

Research on the Characteristics of Traditional Village Appearance from the Perspective of Landscape Gene Information Chain: A Case Study of Dingliwan Village in Xinxian County

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Abstract

This article takes the traditional Chinese village of Dingliwan in Xinxian as an example. Through field research and in-depth interviews, the landscape gene theory is used to identify and extract the landscape genes of the village. Based on this, a traditional village landscape gene information chain is constructed, and the landscape characteristics of its four elements (landscape information element, landscape information point, landscape information corridor, and landscape information network) are analyzed. The results show that: (1) the overall landscape form of Dingliwan is well preserved and has rich historical and cultural research value; (2) The cultural gene information element of Ding Liwan has rich connotations, but has not been effectively inherited; (3) The landscape information points in Dingliwan are diverse in form, covering two aspects: material landscapes such as mountains, water systems, and cultural relics, as well as traditional handicrafts and intangible cultural landscapes. The preservation degree of material landscapes is better than that of intangible cultural landscapes; (4) The landscape gene corridor, which serves as a connecting channel, is relatively well preserved, but there are phenomena such as local looseness and breakage; (5) The overall preservation of the landscape gene information network is strong, and coupled with abundant rainwater erosion throughout the year, the rate of decline has accelerated. A small number of buildings are damaged, incomplete, and need to be repaired as soon as possible. In the future, we should strengthen the digital research on the characteristics of traditional village landscapes, which can provide precise restoration solutions for the protection of traditional villages.

Keywords

Landscape genes, Landscape gene information chain, Traditional villages, Dingliwan Village, Style and Features.

1. Introduction

Traditional village culture, as an important component of China's cultural heritage, includes both the solid existence of tangible material culture and the dynamic inheritance of intangible culture. Its existence is closely related to the development of society and the times. It can reflect the development status of material and spiritual culture in society over a period of time, and also carries national and regional historical memory as well as cultural information. In recent years, with the rapid development of modernization and urbanization in China, the fate of villages, which have been the basic units of agricultural society for thousands of years, has undergone a sudden change in modernization. Since the 1980s, the number of traditional

villages has sharply declined, and policies related to the protection of traditional villages have been introduced one after another[1]. The attention to traditional villages from all walks of life has been continuously strengthened. These guiding documents not only indicate the action path for the protection of traditional village style in China, but also leave innovative space for exploring the genetic information chain of traditional village landscape and summarizing the characteristics of traditional village style.

Xinxian is under the jurisdiction of Xinyang City, Henan Province, located in the southern part of Xinyang City, in the hinterland of the Dabie Mountains, and at the junction of Hubei and Henan provinces. Xinxian is situated in a mountainous area with dense and intersecting river networks, and the construction of settlements is closely integrated with the terrain. When selecting a location, it is preferred to choose relatively flat areas such as valleys, basins, and plains in front of mountains that are close to water sources, forming a settlement pattern where mountain settlements, water bodies, and farmland are integrated; With the advancement of industrial civilization and modern urbanization, traditional villages in mountainous areas have been preserved as a unique geographical unit due to their limited transportation and economic backwardness, making them less susceptible to external interference. As a result, traditional villages have always been a hot topic of concern for scholars. The research results on the traditional village style in China are also quite rich. From the perspective of research content, it can be divided into two levels: material and non-material. On the material level, relevant studies explore the overall spatial pattern of villages based on feng shui theory and the concept of "unity of heaven and man", including village site selection, architectural texture, and street and alley space, with the aim of promoting harmonious coexistence between the natural environment and socio-economic aspects of villages. On the non-material level, culture is the core element that shapes the traditional village style characteristics. The historical culture, customary activities, and traditional crafts formed by the precipitation of culture are irreplaceable parts of the traditional village style characteristics. The composition of traditional village style is complex, and the landscape gene theory identifies, extracts, and classifies traditional village style to form a visual map[2]. Based on this, this article uses landscape gene theory to conduct empirical research using Dingliwan in Henan Province as a case study area. Identify and extract the landscape genes of Dingliwan and establish a gene information chain. Based on this, conduct feature analysis on its core elements and attempt to propose relevant countermeasures, in order to provide reference for the excavation and inheritance protection of traditional Chinese village heritage.

