and their belief culture forms an essential part of the village's cultural life and spiritual beliefs, becoming a unique cultural symbol of the village. From the perspective of the village temple system, the cultural genes of traditional villages along the Jinzhong section of the Wanli Tea Road focus primarily on the belief culture carried by these temple buildings and the related cultural activities, which can be analyzed through two aspects: belief types and temple fair activities.

1. Along the Jinzhong section of the Wanli Tea Road, the traditional village temple buildings carry a rich and diverse cultural heritage of belief (Table 3). Different types of beliefs represent the villagers' abundant spiritual world and psychological reliance, providing solace for their hearts in social life. The main categories include Buddhist beliefs, Taoist beliefs, natural worship, folk gods, and ancient sages and ancestors.

Table 3. Typical belief cultures and their distribution in traditional villages along the Jinzhong section of the Wanli Tea Road (source: drawn by the author).

Village	Village Temple Building	Main Objects of Belief
Xiamen Village	Guan Yu Temple	Guan Yu, God of Wealth, Sun Simiao, Songzi goddess, Yanguang goddess, Guanyin Bodhisattva, Doumu Yuanjun, Dragon King
	Land God Temple	God of land
Tian Village	Qiao Family Ancestral Hall	Ancestors of the Qiao family
	Guan Yu Temple	Guan Yu
Xi Village	Hushen Temple	Hutu and Huyan
	Mao Family Ancestral Hall	Ancestors of the Mao family
	Seven Buddhas Temple	Sakyamuni, Guanyin Bodhisattva, Manjusri Bodhisattva, Ksitigarbha Bodhisattva, Eighteen Arhats, Maitreya Buddha, Bhaisajyaguru Buddha
	Wealth god temple	God of wealth
Jialing Village	Hushen Temple	Hutu and Huyan
	Wudao Temple	Wudao Lord
Liang Village	Hongfu Temple	Ksitigarbha Bodhisattva, Guanyin Bodhisattva, Songzi goddess

(1) Buddhist beliefs focus on the worship of Bodhisattvas and Buddhas, symbolizing compassion and wisdom and believed to bestow health and peace [66]. Revered figures include Shakyamuni Buddha, Guanyin Bodhisattva, Manjusri Bodhisattva, Ksitigarbha Bodhisattva, the Eighteen Arhats, Maitreya Buddha, the Four Heavenly Kings, and Bhaisajyaguru Buddha.

(2) Taoist beliefs mostly take the various gods of Taoism as the objects of faith, including the Songzi goddess who symbolizes having children and expecting offspring, the Yanguang goddess who symbolizes clear eyes and the removal of eye diseases, Doumu Yuanjun who symbolizes health, longevity, and the safety of descendants, as well as the Wudao Lord, who is related to people's life and death and represents reincarnation.

(3) The natural worship of the villagers mostly stems from their reverence for natural objects and forces, as well as the psychological protection needed for issues related to nature. The main object of worship is the Dragon King, associated with water culture and symbolizing favorable weather and plentiful rain.

(4) Folk gods are primarily based on the belief in deities from folk society, including the God of Land, who symbolizes local peace and the protection of the land, as well as the God of Wealth, who is associated with the commercial attributes of the villages, embodying the Shanxi merchants' pursuit of wealth and symbolizing economic security.

(5) Ancient sages and ancestors are mainly focused on historical figures who actually existed and made contributions to people or possessed high moral character during their lifetime. It also includes ancestors of various families within the village.

Among them, Hutu and Huyan from the Spring and Autumn and Warring States periods made outstanding contributions to the development of the State of Jin (modern-day Shanxi) and were deeply praised and worshiped by later generations. This belief is par-

ticularly strong in certain areas of Shanxi. Another example is the Tang Dynasty medical scientist Sun Simiao, who is regarded as a symbol of health and longevity by later generations. Guan Yu, a Shu Han general from the Three Kingdoms period, is worshiped for his loyalty and righteousness, becoming a symbol of justice and loyalty. He is also regarded as the Martial God of Wealth and is highly revered by Shanxi merchants, who emphasize righteousness and trust [67].

Ancestor worship represents a deep spiritual bond rooted in blood relations, reflecting strong ancestral reverence within families. This forms a unique spiritual cohesion and serves as a cultural heritage passed down through generations, embodying the core values of the family.

