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Research and study on village landscape genetic characteristics in minority area-with Tibet and Qiang watchtower village in west Sichuan region as an example

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Research and study on village landscape genetic characteristics in minority area-with Tibet and Qiang watchtower village in west Sichuan region as an example

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Abstract. Cultural landscape is adopted as the main line, and Tibet and Qiang watchtower village in west Sichuan region is adopted as the research object in the paper. The environment, architecture, settlement culture characteristics and their relationships in Tibet and Qiang watchtower village are analyzed by literature, field survey and other methods based on the landscape gene theory. The implied landscape gene is recognized and extracted, thereby revealing the rules of watchtower village settlements in site selection, zoning, spatial pattern and other aspects. A general recognition system is formed. It is expected to provide some theories and methods for genetic archetype mining and gene protection of minority area traditional settlements.

1. Introduction

China's traditional settlement landscape presents a diversified trend due to different geographical environments and cultural customs with a long history and a vast territory. Ethnic mixing and symbiosis make the settlement landscape more specific and mixed especially in minority areas. West Sichuan region located in "Tibetan-Yi Corridor" of ethnic migration is surrounded by the mountains, valleys, rapidly-flowing rapidly-shoals, closed environment and inconvenient transportation, Tibetan and Qiang ethnic groups living here form a relatively closed and independent living space. Their social structure, family organization, religious belief, production and lifestyle also lead to a unique settlement space. [1] However, the space scale, environment size and traffic capacity in most villages can't meet the demand of modern life increasingly with China's urbanization process acceleration. In addition, traditional settlement of social consciousness, national culture, space structure and family organization mode are greatly changed, the settlement culture with local characteristics and national personality is experiencing unprecedented impact, many traditional villages with high protection and inheritance value are facing the risk of destroy. Gene analysis method is applied to identify and extract landscape gene in Tibet and Qiang watchtower village in the paper. It is expected to provide some methods and inspiration for genetic archetype mining, gene protection and inheritance of historical and cultural settlements in different ethnic regions as well as landscape planning and design in ethnic regions.

2. Status quo of Tibet and Qiang watchtower village and watchtower remains in west Sichuan region

Sichuan is the only Qiang settlement area in China and the second largest Tibetan settlement area in China. The Qiang and Tibetan people in west Sichuan region have formed settlement planning layout,



site construction, construction construction as well as other landscapes and concepts with national characteristics. Watchtower village is a unique settlement form here, which is mainly concentrated in Gyarong Tibetan region with Danba County as the center in Garze and Aba regions of Sichuan Province, Muya Tibetan region with Xinduqiao as the center, and Qiang ethnic region with Li County, Mao County and Wenchuan County as the center. The existing watchtower remains are concentrated in Danba County, DaoFu County, Kangding County, Markan County and Wenchuan County, etc., wherein Danba County is known as the 'land of 1000 blockhouses' for wide distribution, complete appearance and functions of watchtowers [2]. However, 2008 Wenchuan Earthquake caused serious damage to topography, landforms and ethnic architectural communities in the region. Characteristics of Tibet and Qiang traditional landscape settlement in west Sichuan region are investigated and studied in order to preserve the original village style and original ecological environment. The original kinship and social relationship network are focused, which are of great significance to the replanning, restoration and landscape protection and development of the village space.

3. Analysis on characteristics of Tibet and Qiang watchtower village landscape settlement

Qiang people and Tibetans of west Sichuan region mainly live in the upper reaches of Minjiang river. 20 or 30 families gather together to form a stockade generally, and the living space of the Tibetan and Qiang people is formed form based on their blood relationship and geographical relationship. Topography, climate, site selection layout, architecture and social culture together constitute the bond and bridge of the common characteristics of the watchtower village settlement landscape.

3.1 Environment characteristics of Tibet and Qiang watchtower village landscape settlement

3.1.1 Topography and climate

The northern plateau of the west Sichuan region is between 2500 and 4000 meters above sea level. It is mainly composed of two geomorphic regions, namely mountain plains and alpine valleys. It is an eastward extension of the Qinghai-Tibet Plateau, which is formed by many mountains, peaks and rivers. It is a continental plateau monsoon climate with obvious characteristics of mountain climate, which has distinct dry rainy seasons, severe winter, no summer heat, large diurnal temperature difference and abundant sunshine. The plateau has a variety of climate types, and large relative height difference affects the distribution of forest and plant settlement types as well as formation of plant belts.

