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Spatial Distribution Characteristics and Influencing Factors of Key Rural Tourism Villages in China

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Abstract

Based on the theory of cultural ecology and the spatial perspective of geography, this paper studies the spatial distribution characteristics and influencing factors of 320 key rural tourism villages in China by using spatial analysis methods such as the nearest neighbor index, equilibrium measure, kernel density analysis, hot spot analysis, geographical linkage rate, and quantitative geography research methods. The results show that: 1) The spatial distribution type of the key rural tourism villages in China is condensed, but the distribution is relatively balanced in the provinces. 2) Overall, the spatial distribution pattern of "two cores, three plates, and the rest close clusters" is presented, and the spatial distribution characteristics are more in the east and less in the west, and more in the edges and borderlands of provinces and regions. 3) On the provincial scale, the hot spots and cold spots of the key rural tourism villages in China show obvious distribution characteristics of "blocky clusters" from east to west. 4) Tourist market, resource endowment, social economy, population density, macro policy, and road traffic are the main factors affecting the spatial distribution of key rural tourism villages in China.

Introduction

Rural tourism is a kind of tourism mode with urban residents as the target market and a return to nature as the target [1]. Many countries and regions in the world regard rural tourism as a tool of revitalization [2].The report of the 19th National Congress of the Communist Party of China proposed the rural revitalization strategy for the first time, and the No. 1 document of the Central Committee in 2018 made a comprehensive arrangement for the rural revitalization strategy [3].The 20th National Congress also proposed an important strategy for rural revitalization, indicating that rural development has become one of the hot topics of current social concern. In this context, the importance and value of studying rural tourism have become more significant. The development of rural tourism plays an important role in promoting the development of local economy, the realization of farmers' poverty alleviation, the improvement of farmers' lives and the adjustment of rural industrial structures. It has an important strategic position in the overall situation of national development

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and the overall situation of Chinese-style modernization. Studying the spatial distribution characteristics and influencing factors of rural tourism destinations is of great significance for optimizing the layout of the rural tourism industry, improving the allocation of factors, and promoting ecological protection and high-quality development.

Foreign studies on rural tourism mainly focus on tourism based on agricultural production [4], driving factors [5], sustainable development [6], etc. China's rural tourism started in the 1980s after the reform and opening up, and then experienced a period of growth and rapid development. Through the review of existing literature, it was found that it mainly focuses on the basic concept of rural tourism [7], rural culture [8], rural tourism spatial structure [9], rural tourism perception [10], rural tourism consumption behavior [11], rural tourism development model [12], and other aspects, and has accumulated rich research results. Among them, the study of rural tourism spatial structure has a theoretical and practical guiding role for the spatial layout, construction direction, resource integration, and sustainable development of rural tourism destinations. At present, domestic and foreign scholars have made a lot of beneficial explorations and attempts at the spatial structure of rural tourism destinations. For example, Dianne Dredge [13] constructed and studied the spatial structure model of tourism destinations, including single-node destinations, multi-node destinations, and chain node destinations.Based on the relationship between recreation, leisure activities, and geospatial structures, Christalle [14] proposed the expansion problem caused by tourists' tourism activities around cities. Wolfer analyzed the buffer zone of different types of scenic spots and found that the scenic area within 5 km is suitable for rural tourism development [15]. Sue found that rural tourism destinations 50 to 100 km away from cities are highly attractive to urban residents [16]. Some scholars have also found that resource endowment and natural conditions are important factors affecting the spatial distribution of rural tourism [17-19].The research of Wu Bihu et al. shows that the layout of rural tourism destinations around large and medium cities in China generally shows a trend of distance attenuation [20]. Li Shujuan et al. conducted a quantitative study on the spatial structure and influencing factors of rural tourist attractions in Shandong Province using quantitative geographical research methods [21]. Wang Xinyue et al. studied the distribution rules and influencing factors of representative rural leisure tourism destinations in Shandong Province [22]. Tian Dongna et al. summarized the evolution forms, characteristics, and existing problems of rural tourism in different stages of Dalian from the perspective of spatial structure [23]. In addition, similar studies have been conducted in Jiangsu Province [9], Shanxi Province [24], Zhejiang Province [25], and Chongqing City [26]. According to the existing research findings, qualitative and quantitative research methods are mostly used in research. In terms of research scale,

the current spatial scale mainly focuses on provincial and prefecture-level rural tourism sites, while there are relatively few studies on the national scale.

