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Retraction

Retracted: Image Simulation of Traditional Village Spatial Layout Based on Computer Numerical Analysis

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] L. Li and J. Zhang, "Image Simulation of Traditional Village Spatial Layout Based on Computer Numerical Analysis," *Mobile Information Systems*, vol. 2022, Article ID 5873846, 7 pages, 2022.

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Research Article

Image Simulation of Traditional Village Spatial Layout Based on Computer Numerical Analysis

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In order to solve the problems of insufficient protection and spatial development of traditional villages, a method of spatial layout of traditional villages based on computer numerical analysis is proposed. This method uses GIS technology to determine the spatial distribution characteristics of traditional villages in a city by using the nearest neighbor index, geographic concentration index, and kernel density estimation, and analyzes its influencing factors. The experimental results show that most traditional villages are 60–119 km away from the central urban area, and 73% of the traditional villages are more than 60 km away from the central urban area. Traditional villages are generally far away from the central urban area and are less affected by urbanization, maintaining the original style of traditional villages. It shows that elevation, slope, hydrology, traffic conditions, economic indicators, and cultural factors are important factors affecting the spatial distribution of traditional villages in a city. Through analysis, it can be seen that the distribution of traditional villages is affected by multiple factors such as natural conditions, social and economic conditions, and cultural factors. The optimal layout of traditional villages can be strengthened mainly from these aspects.

1. Introduction

China has a vast territory, many ethnic groups, and diverse cultures. During the long years, transportation was inconvenient, information was isolated, and each developed and formed its own form, which created the diverse coexistence of Chinese culture and the overall splendor. If there are no traditional villages of various ethnic groups and local roots, where is the splendor of Chinese culture? However, some recent village surveys and statistics have made our hearts suddenly tense. For example, in 2010, the total number of administrative villages was about 690,000, and the number of natural villages was about 4 million. However, by the end of 2012, the total number of administrative villages was quickly reduced to less than 600,000, and the number of natural villages was reduced to more than 3 million. Of the approximately 4.6 million administrative and natural villages, only 11,682 were recommended to be reported as traditional villages, and only 646 were actually selected for publication, accounting for a negligible percentage of the total number of village settlements. This is extremely incommensurate with China's status as a civilized country with one of the oldest agricultural countries in the world, and the protection of traditional villages needs to be strengthened urgently. Traditional villages, also known as ancient villages, refer to villages that were formed earlier, possess rich traditional resources, and have certain historical, cultural, scientific, artistic, social, and economic values and should be protected. They are living fossils and museums of traditional Chinese society. With the rapid advancement of urban-rural integration, the contradiction between traditional local culture and modern urban civilization has become increasingly prominent, as the main carrier of traditional culture, traditional villages have been greatly impacted and destroyed by the original social customs and spatial pattern, the spatial layout of villages shows a high degree of "fragmentation," "islanding" and "marginalization," and many excellent traditional villages are gradually declining [1, 2].

After the 19th National Congress of the Communist Party of China, the state began to vigorously implement the rural revitalization strategy, carried out the improvement of the rural living environment, and coordinated the orderly development of the "production-life-ecology" space in rural areas, this series of policies and guidelines pointed out the research direction for the protection and development of traditional villages in the new era. The spatial layout of traditional villages is an important spatial expression of cultural connotations such as architectural features, village patterns, and folk beliefs of traditional villages' key content. Traditional villages in different historical periods have great differences in the distribution of spatial characteristics. The overall layout of traditional village buildings is mostly based on the mountains, with scattered layers, perfectly combined with the natural environment where they are located, showing extraordinary labor wisdom everywhere.