3.1.2 Ecological condition

There are many stones and poor soil in the upper Minjiang river valley. The production mode of mountain farming has high dependence on natural environment. Meanwhile, the complex geological structure and frequent geological activities lead to many destructive earthquakes, which have caused great damage to the production and life of the Tibetan and Qiang people living here. A large number of settlement landscapes are damaged, which dealt a great blow to the inheritance of the Tibetan and Qiang culture.

3.2 Site selection layout and architectural features of Tibet and Qiang watchtower village settlement

Watchtower, as the most significant humanistic landscape in Tibet and Qiang village, is a unique architectural type with many functions, such as defense, religion, politics, economy, culture and art, etc. Its formation and development are the results of the combination role of harsh natural environment and turbulent social environment at that time. It is the spiritual sustenance of the people in Tibet and Qiang village. Watchtower village is not only a simple architectural remains, but also includes the village site selection layout, residents, land and other living resources on which they live. Therefore, watchtower is not singled out as an heritage unit in Preparatory List for World Heritage in China. Instead, watchtower is integrated into the village and named as 'Tibet and Qiang Fortress ' together as a heritage category. [3]

3.2.1 Settlement site selection

Natural environment is the most direct foundation for the formation and development of settlement as well as the source which embodies its local characteristics. [4] The natural environment of west Sichuan region has great constraint factor on settlement formation. Most Tibet and Qiang villages are located in places with suitable climate, stable water source and sufficient farmland, which stimulates the potential advantages of the site. Meanwhile, a unique settlement form is formed from the perspective of defense in order to avoid wars and disputes. Some scholars divide the settlement into piedmont valley type, mountainside gentle slope type, intermontane platform type and mountaintop highland type [5]. For example, Luobo Village in Wenchuan County is located on the semi-high mountain platform with an elevation of more than 2000 meters. The site is open and the sight is unobstructed. The southward river valley of is back to mountain regions, which is beneficial for resisting cold wind and obtaining excellent sunshine. Taoping Qiang Village located in the bank of Li County Zagunao River is located near nearly river valley slope area, which complies with the landform of transverse longitudinal layout. Farming and grazing production lifestyle are considered at the same time. The dense ladder-like vertical distribution of building community not only saves the land area and construction costs, but also expresses the respect and understanding of settlement space form to the natural environment. Songgang Village of Markang is located on the ridge surrounded by mountains. The region is relatively gentle in topography. However, settlement is relatively concentrated and relatively small in scale due to the limitation of farmland and pasture area. In fact, its site selection, formation and growth are all the result of the people's adaptation to, use and reform of nature.

3.2.2 Spatial layout

Each nation and tribe has its own inherent spatial concept. The interpretation of settlement landscape about its natural environment, skillful use of spatial concept to construct the social environment by designers of settlement, etc., the depth of all these interpretations and the designer's conception are described on the ground plan. [6] Traditional Qiang village spatial layout is concentrated in form and clear in internal texture, thereby forming spatial layout with mountains and rivers as the support or watchtower and official village as the center. The watchtower is often placed in front of and behind the village with functions of defense and enemy inspection. [7] The watchtower village is full of high-density residential units with fortress-like settlement as a unit for defense. It shows the wisdom of small and weak nations with internal uniting and external fighting. [8] Some watchtower villages are also located near the water where the water source is abundant, or artificial canals are built to lead the snow water to the village along the contour line, buildings or green plants are arranged along the canals, thereby presenting a scene of intricate interweaving of buildings and canals in the village space landscape. The settlement not only completes the construction of the building entity, but also forms a complete ecosystem in combination with the surrounding environment. There are three main patterns of settlement spatial layout in Zangzhai village. Firstly, watchtower of Zangzhai is connected with residential buildings as a whole or close to one another. Secondly, watchtower is distributed next to the village, village houses are separated from watchtower, and there is no stylized symbolic form of watchtower in residential buildings. Thirdly, it is located at the traffic arteries, river confluence or outstretched mountain mouth, which is often isolated or echoed with other mountains, thereby playing a watchful and alert role, and forming an important link in the defense system with village and village community at that time.