2. Research area and data sources

2.1. Study area

Dingliwan Village is located in Balifan Town, Xinyang New County, and is one of the few ancient villages in southern Henan that has been well preserved to this day. Geographical coordinates: 31 ° 28 'to 31 ° 46' north latitude, 114 ° 33 'to 115 ° 12' east longitude; Spanning the Yangtze River and Huai River basins, it is 61.6 kilometers long from east to west and 40.7 kilometers wide from north to south, with a total area of 1612 square kilometers; Located in the transitional zone between the northern and southern climates of China, it belongs to a continental humid monsoon climate with distinct four seasons, simultaneous rain and heat, and an average annual precipitation of 900-1400mm. Located at the border of Hubei, Henan, and Anhui provinces, it borders Hubei province to the south and Anhui province to the east. The cultures of the north and south blend here, and it is known as the "thoroughfare of the three provinces" and the "southern gate of the Central Plains". Regional culture has the characteristics of diversity and richness. According to the Li family genealogy and existing inscriptions, Ding Liwan Village was founded in the 11th year of the Yuan Dynasty's Dade era

(1307 AD) and has a history of over 700 years. Due to its remote location and underdeveloped economy, the layout of ancient villages and the architecture of Ming and Qing dynasty residences have been relatively well preserved. Looking north from the pond in the south of the village, several gate buildings from the Ming and Qing dynasties are lined up by the river, with green bricks, white walls, and black tiles. The eaves are towering and upright, and the buildings here resemble a graceful and elegant young girl[8]. In 2003, Dingliwan was designated as a "Henan Folk Residential Village", and in 2012, it was selected as one of the first national level traditional villages in China.see Figure 1 .

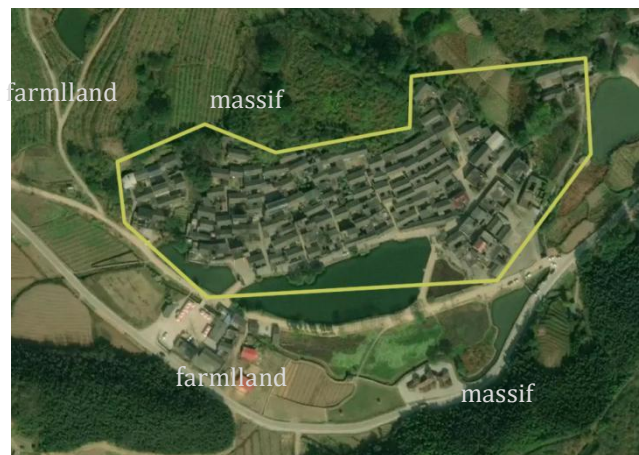


Figure 1 Current situation plan of Liwan Village

2.2. Data sources

The research data in this article mainly comes from three channels: (1) collecting literature materials such as rural chronicles, county chronicles, and texts on rural tourism development; (2) The research team utilizes aerial photography, surveying, photographs, and other graphic and textual materials obtained from drones; The research team conducted on-site investigations to obtain survey data, such as questionnaires, recordings, and interviews. From August 12th to 15th, 2023, the research team conducted field research in Dingliwan Village. All personnel were divided into three groups and collected information on six elements: spatial form, traditional architecture, reference environment, religious beliefs, customs and activities, and traditional crafts.[7] The collection methods mainly include reading texts, questionnaire surveys, interviews, aerial photography, and other forms. After the completion of the research, the obtained research materials, internal information provided by the local government, online search materials, and literature research materials were sorted and archived, providing detailed data and literature support for this study.