2. Literature Review

Hossain et al. are the initiators of the study of settlement geography, he systematically summarized the different types of urban settlements, market town settlements and rural settlements, expounded the relationship between different settlement forms, geographical environment, and traffic arteries, and emphasized the villages, mechanisms of topography, and topography on location conditions. Plum Village analyzed the motives for the formation, development, and evolution of German villages, which is the cornerstone of the study of settlement geography [3]. Doarn and others studied in detail the relationship between rural settlements and their natural environment, and analyzed the relationship with sunshine duration and river systems [4]. Karnena et al. systematically discussed the relationship between settlement and environment, emphasizing that the settlement location and natural environment are inseparable [5]. Brotons-Gisbert and others advocated repairing the old as the old, and believed that the restoration of ancient buildings should follow the original appearance, adhering to the continuity of style, and put forward the theory of ancient building restoration that has a great influence on later generations. The British group opposed the use of modern technology to restore ancient buildings, and advocated regular protection of ancient buildings to prolong their service life, the Italian group proposed that the texture and context of the ancient city should be protected. As for the research on the historical and cultural heritage of settlements, foreign scholars have diverse analysis angles and novel methods [6]. Azeze pointed out that the spatial form of traditional villages was influenced by both nature and society, and expanded the scope of research objects from vernacular architecture to surrounding environmental landscapes, not only limited to residential buildings, but also emphasized the research value of environmental landscapes. The origin and development of traditional village and town settlements were discussed [7]. Baena-Ruiz and Pulido-Velazquez introduced the concept of cultural geography into the overall protection of settlements, discussed the spatial intentions of traditional settlements in terms of geographical location and layout characteristics, and systematically discussed the spatial image of ancient villages. From the perspective of human–land relationship, the systematic research conducted by geographers has made important contributions to the protection of traditional villages in my country [8]. Shields et al. used analysis methods such as nearest neighbor distance, imbalance index, and kernel density estimation to determine the distribution characteristics and influencing factors of traditional villages [9]. Karimi and Iordanova proposed a way to optimize the village space in the loess hilly area of northern Shaanxi, taking Heyi Village as an example, and proposed a strategy to optimize the traditional village space [10]. To sum up, researches related to the spatial distribution of traditional villages mostly focus on the national and provincial levels, while the research on the distribution characteristics and optimization of traditional villages at the municipal level is relatively rare. Therefore, through the spatial analysis of national and provincial traditional villages in a city, the types and characteristics of their spatial distribution are determined and their influencing factors are analyzed, as shown in Figure 1. On the basis of GIS data analysis, suggestions for optimizing the spatial distribution of traditional villages for reference are put forward according to the current situation, which can provide reference for the continuation and development of the characteristic space of traditional villages in a city.

3. Research Methods

3.1. Development Status of a Traditional Village. It is located in the southeastern part of the hilly area of central and southern Shandong and the southern part of the hilly area of eastern Shandong, the area of mountains and hills accounts for more than 3/5 of the city's area [11], it is a typical mountainous city, the Yimeng Revolutionary Base gave birth to Chinese red culture, Yimeng spirit. With its unique natural environment and historical culture, a traditional village with unique regional characteristics has been nurtured and preserved; it has very high historical and cultural value, architectural value, and social and economic value. With the gradual reduction of traditional villages, the state has promulgated a list of national and provincial traditional villages to protect them; there are 14 national traditional villages and 59 provincial traditional villages in a city.

3.2. Analysis of Spatial Distribution Characteristics of Traditional Villages in a City

3.2.1. Research Methods

(1) The Nearest Neighbor Index Method. The nearest neighbor index method uses the distance between the nearest points to describe the distribution pattern, which is equivalent to the inverse of the density in form, represents the distance between points. When the actual nearest neighbor distance is greater than the nearest neighbor distance in the random distribution state, the space tends to be uniformly distributed, when the actual nearest neighbor

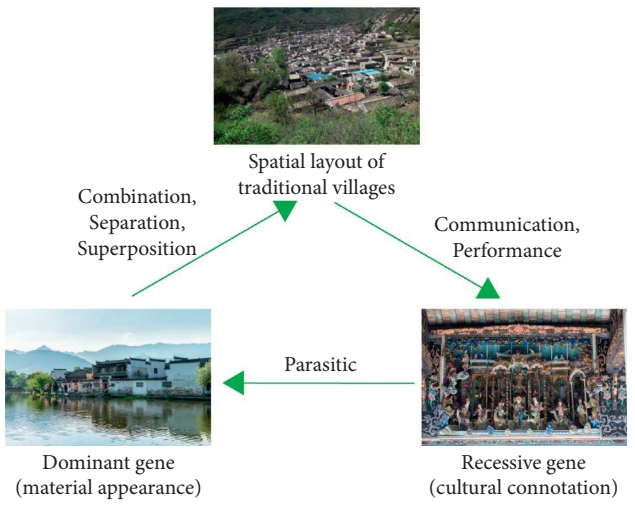

Figure 1: Relationship between spatial layout and landscape genes.