3.2.3 Watchtower architectural structure and shape decoration

The Tibetan and Qiang people in the west Sichuan region created many seismic techniques. Abundant natural stone and wood resources in the local area are applied. The reinforcement is embedded in the stone wall and the buttress wall or stone corral is added on the outside area of the blockhouse, thereby greatly increasing the seismic coefficient of the blockhouse and making the structure scientific and reasonable. Watchtower and blockhouse built with the traditional technique have shown good seismic

performance in the 2008 Wenchuan Earthquake, which are excellent examples of architectural structures. Main watchtower models are the wide at the bottom and narrow at the top, and it is a tower structure gradually narrowing from bottom to top with roughly 5 ° Angle. The facade modeling and detail changes are mainly discovered in the top and blockbody hole positions, thereby reflecting the beauty of the extensive but elegant architectural form. The top of Qiang watchtower is different from that of Tibetan people. Qiang watchtower is square inside and polygon outside mainly. It is concentrated in Taoping Township, Li County, Aba Prefecture; Weizhou Town, Wenchuan County and Heihu Township, Maowen County. The top of the watchtowers are mostly preserved well, and the majority of the watchtowers belong to 'Jiaoyi' shape. The watchtower top with Tibetan inner circle and outer space is simple in top, which is made of stacked stones or added to form a triangle low wall. The watchhole and perforation of blockhouse body mainly belong to strip hole, triangle hole and cross hole, wherein the strip hole is the most common.

3.3 Social cultural features of Tibet and Qiang watchtower village landscape settlement

Tibet and Qiang people began to think about how to maintain a balanced relationship between man and nature long ago. Their attachment to nature extends from material resources to spirit, thereby deriving the primitive ecological ethical concept of awe and worship of nature. The worship of white stone, the worship of sheep totem, the worship of ox head totem and the core of the culture of Buddhism and benism belong to concept of nature and concept of spirit, which is the result of generations of wisdom in the process of our nation's common exploration of nature, society and culture. The problem of avoiding wind and cold is solved on the one hand, it also faces the direction of the sacred mountain in direction site selection in the village settlement. The sacred forests around the village not only provide an ecological barrier for survival. An important spiritual pillar is established between the clansmen and the nature more importantly.

4. Gene recognition and extraction of Tibet and Qiang watchtower village landscape in west Sichuan region

Taylor, an American scholar, once proposed to use gene analysis method for finding the rules of settlement spatial layout, or the most core common factors are discovered by comparing the spatial structure of a certain region, namely gene finding. [9] Landscape gene refers to the basic unit of cultural 'inheritance', that is, the cultural factors that are different from other cultural landscapes passed down from generation to generation. They play a decisive role in the formation of a certain cultural landscape. In turn, it is also a determinant factor in identifying such cultural landscape [10]. The essence of landscape gene is the cultural element forming the traditional settlement landscape. Some factors have material form, and some factors have non-material form among the characteristic factors of Tibet and Qiang watchtower village in west Sichuan region. Therefore, the identification of landscape gene is mainly based on the three principles of uniqueness, criticality and dominance.

4.1 Method of recognizing traditional village landscape gene

Landscape gene identification methods mainly include the follows: (1) extraction of factors, establishment of some landscape factor description indicators and identification based on these landscape indicators; (2) shape extraction, visual identification of distinctive and meaningful graphics, such as totem, color, etc.; (3) constitution extraction, characteristic extraction of special spatial structure of settlement building, such as watchtower, blockhouse and other architectural forms; (4) extraction of meaning, excavation of intangible cultural features in the traditional settlement from the documents and field investigations, such as the history of national migration and integration in Tibet and Qiang regions.

4.2 Identification and extraction of Tibet and Qiang watchtower village landscape gene in west Sichuan region

4.2.1 Environmental factor

Tibet and Qiang habitat of nationality is influenced by complex factors such as geographical environment, historical background and social structure, etc. The village site selection is integrated into three common laws: 1. being close to water; 2. being close to cultivated land; 3. being close to mountain [11]. The river valley has formed a broad gentle slope due to alluvium, the land is fertile and the water source is sufficient for farming. Meanwhile, the village site selection maintains a safe distance from the river bank to avoid the influence of rainy season floods. The technology of stone piling is applied to form a platform structure mainly in the village, which is located halfway up the mountain. Houses are built along the vertical contour line to realize the purpose of saving farmland. The village in the peak area is scattered in the mountains with rugged terrain. It is easy to defend and difficult to attack. There is a relatively wide alpine meadow nearby for grazing generally.

4.2.2 Layout

(1) Spatial layout suitable for local conditions

Houses are mostly arranged along the contour line on the gentle slope in the village of the valley with a relatively relaxed distribution. The stone plate are used for stabilizing the slope. River water is introduced into the village for irrigation and drinking, etc. Meanwhile, the residential buildings have good orientation, and the building density is small. The hillside village is generally distributed in a platform style with scattered and undulating buildings and relatively small public space. The village is composed of closely connected single buildings as a whole, and each roof can be connected by a gangway. The village in the semi-alpine region are separated from steep slopes and mountains with less vegetation. It has smaller distribution range and higher building density, which is in the triangular layout around the village. The village forms a defense system, which fully reflects the local subordination to the overall layout.