2. Temple fair activities are a unique cultural event formed around the temples in the village, which not only have religious significance but also encompass various elements of society, culture, and economy. They are an important manifestation of village culture. The main types of traditional temple fair activities along the Jinzhong section of the Wanli Tea Road include sacrificial activities, opera performances, and village fair trade (Table 4).

Table 4. Temple fair activities and current situation assessment of traditional villages along the Jinzhong section of the Wanli Tea Road (source: drawn by the author).

Village	Details of Temple Fair Activities	Current Situation Assessment
Xiamen Village	Sacrificial activities Opera performances	Sacrificial activities and opera performances continue, reflecting the preservation of core cultural practices. However, the absence of village fair trade suggests a decline in economic activities and cultural exchanges, potentially weakening the village's overall cultural vitality.
Tian Village	Sacrificial activities	Only sacrificial activities remain, with temple fair activities significantly simplified, reflecting the weakening of traditional cultural heritage and the loss of activity diversity.
Xi Village	Sacrificial activities Opera performances	Same as Xiamen Village
Jialing Village	Sacrificial activities Opera performances Village fair trade	Sacrificial activities, opera performances, and village trade fairs remain active, demonstrating a strong blend of cultural and economic elements. This comprehensive preservation of traditions enhances the continuity and vitality of the village's cultural heritage.
Liang Village	Village fair trade	Village fair trade is the main remaining activity, reflecting an economic focus. The absence of belief culture events suggests a weakening of the village's cultural identity.
Pantuo Village	Opera performances Village fair trade	Opera performances and village trade fairs remain active, reflecting a balance between cultural and economic elements. However, the absence of sacrificial activities indicates a weakening in the transmission of belief culture heritage.

(1) The sacrificial activities are a cultural expression of worship and reverence towards the objects of belief, aimed at seeking their blessings and satisfying people's desire for spiritual peace. (2) Traditional opera performances fulfill the spiritual and cultural needs of villagers through rich artistic expressions, while also serving as an important form of inheritance for traditional arts. (3) Village fair trade, on the other hand, is a commercial exchange conducted at temple fairs. With the rise of the Wanli Tea Road in the Qing Dynasty, traditional villages along its Jinzhong section were influenced by it and saw a flourishing development in market trade activities. The bustling temple fair, with its concentrated flow of people, became an ideal venue for merchants to conduct their business activities. The temple fair provided the necessary conditions for the development of commercial activities, while the prosperity of commercial activities also promoted the thriving of temple fairs. In the ongoing temple fair activities today, market trade still occupies an important position. It not only reflects to some extent the strong commercial attributes of Qing Dynasty villages but also injects vitality into local economic development and strengthens interpersonal communication as a catalyst for social interaction.

3.2. Construction of the Landscape Gene Genealogy

The landscape gene genealogy can systematically and accurately present the identification results of landscape genes, providing an intuitive and powerful means for un-

derstanding and cognition of landscape genes. Based on the aforementioned method of landscape gene coding and identification results, we have constructed the landscape gene genealogy of traditional villages along the Jinzhong section of the Wanli Tea Road from the perspective of village temple system. The landscape genes are divided into 4 major categories, 10 subcategories, 14 minor categories, and 51 units as shown in Table 5.

Table 5. Landscape gene genealogy of traditional villages along the Jinzhong section of the Wanli Tea Road from the perspective of the village temple system (source: drawn by the author).