distance is less than the nearest neighbor distance in the random distribution state, it tends to agglomerate the distribution. The calculation method is the ratio of the actual nearest neighbor distance to the theoretical nearest neighbor distance in random distribution, the formula is as follows (1), R is the nearest point index, D is the point density [12]:

$$R = \frac{\overline{r_1}}{\overline{r_E}} = 2\sqrt{D} \times \overline{r_1}. \quad (1)$$

In the formula, R is the closest point index, $\overline{r_1}$ is the average value of the distance r_1 between the closest points, $\overline{r_E}$ is the theoretical closest distance, and D is the point density. When $R = 1$ is $\overline{r_1} = \overline{r_E}$, it means that the point elements are randomly distributed; When $R > 1$ is $\overline{r_1} > \overline{r_E}$, it means that the point elements tend to be uniformly distributed. When $R < 1$, that is, $\overline{r_1} < \overline{r_E}$, indicates that the point-like elements are distributed in agglomeration type. The $\overline{r_E}$ calculation method is as follows (2):

$$\overline{r_E} = \frac{1}{\sqrt[2]{n/A}} = \frac{1}{2\sqrt{D}}. \quad (2)$$

In the formula, A is the area of the area, and n is the number of research objects.

(2) Geographic Concentration Index. The concentration of traditional villages in a city can be expressed by the geographic concentration index. The calculation formula is the following formula (3) [13]:

$$G = 100 \times \sqrt{\sum_{i=1}^{n} \left(\frac{X_i}{T}\right)^2}. \quad (3)$$

In the formula, G is the geographic concentration index of the spatial distribution of traditional villages, X_i is the number of traditional villages in the ith county, T is the total number of traditional villages, and n is the total number of counties. The larger the G value, the more concentrated the spatial distribution of traditional villages, and vice versa, the more scattered.

(3) Nuclear Density Analysis. Kernel density analysis calculates the density of a feature in its surrounding neighborhood. The closer to the search center, the higher the weight given to the feature. The farther from the search center, the smaller the weight. The larger the value of the search radius parameter, the smoother and more generalized the generated density raster will be. The smaller the value, the more detailed information the generated raster will display. The calculation formula of the kernel density estimation method is the following formula (4):

$$f_n(x) = \frac{1}{nh} \sum_{i=1}^{n} k\left(\frac{x - x_i}{h}\right). \quad (4)$$

In the formula, $k((x - x_i)/h)$ represents the kernel function; h represents the bandwidth, and its value is greater than 0; $x - x_i$ represents the distance from the evaluation point x to the event x_i. It can be seen that the mathematical form of the kernel function and the numerical size of the bandwidth largely determine the kernel density estimate.

4. Analysis of Results

4.1. Results and Analysis

4.1.1. Morphological Characteristics of Traditional Villages in a City. The distance between each village point and its nearest neighbor village point is calculated by proximity analysis, and the actual nearest neighbor distance $(\overline{r_1})$ is 6225.17, and the theoretical nearest neighbor distance $(\overline{r_E})$ is 8534.87, therefore, the nearest neighbor index (R) of a traditional village in a city is 0.73, because of $\overline{r_1} < \overline{r_E}$, it means that the traditional villages in a city are distributed in agglomeration type [14].

4.1.2. The Characteristics of Balanced Distribution of Traditional Villages in a City. After calculation, the geographic concentration index of traditional villages in a city is $G = 41.96413$, and under the state of uniform distribution, the geographic concentration index of traditional villages in a city is $G_1 = 30.15113$. It can be seen that $G_1 < G$, ideally, the geographic concentration index of the uniform distribution of traditional villages in a city is smaller than the geographic concentration index of the actual spatial distribution. Therefore, from the county perspective, traditional villages in a city are relatively concentrated, mainly in three counties A, B, and Yishui, with a total of 38, accounting for 64.4%. The A, B, C, and D areas are not distributed.

4.1.3. Distribution Density Characteristics of Traditional Villages in a City. Kernel density analysis is used to calculate the density of traditional villages in their surrounding neighborhoods to study their spatial clustering [15]. After calculation, the distribution density of traditional villages in a city is $3.43/(\times 10^3)\text{km}^2$, of which, the distribution density of county A is $7.13/(\times 10^3)\text{km}^2$, the distribution density of county B is $8.11/(\times 10^3)\text{km}^2$, the distribution density of county C is $4.96/(\times 10^3)\text{km}^2$ due to its large area, and the

density of D is $4.81/(\times 10^3)\text{km}^2$. The distribution density is shown in Table 1.

