Research on Location and Morphological Characteristics of Traditional Settlements along Xijing Ancient Road

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Abstract. Ancient post road is the channel of material and information transmission in ancient China, which has the function of migration and cultural exchange. Xijing Ancient Road is one of the ancient post roads in Guangdong. It has a large span from north to south, and settlements along the road have different location and morphological characteristics. This paper analyzed the data of 113 traditional settlements along Xijing Ancient Road by using Google Earth and ArcGIS. It is found that the site of villages has the trend to distribute in the high elevation district, settled on the gentle slope and close to the foot of mountain. From the perspective of village morphology, most of the villages are massive. The street texture of the settlements in the north of the ancient road is grid-like, while the lanes in the south of the ancient road are mainly transverse. Different natural environment along the Xijing Ancient Road is the basic influencing factor, and the complex and diverse immigration backgrounds are the key influencing factors. Both of the two factors work together to lead to the diversity of traditional settlements along the Xijing Ancient Road.

1. Introduction of Xijing Ancient Road
The ancient road of Xijing, was built in the Eastern Han Dynasty and led to the capital (Xi'an, Shaanxi during the Sui and Tang Dynasties, and Luoyang, Henan from the Five Dynasties to Northern Song Dynasty) in ancient times.[1] Located in northern Guangdong and southern Hunan, it is one of the most important passageway between these two cities. Since ancient times, it has been the main road of transportation between the north and the south of China, which has promoted the economic and cultural ties between the Central Plains and the south of the five ridges.

The Xijing Ancient Road starts from Yingde, Guangdong in the South, connecting with Lian River, and reaches Chenzhou, Hunan in the north, joining to Qitianling Ancient Road. Xijing Ancient Road passes through 4 cities and 11 towns in Guangdong, with a length of approximately 160km. Xijing Ancient Road has a large span from north to south, passing through the edge of Hunan and Guangdong cultural areas. The natural conditions and cultural backgrounds of the areas along the road are different, which inevitably leads to the variety in the location and morphological characteristics of the corresponding settlements.

2. Research objects and methods
In order to explore the site selection and morphological characteristics of settlements along Xijing Ancient Road, 113 traditional village samples were selected as the research objects according to the following criteria:(1)The village is distributed within 3km from Xijing ancient road; (2)The traditional buildings of the village accounts for more than 50% of the total village building area in total. (3) There
are historical remains of Xijing Ancient Road in the village, such as the ancient road itself, post pavilions, inns, etc. or the traditional architectural style of the village is well preserved.

The elevation data of the surrounding area of Xijing Ancient Road was obtained from the SRTM DEM data set of China. The sample traditional villages were fixed in the geographical space coordinate system by ArcGIS, and the DEM was comprehensively processed to analyze the elevation, slope and terrain of the village location. The satellite map of the sample traditional villages was obtained from Google Earth to determine and classify the settlement morphology. The distribution of different settlement types was visually analyzed in ArcGIS.

3. Characteristics of settlement location along Xingjing Ancient Road

The study of settlement location is to analyze the settlement along the ancient road from a macro perspective, focusing on altitude, slope and the relationship with the mountain.[2]

3.1. Elevation analysis of settlement location

Statistics of the area of each elevation section within 3km from Xijing Ancient Road shows that the area with altitude of 0 - 200m accounts for 26%, 200 - 500m accounts for 41%, and 500 - 1000m accounts for 32% in total, and more than 1000m accounts for 1%.

Among the 113 sample villages, 53 villages are distributed in the area with an altitude of 0-200m, 35 villages were distributed in the area of 200-500m, 25 villages were distributed in the area with the altitude of 500-1000m, and there was no village in the area above 1000m.

![Altitude data statistical analysis of the research samples.](image)

3.2. Slope analysis of settlement location

According to the statistics of the area of each slope section within 3km from Xijing Ancient Road, the area with gradient of 0 - 2 ° accounts for 7%, that of 2 - 6 ° accounts for 25%, that of 6 -15 ° accounts for 36%, that of 15 - 25 ° accounts for 21%, and that of above 25 ° accounts for 11%. Among the 113 traditional village samples, 11 villages were distributed in the area of slope of 0 - 2 °, 75 villages were distributed in the area of slope of 2 - 6 °, 26 villages were distributed in the area of slope of 6 - 15 °, only one village was distributed in the area of slope of 15 - 25 °, and no village was distributed in the area with slope above 25 °.
3.3. Terrain analysis of settlement location

According to the observation, the site selection of settlements along Xijing Ancient Road is related to the mountainous terrain. Generally, the traditional settlements prefer settled in a specific location: "close to the mountain and by the water". The mountain not only impact on the microclimate of the settlement, but also is an important factor of Geomantic Omen. The sample settlements can be classified into the following three types according to the terrain of location: (1) The settlement at the foot of the mountain: the settlement has one or more directions directly close to the mountain, and the terrain is relatively steep; (2) Valley type settlement: there are mountains in the buffer zone within 500m around the settlement. The farther away from the mountain, the more flat the terrain is; (3) Flat type settlement: there is no mountain in the buffer zone within 500m around the settlement, and the terrain is relatively flat. According to the statistics of the three types of sample settlements, there are 67 settlements at the foot of the mountain, accounting for the majority; the flat type is the second, with a total of 25; the valley type is the least, with a total of 21. Settlements at the foot of the mountain is distributed in most areas along the ancient road, but less in the south end of the ancient road. The valley type settlements are mainly distributed in the northern section of the ancient road. The flat type settlements are mainly distributed in the southern section of the ancient road, which is roughly opposite to the dense area of the foot of the mountain.