This paper uses 320 key rural tourism villages as research samples. Cultural ecology theory and geographical spatial perspective are introduced into the research, and spatial analysis is used to reveal the overall spatial distribution characteristics and rules of the key villages of rural tourism. It provides a theoretical basis for optimizing the ecological structure system and spatial distribution pattern of the key rural tourism villages.

Data Sources and Research Methods

Data Sources

Based on the principles of representativeness, typicality, and scientificity of the research objects, the list of 320 "the first batch of National Rural Tourism Key Villages" published by the Ministry of Culture and Tourism and the National Development and Reform Commission in July 2019 was taken as the research object. The 5A-level tourist attractions used are from 259 5A-level tourist attractions published on the official website of the Ministry of Culture and Tourism. The spatial administrative boundary vector and water system data came from the 1:400,000 China basic geographic information database of the National Basic Geographic Information Center. The study area does not include Taiwan Province, Hong Kong, or Macao Special Administrative Region, and the population and economic data are derived from the provincial and municipal statistical yearbooks and government work reports. The geographical coordinates of each key rural tourism village and 5A scenic spot were read by picking coordinates from Baidu, sorted into an Excel database, and imported into ArcGIS10.3 to generate a spatial distribution map as basic data. In addition, Krasovsky_1940_Albers equal-area conic projection is used for all vector graphic data.

Research Methods

With the help of software tools such as ArcGIS10.3 and SPSS21.0, this paper studies the spatial distribution characteristics and causes of key rural tourism villages in China by using parameters and methods such as the nearest neighbor index, geographical concentration index, equilibrium index, kernel density analysis, buffer zone analysis, spatial interpolation analysis, and spatial statistics.

Nearest Proximity Index

The nearest neighbor index (NNI) was used to determine the spatial distribution type (uniform, random, and condensed) of key rural tourism villages

in China [27, 28] . The nearest neighbor index R is obtained by the ratio of the actual nearest neighbor distance to the theoretical nearest neighbor distance under the random distribution model, and its expression is as follows:

$$R = \frac{\overline{r_1}}{r_E}, \quad \overline{r_E} = \frac{1}{2\sqrt{n/A}} = \frac{1}{2\sqrt{D}} \qquad (1)$$

Where A is the area of the region, n is the number of points, D is the point density, and R is the nearest number of points. If R = 1, the point distribution is random. When R>1, the point elements tend to be evenly distributed. When R<1, the point elements tend to condense.

Measurement of Equilibrium

Geographical concentration index, Gini coefficient, and imbalance index are introduced to measure the equilibrium degree of spatial distribution of key rural tourism villages in China. The formula for calculating the geographical concentration index G [29, 30] is:

$$G = 100 * \sqrt{\sum_{i=1}^{n} (\frac{X_i}{T})^2} \qquad (2)$$

In the formula, G is the geographical concentration index of the scenic area, X_i is the number of national key rural tourism villages in the i-th province, T is the total number of national key rural tourism villages, and n is the total number of provinces. The larger the G value, the more concentrated the distribution of key rural tourism villages in China, while the opposite results in a more dispersed distribution.

The calculation formula for Gini coefficient Gini [30] is as follows:

$$Gini = 1 - \frac{1}{n}(2\sum_{i=1}^{n-1} W_i + 1) \qquad (3)$$

In the formula, n indicates the number of areas, and W_i indicates the proportion of the accumulated number in the total number. The value of the Gini should be between 0 and 1. The larger the value, the greater the non-equilibrium and the higher the degree of concentration. Gini coefficient below 0.2 is the absolute average, between 0.2 and 0.3 is relatively average, 0.3 to 0.4 is relatively reasonable, 0.4 to 0.5 is a large gap, and above 0.5 is a wide gap.