3. Overview of Landscape Gene Information Chain Theory

The concept of genes originated from biological concepts and is the carrier of genetic information. It can replicate itself to make offspring exhibit traits consistent with their parents, in order to maintain the basic characteristics of organisms. The theory of landscape genes is to apply the concept of genes to the cultural landscape of settlements, and use relevant methods such as typology and morphology to classify landscape genes from multiple perspectives, thus forming a landscape gene map. The theory of landscape genes was initially proposed by Professor Liu Peilin, inspired by the "Question of Academician Ma Junru" and based on his extensive research foundation. The landscape gene information chain is a further summary and practice of landscape gene theory, which takes landscape information elements, landscape information points, landscape information corridors, and landscape information networks as

the core elements, and transforms landscape genes from abstract to concrete, from hidden to manifested, and from discrete to combined. Landscape information elements are the core cultural genes that are generally difficult to manifest and require professional technical means to extract; Landscape information points are the concretization of information elements and independent concrete objects; Landscape information corridor is the orderly arrangement and combination of landscape information points in space to achieve visual impact or atmospheric infectivity;[6]The landscape information network is composed of multiple interwoven landscape information corridors, covering the entire settlement (village). Therefore, Dingliwan Village is divided into material landscape genes and non-material landscape genes according to its material form, and the two major morphological genes are identified and extracted to construct an information chain of landscape genes. The core elements of the landscape genes are deconstructed to provide reference ideas for the reconstruction of traditional village landscape under the background of rural revitalization.

4. Construction of Gene Information Chain for the Landscape of Dingli Bay

Based on the characteristics of the landscape gene information chain and the actual situation of traditional villages, the landscape genes of Dingliwan are divided into two categories according to their material form: material landscape genes and non-material landscape genes. Based on the "Guiding Opinions on Strengthening the Protection of Traditional Chinese Villages" and the actual situation of traditional villages, three identification factors and ten identification indicators have been constructed from the aspects of spatial form, traditional architecture, and reference environment, respectively. Among them, village form, traditional pattern, street and alley pattern, traditional site selection, and belonging to spatial form[3,4].Traditional architecture includes public places, traditional residences, historical buildings, and archaeological sites; Select characteristic landscapes with a long lifespan and minimal changes in appearance as environmental reference materials, such as ancient roads, bridges, culverts, and ancient wells, ponds, trees, and vines. According to field research results, non-material landscape genes can be divided into three identification factors and six identification indicators: religious beliefs, customary activities, and traditional crafts. Among them, religious beliefs can be approached from two aspects: the object of belief and the surname and clan; Customs and activities can be deconstructed from two aspects: entertainment and trade; Analyze the traditional craftsmanship from the perspectives of inheritance level, name and materials.see Table 1.

Table 1:Gene Identification Index System for the Landscape of Dingli Bay

Landscape genes	category	Identification factor	Interpretation of indicators	Identification indicators
	Material appearance and landscape	Spatial form	Village form	Biomimetic patterns or imagery graphics
			Traditional pattern	Based on the terrain and topography, a chessboard, eight trigrams, and other basic conditions are formed
			public place	Mountain style, etc
		Traditional site selection	public place	Road network structure
				Influenced by Feng Shui concepts, consider facing the water on the back of the mountain

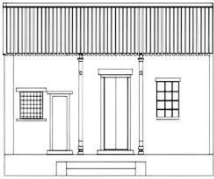
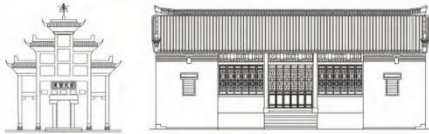
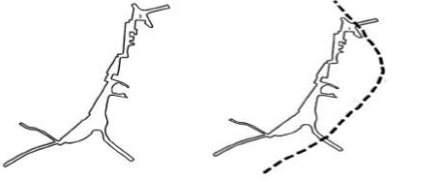
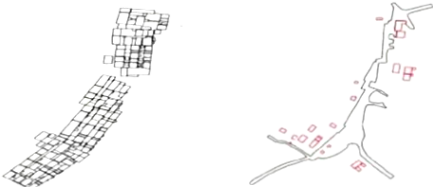
Dingliwan Village	traditional architecture	traditional residence	Ancestral halls, temples, schools, etc
		Historical architecture	Building age, degree of damage, etc
		Ruins and relics	Geographic location,research value, etc
		traditional residence	Style type,characteristics, current situation, etc
	Reference environment	Historical architecture	Buddhism,Taoism,Confucianism, ancestors, heroic figures, etc
		Ruins and relics	Geographic location,research value, etc
		Ancient roads,bridges,anculvertsGujingtang Tree Vine	Style type,characteristics, current situation, etc
		Object of faith	Object of faith
	religious belief	Object of faith	Buddhism,Taoism,Confucianism, ancestors, heroic figures, etc
	intangible cultural landscape	Surname Clan	Genealogy, family tree, etc
Customs and Activities		Trade customs	Temple fairs,commercial gatherings, etc
		Entertainmentcustoms	Local theater, folk art performances, etc
Traditional craftsmanship		Inheritance leve	Number of inheritors, types, familiarity, etc
	Name Material	Wooden, stone carvings, iron tools, etc	