The core density of traditional villages in a city is analyzed, and the core density distribution map of traditional villages in a city is obtained, the spatial distribution of traditional villages in a city forms two high-density core areas, one of which is a high-density core area, located at the junction of County A and County B, its radiation range includes the east of C County, the west of D County and E County; A sub-high-density area is located in the south of F County, and its radiation range includes the entire G County, H County, and I County.

4.2. Analysis of Factors Affecting the Spatial Distribution of Traditional Villages in a City

4.2.1. Natural Factors. Natural factors have a very important impact on the formation, development, and continuation of traditional villages, in this study, three natural factors, elevation, slope, and river, were selected to explore the influencing factors of the spatial distribution of traditional villages in a city.

(1) Elevation. The elevation values of traditional villages are extracted from the DEM data of the elevation map of a city [16], the elevation of each village is calculated and counted, and the distribution map of traditional villages is coupled with the elevation map of a city to analyze the relationship between the distribution and elevation of traditional villages in a city.

Through statistical analysis, it is concluded that the plain areas where the traditional villages in a city are below 200 m above sea level account for 18.64%, which are concentrated in the southern part of the city, and the hilly areas where the traditional villages are 200–400 m above sea level account for 57.00%, which are mainly distributed in a certain city in the northern area of the city.

(2) Slope. Through slope analysis, a map of traditional villages and slope distribution in a city is obtained, the analysis shows that 20.34% of traditional villages are distributed in a gentle area with a slope of less than 5°, and 49.15% of traditional villages are distributed in an area with a slope of 5–10°. Most of the traditional villages in a city are built according to the mountain, and they are distributed in areas with little change in slope and small undulating terrain [17], and most of the village buildings are backed by the mountains and face south.

(3) Water Resources. Buffer analysis was performed on the water resources distribution layer of a city [18], and then superimposed with the traditional village point layer in a city, up to 70% of the traditional villages in a city are distributed within the 1 km buffer zone of rivers and reservoirs, and along the rivers are distributed in strips. On the whole, the traditional villages distributed near the river are distributed in clusters, and most of them are built on the mountains.

4.2.2. Socioeconomic Factors

(1) Economic Indicators. Three indicators of GDP, per capita GDP, and population density of a city and counties are selected to reflect the social and economic development level of each county in a city (Table 2), in order to analyze the relationship between the spatial distribution and economic conditions of traditional villages in a city.

It can be seen from Table 2 that the GDP, per capita GDP, and population density of the three counties A, B, and C with a large number of traditional villages are all lower than the city's average, however, Lanshan District and Luozhuang District with better economic conditions currently have no traditional villages, and areas with a large number of traditional villages, its socioeconomic development level is relatively low.

(2) Traffic Conditions. Highway mileage is an important indicator reflecting the development scale of highway construction and an important symbol of the level of social and economic development. Therefore, reasonable prediction of highway mileage scale has guiding significance for the construction and development of regional highways. Although there have been a variety of forecasting methods with reasonable scale of highway mileage, due to the variety of forecasting methods and different standards, the forecast results are quite different and less reasonable. On the one hand, some regions use the forecasting models of other countries or regions when predicting a reasonable scale of highway mileage, and fail to combine local conditions, resulting in a large difference between the forecast results and the actual situation; on the other hand, some regions are conducting reasonable scale forecasting of highway mileage. Most of the model parameters used are mechanical values or empirical values, and the specific parameters cannot be analyzed in detail, resulting in low reasonableness of the prediction results. Therefore, according to the development characteristics of my country's highway mileage scale, improving the accuracy of the reasonable scale prediction value of my country's highway mileage can largely ensure the rationality of highway mileage construction and growth, so as to better solve the problem between regions and highway mileage. Supply and demand conflict: by visualizing the road distribution line layer and the traditional village point layer, a traditional village and traffic distribution map in a city is obtained. As a trade city and a logistics capital, roads are relatively densely distributed [19]. However, in the core area where there are many traditional villages in a city, such as the junction of County A and County B, there are towering mountains, complex terrain, and few roads.

Further obtain the relevant data of the highway mileage of each county in a city, and calculate the highway density in each region (Table 3 and Figures 2 and 3). It can be seen from the results that counties with a large proportion of mountainous areas, such as County A and County B, have a large distribution of traditional villages although the road network density is high, the reason is that the areas where traditional villages gather and distribute are mostly mountainous areas, the traffic is still relatively blocked, and they are less affected

Table 1: Distribution density of traditional villages in each county of a city.