The equation for calculating the imbalance index S [29, 30] is as follows:

$$S = \frac{\sum_{i=1}^{n} Y_i - 50(n+1)}{100n - 50(n+1)} \qquad (4)$$

In the formula, n represents the total number of regions, and Y_i is the cumulative percentage of the ith place after the proportion of a certain research object in the whole region is sorted from large to small. The imbalance index S is between 0 and 1. If the study objects are evenly distributed in each region, then S = 0; if all the study objects are concentrated in one region, then S = 1.

Estimation of Nuclear Density

The Kernel Density Estimation Method [27-31] is used to estimate the density of key rural tourism villages in their surrounding areas. By smoothing the sorted point factor data, the density surface is obtained, which shows the places where the point elements are relatively concentrated and intuitively shows the spatial dispersion or accumulation characteristics of the elements. The expression is as follows:

$$\lambda(s) = \sum_{1}^{n} \frac{1}{\pi r^2} \vartheta(\frac{d_{ls}}{r}) \qquad (5)$$

In the formula, $\lambda(s)$ is the estimation of the nuclear density at point s, r represents the search radius of the nuclear density function, n represents the number of key rural tourism villages in the country, and ϑ is the weight of the distance between l and S.

Hotspot Analysis (Getis-Ord Gi*)

Hot spot analysis can calculate Getis-Ord Gi* statistics for each factor in the data set. Based on the obtained z score and p value, the location of clustering of high or low factors in space can be obtained, which is calculated as follows [14, 25] :

$$Gi = \frac{\sum_{j=1}^{n} W_{ij}(d)x_j}{\sum_{j=1}^{n} x_j} \qquad (6)$$

Where d is the distance, $W_{ij}(d)$ is the distance weight between points i and j, and the G coefficient can also be standardized.

$$Z(Gi) = \frac{Gi - E(Gi)}{\sqrt{Var(Gi)}} \qquad (7)$$

If Z (Gi) is significantly positive, it indicates that the values around unit i are relatively high and that it is a high-value spatial cluster (hot spot). On the other hand, if Z (Gi) is significantly negative, it indicates that the values around unit i are relatively low and belong to a low-value spatial agglomeration (cold spot region).

Results and Discussion

Characteristics of the Spatial Distribution of Key Rural Tourism Villages in China

Spatial Distribution Type

Based on the calculation formula of the nearest point index and the ArcGIS10.3 software, the nearest point index R = 0.67<1, Z score -11.40, and P value 0.0000 of the key rural tourism villages in the country were calculated, indicating that the distribution of the key rural tourism villages in the country was condensed. Because the nearest neighbor index is still controversial in determining the spatial distribution type of point target, the coefficient of variation method of Voronoi polygon area is used to further test the above results. The Voronoi polygon of the key rural tourism villages in China is shown in Fig. 1. The calculated average area of 320 multi-deformations is 29,700 km^2, the standard deviation is 5.62, and the coefficient of variation CV is 109%.According to the research conclusion of Duyckaerts et al. on the value of the variance function and the corresponding point target distribution state, it is further verified that the spatial distribution of key rural tourism villages in China is a condensed state.

Balanced Spatial Distribution

According to the calculation formula of the geographical concentration index, the geographical concentration index G = 18.31 of the key rural tourism villages in the country is calculated, which is slightly higher than the geographical concentration index 10.32 under the uniform distribution state, indicating that the distribution of the key rural tourism villages in the country is relatively concentrated at the provincial scale, and the distribution difference among provinces and regions is large. According to the calculation formula of the Gini coefficient, the Gini coefficient Gini = 0.111 of the key rural tourism villages in the country is calculated, which indicates that the non-equilibrium is low and the distribution of the key rural tourism villages in different provinces is more balanced in the country. According to the imbalance index formula, the imbalance index S = 0.115 of the key rural tourism villages in the country can be obtained, which further verifies that the distribution of the key rural tourism villages in the country is relatively balanced in the province.