5. Analysis of the Landscape Characteristics of Dingliwan Village

5.1. . Analysis of Landscape Information Element Style Characteristics

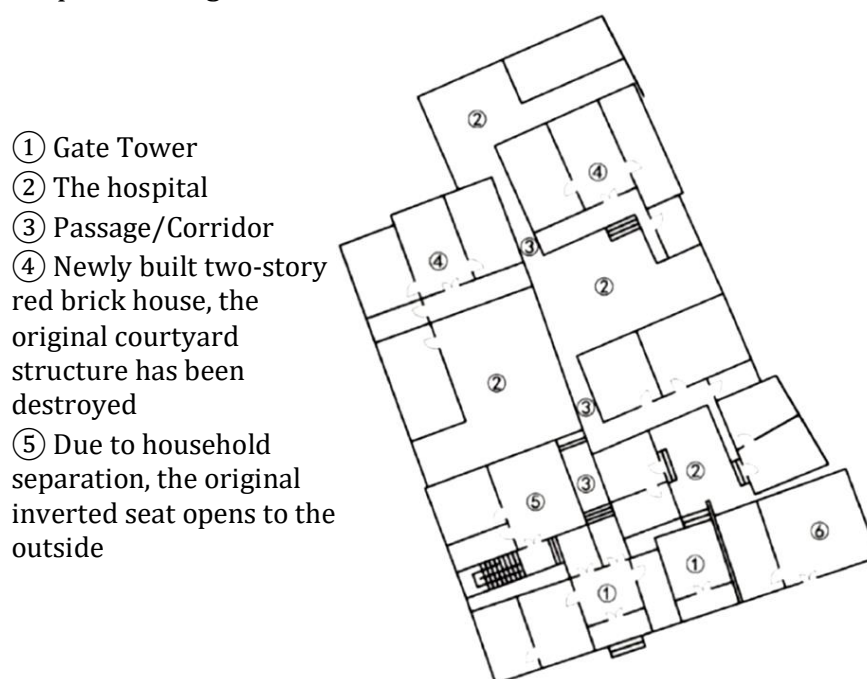
Folk customs are the behavioral patterns that people in a specific region follow over a long period of time. The saying 'different winds over a hundred miles, different customs over a thousand miles' has led to the diversity of customs and genes in different villages and regions[5]. Due to its unique location at the border of three provinces, Xinxian is a region where cultures from the north and south blend, resulting in cultural diversity and richness.see Table 2

Table 2: Example of Gene Information Chain for Landscape Architecture of Dingliwan Village

Project	category	Example of Information Elements
Landscape information points	Traditional residential buildings	
	Ancestral Hall Archway and Enjoyment Hall of Public Buildings	
	Gate tower design	
Landscape Information Corridor	Gate tower design	
Landscape Information Network	Cultural Relics, Ancient Architecture and Inconsistent Areas	