(2) Settlement combination of centrality and uplift

The watchtower village on the hillside and hilltop has a relatively limited land area and needs to be defended at the same time. Therefore, there are many streets and lanes scattered in the village, and the internal structure is complex and changeable under the pattern with watchtower as the center of the defense system, which reflects the cohesion and centrality of the village residential group. A typical example is Taoping Qiang village with watchtower as the axis, it radiates leftwards and rightwards in a fan-shape and semi-bagu-shape from bottom to top, which converges on the main blockhouse finally. [12] The Suopo watchtower village is located on the mountain platform, the watchtower backs the mountains and faces the river valley. The residential houses are positioned against the mountains and are lifted back by the mountains, thereby strengthening the volume and outline of the building, and forming very spectacular space momentum and rich space hierarchy.

(3) Three-dimensional intersected road, water and air network system

The watchtower village road network system is established by combining topographic features, which is beneficial for defense. It takes streets and lanes as the main framework to form a well-connected intra-village traffic and defense system in depth. Direct sunlight on the ground is reduced by narrow alleys and tall houses on both sides, which is also beneficial for maintaining humidity. The gable wall has few and small windows in order to resist the cold winter, hot summer and mountain wind, thereby forming a relatively closed linear space. The village road is radially distributed with watchtower as the center, thereby forming multiple exits, and jointly forming a complex network system like a tree branch with multiple roadways in the village together. Any turning point can be used to ambush the enemy. The village also forms a transportation network in the air. Flat roof has become the main outdoor activity space of the residents because the village space is narrow, it can be used as a place for resting and drying air basks. Springboard and single wooden ladder are used to connect all roofs in wartime, thereby forming the roof combat platform with strewn at random

discretion. It can support each other, residents can hide in time, thereby transforming plane combat system into 3D system. The vertical multi-grid road system meets residence and defense function. Meanwhile, there is also a highly scientific and defensive water network system in the village. The river water or the spring from the snow mountain is introduced under residential buildings in the village. The water flow is controlled through a water sluice. Firstly, water can be used conveniently, and there are strict water supply and drainage rules. Secondly, temporary rescue demand is satisfied [13] to deal with the enemy's fire attack.

4.2.3 Main public buildings

Watchtower exists for a long time as a residential or defensive building widely adopted by Tibet and Qiang nationality in the west Sichuan region. Its shape and structure changes reflect social, historical and cultural changes in the region. The watchtower heritage here is characterized by wide distribution scope, a large number of remains, and the most abundant architectural form and function. Common watchtower planar forms include square shape inside and outside, inner square and outer polygon, inner circle and outer square, inner circle and outer star, etc. The facade structure is mainly concentrated in the blockhouse body and roof. The watchtower is internally divided into 7-13 floors, which is characterized by floor partitions, aspect ratios, functional structures and decorative elements. The floor partition is made up of trabeculae placed on the beams every ten meters and then laid with branches, clay and weeds. The unique wall reinforcement, stone cornice, buttress wall and hole have become the functional components for stabilizing the watchtower. The external wall reinforcement and the internal wall reinforcement can strengthen the integrity of the building and mitigate the impact of the earthquake. Meanwhile, it is decorative. The belief symbol is the main decorative element of blockhouse, including the ox head symbol inlaid with white stone, benzene and buddhist symbols 卐 and convex stone, etc. The most special buildings are 5 scripture hall blockhouses left in Zhonglu Township of Danba County. The blockhouses are equipped with rooms for worshipping Buddha statues and buddhist chanting apart from the main features of general watchtower. There are exquisite wooden cloisters and well-preserved religious murals of Ming dynasty (figure 1) on the upper portion of the blockhouse. The national history, religious belief and other art forms related to watchtower embody the characteristics of multi-cultural communication and integration, thereby showing the supreme aesthetic realm of regional architectural culture.

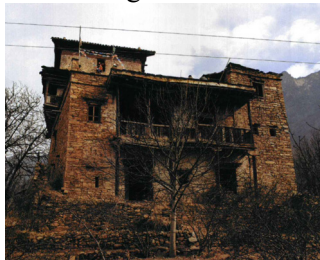


Figure 1. Saraca blockhouse in Danba County

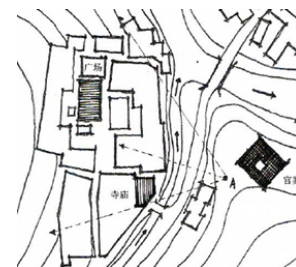


Figure 2. Plan sketch of official village, temple and Square in Markang Xisuo Village