Using the Lorenz curve to test the imbalance and concentration degree of key rural tourism villages in the country, the number and proportion of 320 key rural tourism villages were counted according to each administrative region, and the cumulative percentage was calculated one by one. Taking the position of different administrative divisions as the horizontal axis and the cumulative proportion as the vertical axis, the Lorenz curve of the key rural tourism villages in China is connected. The results show that the key rural tourism villages in the country present a typical concave shape (Fig. 2), indicating that the key rural tourism villages in the country have a spatial cluster distribution feature, which is consistent with the significance of the nearest neighbor index. Xinjiang, Zhejiang, Yunnan, Jiangsu, Gansu, Guizhou, Sichuan, Jiangxi, Anhui, and other provinces have a large number of key rural tourism villages (Fig. 3).
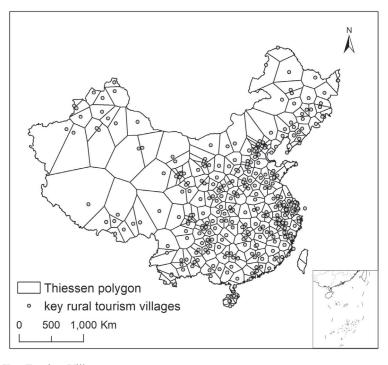

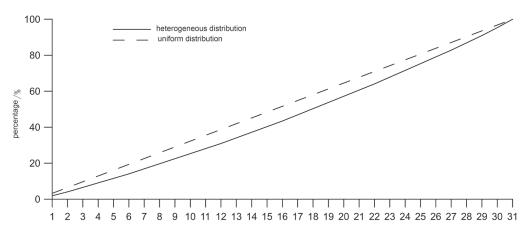Fig. 1. Voronoi of National Key Tourism Villages.

Fig. 2. Lorentz Curve of Spatial Distribution of Key Villages of Rural Tourism in China.
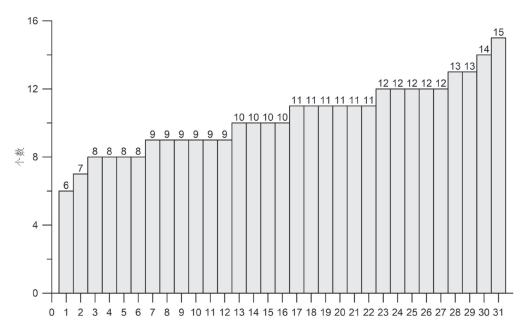

Fig. 3. The numbers of key villages in different provinces (with the provinces numbered 1-31 in the horizontal coordinates are Shanghai, Tianjin, Shanxi, Jilin, Hainan, Qinghai, Beijing, Inner Mongolia, Liaoning, Chongqing, Xizang, Ningxia, Heilongjiang, Shandong, Henan, Guangdong, Hebei, Fujian, Hubei, Hunan, Guangxi, Shaanxi, Anhui, Jiangxi, Sichuan, Guizhou, Gansu, Jiangsu, Yunnan, Zhejiang, Xinjiang).