Major Category	Subcategory	Minor Category	Unit
A Environmental gene	A1 Mountain and water environment	A10	A101 The integration of mountains and water, A102 Vast and open, A103 Adjacent to water bodies
	A2 Cultural environment	A20	A201 Ancient and famous trees, A202 Old sites of the ancient tea road, A203 Commercial buildings
B Layout gene	B1 Site selection	B10	B101 Broad and gentle, B102 Mountain-adjacent with gentle slope, B103 Mountain slope
	B2 Morphological layout	B20	B201 Cluster-shaped, B202 Strip-shaped, B203 Strip-extended cluster-shaped
C Architectural gene	C1 Combination form	C10	C101 Courtyard type, C102 Single-building type
	C2 Roof style	C20	C201 Flush gable roof, C202 Round ridge roof, C203 Flat roof, C204 Gable-end roof, C205 Gable-end hip roof, C206 Pointed roof
	C3 Building materials	C30	C301 Wood, C302 Brick, C303 Stone
	C4 Decorative pattern	C40	C401 Crane, C402 Dragon, C403 Rhinoceros, C404 Auspicious clouds, C405 Flowers and plants
D Cultural gene	D1 Belief Types	D11 Buddhism	D111 Sakyamuni, D112 Guanyin Bodhisattva, D113 Manjusri Bodhisattva, D114 Ksitigarbha Bodhisattva, D115 Eighteen Arhats, D116 Maitreya Buddha, D117 Four Heavenly Kings, D118 Bhaisajyaguru Buddha
		D12 Taoism	D121 Songzi goddess, D122 Yanguang goddess, D123 Doumu Yuanjun, D124 Wudao Lord
		D13 Nature worship	D131 Dragon King
		D14 Folk gods	D141 God of land, D142 God of Wealth
		D15 Ancient sages and ancestors.	D151 Hutu and Huyan D152 Sun Simiao, D153 Guan Yu, D154 Family ancestors
	D2 Temple fair activities	D20	D201 Sacrificial activities, D202 Opera performances, D203 Village fair trade

3.3. Construction of the Landscape Gene Map

Combining the results of landscape gene identification in previous sections and the constructed landscape gene genealogy, graphical extraction and refinement were conducted on identifiable landscape genes to construct a landscape gene map of traditional villages along the Jinzhong section of the Wanli Tea Road from the perspective of village temple system, as shown in the Table 6 below.

Table 6. Landscape gene map of traditional villages along the Jinzhong section of the Wanli Tea Road from the perspective of the village temple system (source: drawn by the author).

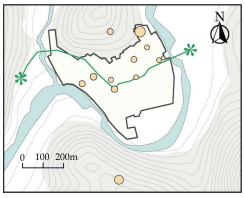
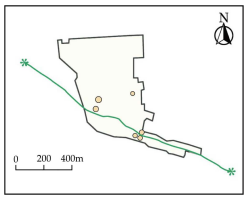
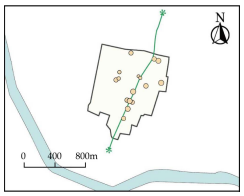
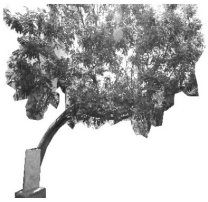
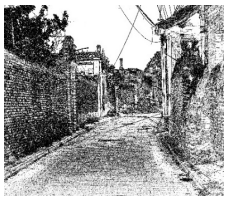
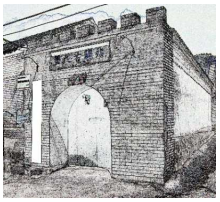
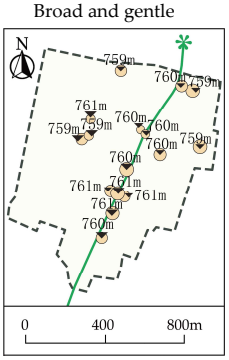
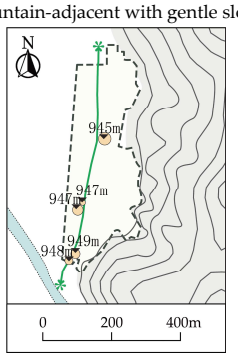
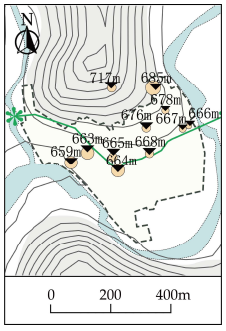
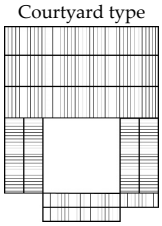
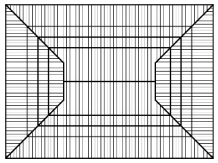
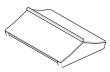
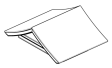
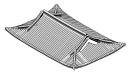
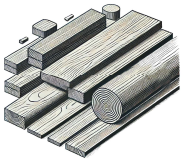
Major Category	Subcategory	Minor Category	Unit
A Environmental gene	A1 Mountain and water environment	A10	A101 The integration of mountains and water  A102 Vast and open  A103 Adjacent to water bodies  Old sites of the ancient tea road; Location of village temple buildings; Natural water bodies; Village area
	A2 Cultural environment	A20	A201 Ancient and famous trees  A202 Old sites of the ancient tea road  A203 Commercial buildings 
B Layout gene	B1 Site selection	B10	B101 Broad and gentle  B102 Mountain-adjacent with gentle slope  B103 Mountain slope  Old sites of the ancient tea road; Location of village temple buildings; Elevation of the location of village temple buildings; Village area
	B2 Morphological layout	B20	B201 Cluster-shaped  B202 Strip-shaped  B203 Strip-extended cluster-shaped  Location of village temple buildings; Existing buildings in the village; Current village Area; Old sites of the ancient tea road; Ancient village area in the Qing Dynasty; Village road; Direction of village development