4.2.4 Residential buildings

The most important structure in its settlement is the residential building regardless of the different forms and sizes of Tibet and Qiang watchtower village. Each part is closely related in village settlement space from settlement -- group -- unit. The building complies with the topography, which is arranged in a well-arranged way. Moreover, each unit is connected organically through the road to form a village with complete functions and convenient transportation. Qiang people build houses with stones. Stilt-style buildings are formed along the mountains. The basic functions of the interior space can be summarized as enclosure in the ground floor, housing in the second floor, and drying food in the third floor [14]. The main activity space is main room and hall, wherein the fire pond, the central pillar and the corner god are the most characteristic elements of Qiang folk dwellings. The largest

pillar on the second floor of the building is honored as the god of the central pillar. Although it has long been unable to bear the weight of the building, it reflects the brand of Qiang ancestors as a nomadic people. Some adjacent Qiang houses are also equipped with air walkway for linking all houses - linked building. It is not only conducive to the observation and defense as the expansion part of Qiang house, but also used as a place of embroidery Qiang women. Therefore, it is called embroidery floor. The four corners of the roof are laid with white stones for prayer and worship. Some roofs are equipped with different colors, thereby symbolizing five great gods of Qiang people and their endless life. It is the most natural, sacred and economical spiritual symbol of the folk architecture. Stone and wood structure is generally adopted in Tibetan dwellings in west Sichuan region. The flat roof is created according to the plateau natural climate and local living customs. The external forms are mainly divided into the body facade and roof facade. The whole house is characterized by wind resistance, sun exposure, theft resistance, defence, etc. By L-shaped and concave compact plane form. The ground floor is used as the corral and storage room. The middle floor is the most important place for activities, including kitchen, storeroom and bedroom, and the top floor is used as the prayer hall, guest bedroom and drying dam. The door of the Tibetan house is low, and the lower threshold is high. The window is small. Stone plates with suitable length are selected on the door and window as small canopy. The Tibetan people are a religious nation, and scripture hall carries the spiritual core of family belief. The dazzling decorations, complicated woodcut paintings, exquisite furniture and huge buddhist shrines as well as red and yellow color of bedrooms create a gorgeous, solemn and peaceful atmosphere in scripture hall .

4.2.5 Village public space

The village in the form of centripetal layout also has very important public activity space inside in addition to watchtower as its important defense center. Guozhuang Square or Bazi in the center of village is the place for religious sacrifice and celebration activities all over the village. It is an important node of well-connected road system and the political cultural core of the village. In addition, most Tibetan villages are equipped with temples or Tusi official village , and their position is the most important core of the whole village. If the village is located in the hillside slope or half mountain ground, the temple is located in the high place, thereby forming a pattern of 'temple on the upper portion and village in the lower portion'. The temple and official village are close to residents in order to meet the needs of Tibetan worship, thereby clearly reflecting the subordination, attachment and surrounding relationship among local-style dwelling houses, temples and official villages. (figure 2)

5. Conclusion

The landscape gene of Tibet and Qiang watchtower village in the west Sichuan region is identified based on the two-dimensional plane expression, three-dimensional structure, visual expression and microstructure form, etc., thereby building an important language mode of the traditional settlement landscape. **(1)** Natural environment is adopted as the base map, Tibet and Qiang watchtower village settlement form making full use of the limited resources, security and defense as well as other demands is presenting a settlement landscape corridor system based on mountains and rivers, thereby reflecting the genetic archetype of 'adapting measures to local conditions'. **(2)** Watchtower architecture form and layout of its spatial pattern in the villages reflect the historical changes of the Tibetan and Qiang people adapting to the complex tribal relationships and turbulent social environment in the ethnic corridor. Such village landscape and spatial pattern are unique in both China and the world. **(3)** The three-dimensional internal road, water and air network system reflects their innovation in rational construction of defense system, expansion of communication and production space, and resource utilization and management. **(4)** Excellent assembling technology shows their ability to control materials and technological innovation; **(5)** Harmonious beauty of 'heaven, earth, man and god' is presented in the settlement combination relationship and spatial structure rhythm, thereby highlighting the specific beauty of watchtower and residential buildings in the natural environment, and showing the multi-cultural settlement spatial aesthetics. Wherein, we have

experienced that the ancient appearance of the traditional Tibet and Qiang village contains various strange ideas and structures of our ancestors in order to adapt to the harsh natural environment and foreign invasion in war, thereby embodying the art of living space of the Tibetan and Qiang nationality in its continuous innovation under hardships. The profound truth of 'harmony between man and nature' contained in the settlement and environment is still of great guiding significance to current urban landscape planning and construction as well as architectural practice.

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