Spatial Distribution Density

In order to accurately measure the spatial distribution characteristics of key rural tourism villages in China, the density tool in the Arcgis10.3 toolbox was used to analyze the spatial distribution density of 320 key rural tourism villages in China. The kernel density and search range in the parameters adopted the default values; the output grid size was 1000m×1000 m, the area unit was 9.6 million km², and the density distribution map of the key point village was generated (Fig. 4). The study shows that the spatial distribution of key rural tourism villages in China has formed a high-density distribution area with the core of Beijing, Tianjin and Hebei, South Jiangsu, southeast Anhui, northwest Zhejiang and Shanghai. Also the central junction of Gansu and Qinghai, across Shanxi, Hebei, Shandong, Shaanxi, Sichuan, Chongqing, and Guizhou, and eight provinces and cities in the northeast and southwest strike zone, central Anhui, southeast Hubei, northeast Guizhou, northern Jiangxi, central Jiangsu, and northeast Fujian surround the secondary core distribution zone. On the whole, the key rural tourism villages in China show the spatial distribution pattern of "two cores, three plates, and the rest close clusters", and the spatial distribution characteristics of more east and less west, and more distribution in the edge and border areas of provinces and regions. The reason is that the Beijing-Tianjin-Hebei region and the Yangtze River Delta region are highly developed economic areas in China, with high accumulations of economic flow, material flow, population flow, and information flow. Compared with
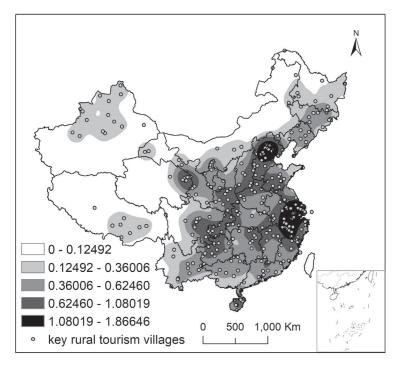
Fig. 4. The Density Map of Key Villages of Rural Tourism in China.

other regions, rural tourism planning and construction in this region have developed rapidly, which is also more in line with the central place theory.

It should be pointed out that across the eight provinces and cities of Shanxi, Hebei, Lu, Shaanxi, Sichuan, Chongqing, and Guizhou, the northeast and southwest toward the secondary core zone, located in the transition zone from the second ladder to the third ladder in our country, is the Taihang Mountain-Wushan Mountain - Xuifeng Mountain line. The accessibility of these areas is relatively poor; the economy and infrastructure are relatively backward, but the region is rich in tourism resources and the rural ecological environment is beautiful, which has become a hot area to attract tourists. In addition, these rural tourism spots, in the promotion of tourism poverty alleviation and other macro policies, rural tourism development speed is also rapid, and the surrounding area can form a demonstration effect, naturally become the national rural tourism key village.

Spatial Association Features

A ArcGIS 10.3 spatial analysis spatial autocorrelation tool was used to explore the correlation characteristics of key rural tourism villages in China. The global Moran I index of settlement results was 0.42, the expected index was -0.03, the variance was 0.005599, the Z value was 6.07, and the p value was 0.00. This indicates that the key rural tourism villages in China show agglomeration characteristics in the spatial distribution of provincial scale. In order to further analyze which provinces show agglomeration characteristics of high density values and low density

values, the local correlation index Getis-Ord Gi* of 31 provinces, cities, and autonomous regions in China is calculated. The spatial distribution is divided into four types: hot spot regions, sub-hot spot regions, sub-cold spot regions, and cold spot regions. As shown in Fig. 5, the key rural tourism villages of the country on a provincial scale are: the hot spots include Shandong, Henan, Jiangsu, Anhui, Hubei, and Shanghai, and the sub-hot spots include Beijing, Tianjin, Hebei, Shanxi, Zhejiang, and Fujian. The sub-cold spot area includes 16 provinces and municipalities, including Inner Mongolia, Heilongjiang, Liaoning, Jilin, Shaanxi, Gansu, Ningxia, Sichuan, Chongqing, Yunnan, Guizhou, Hunan, Jiangxi, Guangdong, Guangxi, and Hainan, while the cold spot area includes Xinjiang, Qinghai, and Tibet. In general, the hot spots and cold spots of the key rural tourism villages in China show obvious distribution characteristics of "blocky clusters" from east to west on the provincial scale.