5.2. Analysis of Landscape Information Point Style Characteristics

From the perspective of traditional architecture, most of the buildings in Ding Liwan are courtyard style, with a cross shaped courtyard and corridors on all four sides [6]. In terms of spatial layout, it reflects the cultural characteristics of the southern Henan region [7]. Without being constrained by terrain conditions, the planar layout is symmetrical about the central axis, and the functional layout is arranged in an orderly manner with respect to hierarchy and placement of each position. The layout and height of the left and right wing rooms are differentiated by the feng shui culture of "the green dragon is ten thousand feet tall, the white tiger does not look up". In the architectural combination of Ding Liwan, the main hall is the most important individual building. Not only in terms of spatial volume, but also in terms of human behavior patterns. The hall is mainly used to worship ancestors and entertain guests. To show respect, the hall is generally not allowed to be crossed. According to the orientation, there is a concept of "emphasizing the left" in the residential culture of southern Henan. Regardless of the orientation, the left wing is generally higher than the right wing. The main body of buildings often adopts gable and roof truss structures, which are traditional civil structures. The two sides of the house are supported by brick walls, and the middle is supported by wooden columns and roof trusses. In the southern Henan region, this type of beam lifting wooden frame structure is mostly used, with three, five, seven and other styles of beams on top, saving a lot of space, see Figure 2.

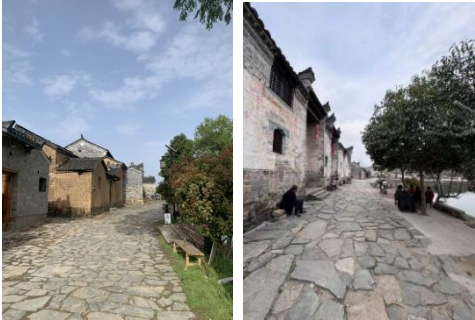
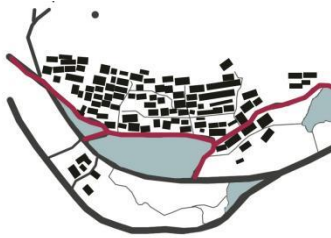
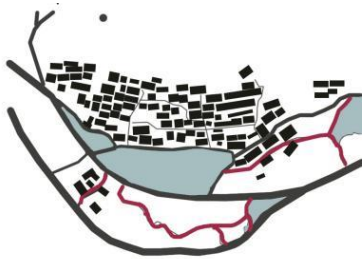
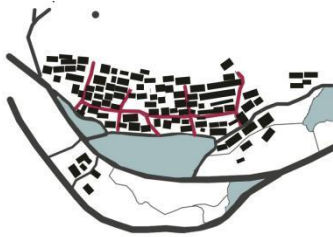


5.3. Analysis of Landscape Information Corridor Style Characteristics

The corridor of Dingliwan Village can be divided into four levels according to width and importance, namely: main road, primary road, alleyway, and field dirt road. The layout of roads in Dingliwan Village is in the form of outward horizontal adjacent expansion, spreading northward along the central main road. The main road is the only passage from the outside to the village, with a width of about 5 meters, which can accommodate motor vehicles. It serves as a link between east and west, and connects the two residential building clusters of old and new buildings; The secondary road is influenced by the ancient residences of the Ming and Qing dynasties, with a width of about 3 meters and no motor vehicles allowed to pass through. It is mainly located directly opposite Wangyue Pond and has high convenience; The dirt roads in

the fields are often combined with farmland, located on the outer side of the traditional residential buildings behind the village walls. The village walls occasionally have small doors for passage; As an indispensable spatial memory in traditional dwellings, alleys showcase a unique linear layout art. They follow the terrain winding and undulating, with varied shapes, generally presenting a narrow and profound feature[8]. Some are so narrow that only one person can pass sideways, while the most spacious part is just enough for two people to walk side by side. This carefully designed layout not only has a sense of rhythm, but also deeply reflects the orderliness of spatial use,see Table 3.