4. Morphological characteristics of settlements along Xijing Ancient Road

To study the settlement morphology is to analyze the settlement along the ancient road from the meso level, focusing on the characteristics of the settlement landscape pattern and the internal streets texture of the residence.[3]

4.1. Types of settlement morphology

According to different shapes and quantity of the settlement, the settlement patterns along Xijing ancient road can be categorized into four types: (1) Agglomerate type: the settlement is composed of one patch, and the length and width of the patches are not different; (2) Cluster type: the settlement is composed of two or more patches, and each patch is large enough; (3) Band type: the settlement patch is a long strip; (4) Scatter type: there is a long distance between the buildings in the settlement, and there is no tendency of aggregation of the buildings.

According to the street organization, the settlements along Xijing Ancient Road can also be classified into four types: (1) Grid type: the settlement has obvious longitudinal and transverse bi-directional streets, interwoven to form a grid like system; (2) Transverse lane type: the settlement has
obvious transverse lanes, with few or discontinuous streets in longitudinal direction, forming a street lane system dominated by transverse lanes; (3) Single type: the settlement is composed of a large-scale residential building without external streets; (4) Branch type: the streets in the settlement are mainly connected with the scattered patches, and there are few streets and alleys in the patches.

4.2. Statistics and distribution of settlement morphology
According to the statistics of the number of settlements within 3km from Xijing Ancient Road, it can be seen that the majority of the settlements are of agglomerate type and transverse lane type, while the number of settlements of band type, scatter type and branch type are less. Among them, half of the sample settlements are of agglomerate-transverse-lane type.

From the settlement distribution of each type, it can be seen that the agglomerate-grid type is only distributed at the north end of Xijing Ancient Road, and settlements of agglomerate-single type gather in the south part of Xijing Ancient Road. These two types are not coexisting in distribution. The agglomerate-transverse-lane type is distributed in the all parts of Xijing Ancient Road. The cluster type is more distributed in the south section of Xijing Ancient Road, and the settlements of cluster-branch type gather in further south than settlements of cluster-transverse-lane type. The band-transverse-lane type and scatter-branch type are only distributed in the north section of the ancient road.

5. Influence mechanism of settlement location and morphology
Both natural environment and cultural background have an impact on the location and morphology of settlements. The settlement is placed in the interactive process of human power and natural force, so it becomes a cultural landscape system rooted in the geographical environment, so as to highlight the close relationship between the residential system and the natural system in the sciences of human settlement, and enrich the research content of the village human settlement environment science.[4]

5.1. Diverse natural environment in northern Guangdong
The natural terrain along the Xijing Ancient Road has varies greatly. It passes through hilly areas with an altitude of 200-300m, medium undulating mountains with an altitude of more than 500m, hilly plains with an average altitude of 50m and large undulating mountains with an altitude of more than 1000m.

As a favorable factor in traffic, Xijing Ancient Road attracts traditional villages to settle along the mountainous terrain areas. Because of its high terrain and steep slope, the cultivated land resources of the settlements are precious. Therefore, the settlements are often located on the gentle slope at the foot of the mountain, and the lower and flat valleys are preferred for cultivation to meet the needs of village production. Because of the steep terrain, the construction of settlements parallel to the contour line can reduce the construction difficulty and ensure the flat ground for building, so alleys of most of the settlements in mountainous areas are transverse.

5.2. The difference of source of ancient road immigrants
Since opening in the Eastern Han Dynasty, Xijing Ancient Road has been used as a migration channel for Han people from Central Plains to Guangdong for a long time. The northern part of the ancient road is located in the northern Guangdong dialect area of Lechang. The ancestors of the local residents are mainly from the Central Plains who migrated from Jiangxi and Hunan during the Song Dynasty. During the Ming and Qing Dynasties, a large scale of Hakka people from Western Fujian migrated to northern Guangdong. In Lechang, Ruyuan, Yingde and other cities and counties along the ancient road, more than half of the residents used Hakka dialect, which is the result of immigration activities in this period. There are still a few Yao people living in Ruyuan as early as the pre Qin Dynasty.[5]

The Hakka dialect area along the Xijing Ancient Road covers most of the mountainous terrain. During the Song Dynasty, people from Central Plains who moved to northern Guangdong preferred to settle in the hilly plain with better agricultural conditions. Until the Yuan Dynasty, the mountain area
of Meihua, Lechang was still deserted. Hakkas had more experiences at cultivating in the mountains, and they moved in relatively later in time. Therefore, more Hakka settlements are located in the mountainous areas with poor conditions, so that the cold and steep areas are developed one after another.

6. Conclusion

Xijing Ancient Road is not only an ancient traffic artery, but also a cross-section of mountains and rivers in northern Guangdong and a channel of regional culture transmission. The variety of natural conditions and cultural backgrounds lead to the differences in location and morphology of traditional settlements along the road. The research on the diversity of traditional settlements along Xijing Ancient Road is beneficial for the protection of multi-cultural characteristics in the process of the construction of villages along the ancient road nowadays, also, provides the basis for the typification of distinctive cultural characteristics of villages.

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