Analysis of Influencing Factors

The theory of cultural ecology emphasizes the interaction between culture and environment and holds that the formation and development of cultural things are inevitably influenced by the environment, such as the natural environment, the economic environment, and the social organization. Based on the perspective of cultural ecology, the formation and distribution of key rural tourism villages will also be affected by the above factors. By referring to the existing studies [21] and eight selection criteria of key rural tourism villages in China, six dimensions affecting the spatial layout of key rural tourism villages, namely, the tourist market, resource
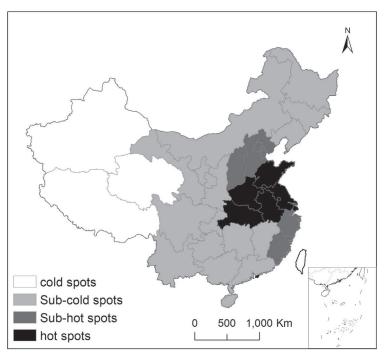
Fig. 5. Hotspot Map of Spatial Distribution of Key Villages of Rural Tourism in China.

endowment, social economy, population density, macro policies, and road traffic, are summarized.

Tourist Market Factors

The main source market for rural tourism is urban residents, who are full of sustenance and nostalgia for rural life. Therefore, the larger the scale of the city, the higher the economic level, and the more convenient the travel, the more it can meet the vision of urban residents to experience the rural lifestyle. Existing studies have shown [20] that with the increase in travel distance, the travel intention of urban residents presents a certain distance attenuation, and people's travel intention will decrease. Driving is the main mode of rural tourism in China. The ideal distance is a two-way decline of around 1 to 2 hours of car distance, and rural tourist spots within about 200 km of a 2-hour self-drive have become the first choice for travel. Therefore, a 200 km buffer zone will be made with prefecture-level cities and provincial capitals as the centers.

Fig. 6 shows that 215 key rural tourism villages are located within the 200 km buffer zone of provincial capital cities, accounting for 67.19% of the total number. In addition, only 6 key rural tourism villages are not located within the 200 km buffer zone of prefecture-level cities. It can be seen that there are obvious distribution characteristics of tourist source markets in the key villages of rural tourism in the country, which are mainly concentrated in the provincial capital cities, and almost all of them are gathered around the prefecture-level cities. The main reason is that, due to the high urbanization and economic level of provincial capitals and cities, residents have a strong sense of

leisure travel, which provides sufficient tourist sources for the development of rural tourism. In addition, the surrounding areas of cities are often suburban agricultural areas or water resource protection areas [32], which provide convenient conditions for the development of characteristic rural tourism. It is easy to develop into a tourist destination for urban residents' leisure and sightseeing experiences.

Resource Endowment Factors

The key rural tourism villages in China are generally in optimal areas with good tourism resources. China's tourism resource endowment is mainly reflected in different forms of tourism scenic spots. 5A scenic spots are representative of national tourism scenic spots in terms of popularity and tourism income. Therefore, 5A-level tourist attractions are selected as the dependent research objects of key rural tourism villages in the country, and the spatial distribution density map of national 5A-level tourist attractions is obtained by using nuclear density analysis, which overlaps with key rural tourism villages in the country, as shown in Fig. 7.

Arcgis software was used to make a statistical analysis of the correlation between the density of 5A scenic spots and the density of rural tourism spots in China, and the Pearson correlation coefficient was 0.92, indicating a high correlation between the two. It shows that the spatial distribution of key rural tourism villages in China has obvious distribution characteristics of dependent tourism scenic spots. Through statistical analysis, the shortest average distance between rural tourist spots and 5A scenic spots in China is 73.61 km, which is within the 1-hour
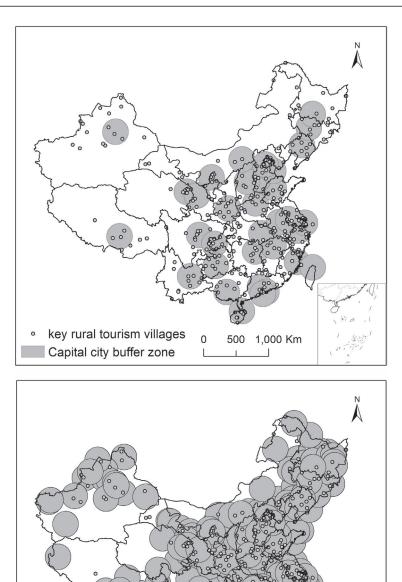
Fig. 6. Relations between Key Villages of Rural Tourism and Major Cities in China.