Place location	Area aera km^2	Number of villages number of village//individual	Distribution density distribution density 个/(×103)km^2
A	1822.9	13	7.13
B	1601.6	13	8.11
C	2414.0	12	4.96
D	1659.9	8	4.81
E	1719.3	7	4.06
F	1724.0	4	2.31
G	1750.9	1	0.57
H	1010.2	1	0.98
I	833.8	0	0
G	891.0	0	0
K	568.6	0	0
L	1195.1	0	0
Total	17191.3	59	3.43

Table 2: Economic indicators of a city, counties, and regions in 2018.

Place location	Gross product total output value//billion	GDP per capita GDP//yuan	Population density population density people/km^2
A	342.88	35515	530.53
B	209.06	39768	329.05
C	435.9	43382	416.82
D	331.94	41544	481.96
E	278.89	33388	486.71
F	407.43	34077	694.32
G	300.94	38538	446.57
H	271.24	43419	619.58
I	1053.95	77258	1534.12
J	405.4	71918	993.84
K	228.56	42263	650.27
L	326.68	36903	742.19
Average	471.79	44407	582.66

Table 3: Road network density in each county of a city.

Sort rank	Place location	Area area km^2	Road mileage mileage km	Road network density road network density km/km^2
1	A	819.310	285.681	0.32
2	B	1601.954	463.738	0.289
3	C	568.745	160.606	0.282
4	D	1823.124	488.246	0.267
5	E	1010.766	266.431	0.263
6	F	1719.980	443.149	0.257
7	G	1660.209	417.748	0.251
8	H	834.164	199.644	0.239
9	I	2415.217	564.469	0.233
10	J	1752.131	374.759	0.213
11	K	1195.557	250.587	0.209
12	L	1724.372	357.577	0.207

by the external environment, which is conducive to the preservation of traditional villages. In a county with a relatively flat terrain, the greater the density of the road network, the more convenient the transportation, the greater the external influence, and the less traditional villages are distributed.

(3) Distance from the Central City. Traditional villages are seriously eroded by urbanization; especially the distance from the central urban area has a non-negligible impact on the spatial distribution of traditional villages. Select Lanshan District in a central urban area as the center, measure the straight-line distance from traditional villages to the central urban area in ArcGis 10.3, and export the data to form a distance distribution map with an interval of 20 km, and then analyze the spatial distribution between the central urban area and traditional villages in a city relationship (Figure 4) [20].

It can be seen from Figure 4, in ArcGis10.3, measure the straight-line distance from traditional villages to the central city, and export the data to form a distance distribution map with an interval of 20 km, that most traditional villages are

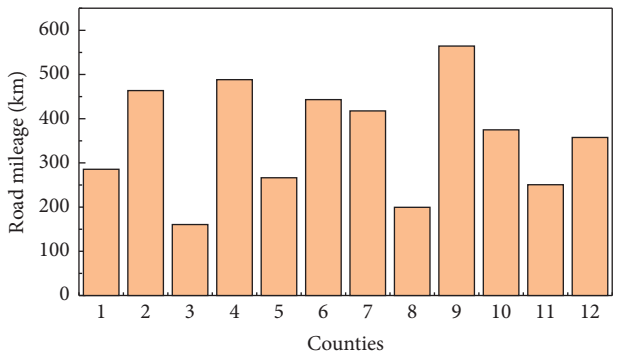

Figure 2: Histogram of highway mileage in each county of a city.

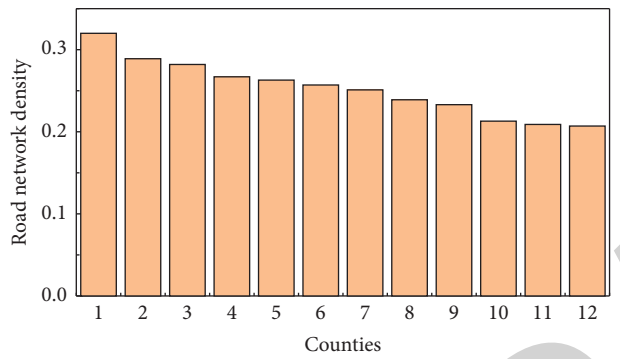

Figure 3: Histogram of road network density in each county of a city.