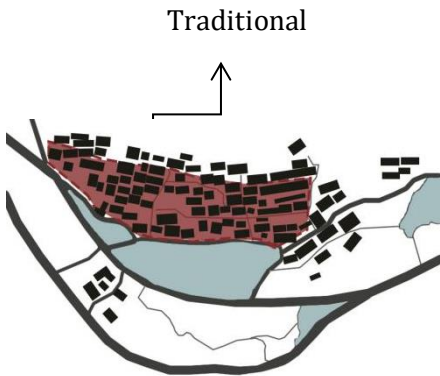
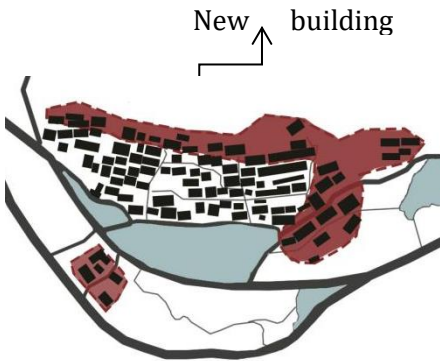
Table 3:Classification and layout characteristics of roads in Dingliwan Village

Type	Current Status	Layout
First level road		
secondary road		
lane		
a path in the field		

5.4. Analysis of Landscape Information Network Landscape Characteristics

Dingliwan Village is backed by mountains and faces water. The overall village is built on a sunny hillside terrace with higher terrain, combined with the terrain, to find terraces or slopes with water sources and good lighting. The overall size of the village is relatively small. The residential layout of Dingliwan Village is a multi row connected pattern, with vertical single household housing as the basic unit. According to the family population and size, a household can set up multiple courtyards and houses vertically,see Table 4.

Table 4 :Layout Characteristics of Dingliwan Village

Type	Current Status	Layout
Traditional village layout form		Distributed in a concentrated strip along the west side of the main road
New village layout form		Distributed in a concentrated
Overall layout form		New and old village clusters are developed, connected by roads to different clusters

6. Conclusion and discussion

Using the theory of landscape genes, the landscape genes of Dingliwan Village were identified and extracted. Based on this, a landscape gene information chain was constructed, and the landscape characteristics of its four elements (landscape information element, landscape information point, landscape information corridor, and landscape information network) were analyzed. The results showed that: (1) the overall landscape genes of Dingliwan Village are well

preserved, especially the landscape information corridor, which has great cultural research value. In future tourism development, the principle of maintaining the ancient charm of the ancient village should be followed, and the restoration of its original appearance should be adopted for those with important historical and cultural value; (2) The cultural genes inherent in Dingliwan Village, namely the landscape information element. Although it has rich connotations, its continuity is poor. The fusion of religious ideas, rich customs and activities, long-standing historical legends, and traditional handicrafts all have historical traces, but they have not been effectively inherited. Cultivating local culture and economic industries through profound cultural accumulation and rich artistic activities is an effective way of protection and development; (3) The genetic information points of the landscape of Dingliwan Village are numerous and rich in content, recording the uninterrupted millennium evolution process of Dingliwan Village. It has significant historical research value and adopts methods such as maintaining and restoring its original appearance. The natural landscape is an important symbol of the feng shui pattern in villages, protecting their original ecological features[6]; (4) The landscape gene information corridor of Dingliwan Village is the most well preserved gene in the information chain. The main road is still a traditional bluestone road, and some secondary roads have been newly built with cement roads. The main road carries a thousand year history, while the secondary road connects various residential buildings and is closely related to each other. In the future planning and development, it is necessary to maintain overall coordination and integrity, repair and maintain the main roads, no longer add secondary roads that are not in harmony with the ancient village style, and try to restore their original appearance as much as possible; (5) The overall preservation of the landscape gene network in Dingliwan Village is average, with damage to some parts of the building decoration. There are relatively few collapsed buildings, but they need to be repaired as soon as possible to avoid further damage. Although this article utilized landscape gene theory to analyze the characteristics of Dingliwan Village's landscape, due to limited data collection, the relevant research is mainly qualitative. In fact, with the rapid development of geographic information technology, traditional village features can be integrated through multi-source data, using cloud point computing, GIS spatial analysis, and mathematical model simulation to extract specific numerical values of traditional village material features, such as the height and slope of ancient buildings, the distance and density of water and road networks, etc. Non material features (such as legends, customs, genealogies, etc.) can also be visualized and integrated, enriching the research on traditional village features based on the research in this article. This is also an important area that our team is following up on, and we hope that colleagues in the academic community will pay attention to the digitalization of traditional villages, which is an academic field that needs to be developed.

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