Table 6. *Cont.*

Major Category	Subcategory	Minor Category	Unit
C Architectural gene	C1 Combination form	C10	C101 Courtyard type  C102 Single-building type 
	C2 Roof style	C20	C201 Flush gable roof  C202 Round ridge roof  C203 Flat roof  C204 Gable-end roof  C205 Gable-end hip roof  C206 Pointed roof 
	C3 Building materials	C30	C301 Wood  C302 Brick  C303 stone 
	C4 Decorative pattern	C40	C401 Crane  C402 Dragon  C403 Rhinoceros  C404 Auspicious clouds  C405 Flowers and plants 
D Cultural gene	D1 Belief Types	D11 Buddhism	D111 Sakyamuni, D112 Guanyin Bodhisattva, D113 Manjusri Bodhisattva, D114 Ksitigarbha Bodhisattva, D115 Eighteen Arhats, D116 Maitreya Buddha, D117 Four Heavenly Kings, D118 Bhaisajyaguru Buddha
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		D14 Folk gods	D141 God of land, D142 God of Wealth
		D15 Ancient sages and ancestors	D151 Hutu and Huyan D152 Sun Simiao, D153 Guan Yu, D154 Family ancestors
	D2 Temple fair activities	D20	D201 Sacrificial activities, D202 Opera performances, D203 Village fair trade

Environmental Genes: The integration of mountains and water is the most typical mountain and water environment in traditional villages along the Jinzhong section of the Wanli Tea Road, with the most prominent features and the highest frequency (four villages). Old sites of the ancient tea road and commercial buildings are the most typical elements of the cultural environment, present in nearly every village, though their preservation status varies, indicating the need for further protection in the future.

Layout Genes: Among the three site selection types, the mountain-adjacent with gentle slope type is the most common (three villages), providing favorable topographical conditions for commercial activities along the Qing Dynasty Wanli Tea Road. The three morphological layout types are relatively balanced in number, each exhibiting unique characteristics while reflecting the influence of the tea road.

Architectural Genes: Courtyard-type buildings are the most numerous among the remaining village temple structures, highlighting their role in carrying rich belief culture traditions. Single-building types are less common, with Zhenhe Pavilion in Jialing Village being the most representative. The flush gable roof is the most common roof form, seen

in the main halls, side halls, and other sections, whereas the hipped roof is the least common, appearing only in higher-ranking buildings. In terms of building materials, wood, brick, and stone are the most prevalent, contributing to solid and regionally characteristic structures. Decorative patterns are diverse, with floral motifs (flowers and plants) being the most common.

Cultural Genes: A diverse belief culture reflects the villagers' rich spiritual world, with most belief systems focused on ancient sages and ancestors, as well as folk gods, highlighting strong regional characteristics. The three typical forms of temple fair activities are relatively evenly distributed in terms of their overall numbers, showcasing both the village's spiritual richness and its commercial attributes.

4. Discussion

1. The landscape genes of traditional villages along the Jinzhong section of the Wanli Tea Road are deeply embedded in the village temple system, which serves both as the spiritual and cultural nucleus of the village and as a key organizer of its overall space. Unlike previous studies, this research provides a clearer understanding of the holistic role of village temple buildings, highlighting the significance of belief culture landmarks in shaping the village's structure and identity.

Relevant studies by both Chinese and foreign scholars on cultural landscapes and landscape genes have laid the theoretical foundation for understanding how unique cultural landscapes are transmitted across generations in traditional settlements. Building on these established findings, this study further explores the role of the village temple system as an important part of village life. The village temple system not only represents physical structures but also acts as a convergence point between intangible cultural beliefs and the material landscape, thereby expressing village identity and ensuring the continuity of cultural traditions over time.