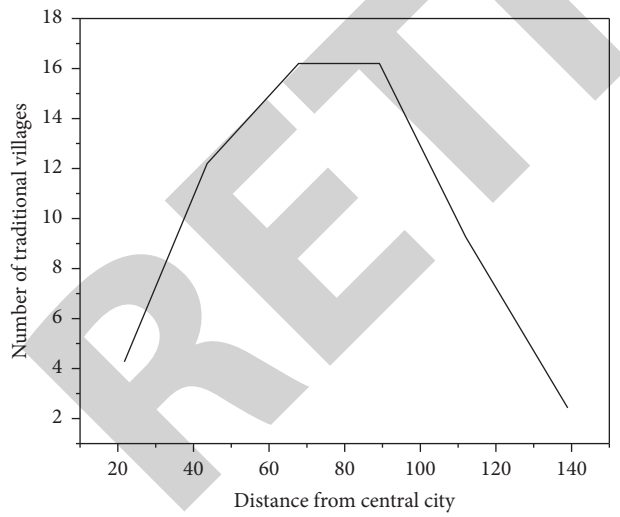

Figure 4: Distribution of distance between traditional villages and central urban areas.

generally far from the central urban area, most of which are 60–119 km away from the central urban area, and 73% of the traditional villages are more than 60 km away from the central urban area. Since traditional villages are generally far away from the central city, they are less affected by urbanization;therefore, the original appearance of traditional villages can be better maintained.

4.2.3. Traditional Cultural Factors. There has been an excellent traditional culture since ancient times, the successive dynasties set up prefectures here, and the Dongyi civilization and Confucian culture were carried forward here. In modern times, the Communist Party of China established the Yimeng Revolutionary Base in the arduous War of Resistance Against Japanese Aggression and the War of Liberation, and a large number of red fortress towns (townships) and villages emerged, which had an important impact on the distribution of traditional villages, by analyzing the spatial layout and red genes of traditional villages culture, get the closest distance between the traditional village and the red cultural area, the analysis shows that there are 17 traditional villages belonging to the red fortress village or in the red A-level scenic spot, accounting for 28.81% of the total number of traditional villages, mainly distributed in the 4A-level red tourist area of the Daigu landform in County B. There are 33 traditional villages within 5000 m from the Red Fortress Village or the Red A-level scenic spot, accounting for 55.93% of the total number of traditional villages, distributed in the red fortress village, and the red A-level scenic spot in a city [21]. Practice has proved that, red culture has a certain influence on the spatial distribution of traditional villages, and there are many traditional villages in areas with excellent history and culture and outstanding characteristics.

5. Conclusion

Through analysis, it can be seen that the distribution of traditional villages is affected by multiple factors such as natural conditions, social and economic conditions, and cultural factors, the optimal layout of traditional villages can be strengthened mainly from these aspects. Analyzing the location of villages from a city level, traditional villages are spatially cohesive, and the distribution among districts and counties is still unbalanced. Therefore, it is suggested that a city should explore, protect, and revitalize traditional villages from the following aspects.

(1) Existing traditional villages will implement overall group development. Centering on County A, County B, and Yishui County, it will drive the linkage of surrounding traditional villages, and combine the excellent natural, economic, and cultural factors of traditional villages with surrounding natural villages, cultural relics, red culture, and tourism resources to form a regional integration development pattern.

(2) Protect the traditional village style. Strengthen the villagers' awareness of the protection of traditional villages, improve the villagers' awareness of the material and intangible cultural heritage of traditional villages, do not build or demolish traditional buildings privately, destroy the overall style of the village, and actively protect the style and environment of the village.

(3) Improve the living environment. On the basis of fully excavating and protecting historical relics and cultural relics, optimize and beautify the living

environment of traditional villages, and organically combine protection and utilization with modern civilization. People-oriented, correctly handle the relationship between protection and preservation and improving the quality of life of the peasants, and scientifically rectify the village environment, so that the peasants living in traditional villages can also enjoy the life of modern civilization, and improve the "empty nest" and "aging" of the village.

(4) Moderately develop characteristic tourism projects. Pay attention to the intrinsic value endowed by traditional culture to traditional villages, relying on its unique landscape environment and traditional architectural style, and actively cultivate cultural leisure tourism items of traditional villages. For a traditional village in a city, relying on red culture, developing red tourism, organizing party-led red culture teaching activities, etc., can drive the overall economic development, enhance the vitality of traditional villages, and promote the growth of village space.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

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