Through this research perspective, the integration of the village temple system into the study of traditional village landscape genes becomes more nuanced. It not only strengthens the recognition of the village temple system as the core of belief culture within the village but also highlights its role in organizing the cultural landscape of traditional villages.

2. This study integrates the village temple system with the broader cultural landscape of traditional villages, advancing our understanding of the landscape gene characteristics. This research further enriches landscape gene identification and analysis methods, which are not only highly applicable to the traditional villages along the Jinzhong section of the Wanli Tea Road but also extend to other sections of the Wanli Tea Road. Additionally, this approach opens new avenues for comparative studies across different regions.

This study provides a theoretical foundation from a unique perspective for the preservation of traditional villages in the context of rapid urbanization and modernization. The village temple system, as a cultural anchor within the village, can maintain or restore the village's identity and uniqueness under external pressures. By identifying and analyzing village landscape genes from the perspective of the village temple system, planners and conservationists can obtain regionally distinctive and functionally relevant markers for protection and restoration.

3. While this research has made significant progress in identifying and analyzing the landscape genes of traditional villages along the Jinzhong section of the Wanli Tea Road, several challenges remain. One of the main difficulties lies in the historical evolution and variation of landscape genes over time, adding complexity to their classification and identification. The long-term development of these villages has led to the disappearance or transformation of certain landscape elements, making it difficult to fully reconstruct their original landscape gene characteristics. This challenge is further exacerbated by gaps in historical records and incomplete data, which limit a more comprehensive understanding of some village temple systems.

Future research should integrate multidisciplinary perspectives, employing a variety of methods and technological approaches. For instance, employing research methods from

landscape archeology, along with leveraging technologies such as remote sensing and 3D modeling, can help address some of the limitations encountered in this study, particularly in visualizing and analyzing the evolution of landscape genes. Expanding the research scope to other sections of the Wanli Tea Road or similar historical routes could also enhance the understanding of regional landscape genes and broaden their applicability.

5. Conclusions

The traditional villages along the Jinzhong section of the Wanli Tea Road possess a unique geographical location and rich historical culture, nurturing diverse cultural landscapes. Through the perspective of the village temple system, this paper identifies and analyzes the landscape genes of these villages, revealing the complex interaction between the village temple system and village landscape genes. By constructing a landscape gene genealogy and map, the typical characteristics of village landscape genes from a unique perspective are presented in a logical and visual manner. The research results also indirectly reflect the crucial role that the village temple system plays in the preservation and transmission of both the tangible and intangible cultural landscapes in these villages. This study not only deepens the understanding of landscape genes but also provides new theoretical foundations and perspectives for the protection and renewal of cultural landscapes in the traditional villages along the Jinzhong section of the Wanli Tea Road.

The traditional villages along the Jinzhong section of the Wanli Tea Road provide a representative case for exploring the formation and development of cultural landscapes in other regions. As key nodes along a historical trade route, the landscape gene characteristics of these villages reflect their unique natural environment and historical development trajectory, illustrating the deep intertwining of commercial activities and local cultural landscapes. Through the lens of the village temple system, this study identifies and analyzes the environmental, architectural, spatial, and cultural genes of these villages, establishing a replicable framework that is not only applicable to local studies but also offers valuable insights for global cultural landscape research. Moreover, the findings offer a deeper perspective on understanding the cultural adaptability and landscape gene inheritance of traditional villages in the context of modernization.

Future research should expand the application of landscape gene theory while continuing to explore the relationship between landscape genes and regional cultural characteristics from the perspective of the village temple system. By integrating methodologies from archeology, sociology, geography, and other disciplines, researchers can gain a more comprehensive understanding of landscape gene transformations and their crucial role in cultural adaptation and transmission. The incorporation of emerging technologies, such as remote sensing and 3D modeling, will further enhance the precision of identifying and representing landscape genes in traditional villages. Additionally, future research should focus on the challenges posed by modernization and urbanization, examining their impact on the village temple system and landscape genes, and developing corresponding strategies to address them. These new directions and approaches will allow the findings of this study to offer more scientific and systematic guidance for the preservation and development of traditional villages.

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