drive range of 5A scenic spots. With high visibility and influence, 5A scenic spots are the first choice tourist destinations for tourists to go out, and the siphon effect is obvious, which can give full play to the spillover effect of resources. In the large-scale space, the key village of rural tourism may become a short stop for tourists to travel, so the key village of rural tourism in the country is mostly attached to the distribution of scenic spots. In addition, most of the tourism resources of the key rural tourism villages in the country are unique, and folk customs, red culture, food culture, pastoral scenery, etc. have naturally become tourism attractions to attract

tourists under the promotion and creation of the tourism market.

Socio-Economic Factors

The level of social and economic development can stimulate people's willingness to travel and consume, which is an important driving force for the evolution of the spatial pattern of tourist scenic spots. Theoretically, there must be a certain relationship with the spatial distribution of key rural tourism villages in China. Geographical linkage rate is an index that reflects the
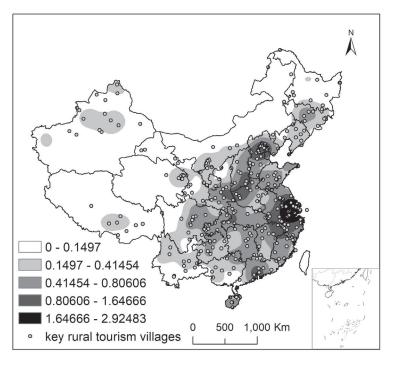
Fig. 7. Spatial distribution density of 5A Scenic Spots in China.

spatial equilibrium and cooperation degree of a certain regional activity with economic, population, and other factors in geographical research. The formula [21] is as follows:

$$V = 100 - \frac{1}{2} \sum_{i=1}^{t} |x_i - y_i|$$

Where V is the geographical linkage rate, xi is the key village of rural tourism in i province, accounting for the proportion of the whole country, yi is the economy in i province, accounting for the proportion of the whole country, and t is the total number of regions. The V value ranges from 0 to 100, and the larger the V value, the higher the degree of coordination between the spatial distribution of the key rural tourism villages and the economic development level of the provinces. The calculated results show that the economic-geographical linkage rate V is 80.92, which reflects that the development of tourism activities in key rural tourism villages is highly correlated with the economy, and the degree of spatial coordination is high.

According to the average per capita GDP of each provincial administrative region and municipality directly under the Central Government in 2018, the degree of regional economic development is judged, and the country is divided into economically developed regions, moderately developed regions, underdeveloped regions, and underdeveloped regions according to the natural classification method. The results show that Beijing, Tianjin, Shanghai, and Jiangsu, as developed regions, account for 10.94% of the country's key rural tourism villages; Shandong, Zhejiang, Fujian, and Guangdong, as moderately developed regions, account for 14.06% of the country's key rural tourism villages; and Shaanxi and Hubei, as less developed regions, account for 24.06% of the country's key rural tourism villages. In Shanxi, Henan, Yunnan, Tibet, Xinjiang, and other economically underdeveloped areas, the number of key villages for rural tourism accounts for 50.94% of the total. There are a large number of key villages for rural tourism in underdeveloped areas. The main reason may be that the accessibility of the traffic in the underdeveloped areas limits economic development and preserves the unique original natural scenery and environment in these areas. In the subsequent development process, its regional culture and ecological advantages can also be retained, but it can develop into a characteristic resource of rural tourism.

Population Density Factor

The population provides a sufficient source of tourists for the development and construction of key rural tourism villages. Based on the statistical data of the permanent resident population of various provinces and autonomous regions in 2018, the V value of the population-geographical linkage rate was finally calculated as 77.66. It reflects that the development of tourism activities in key rural tourism villages is highly related to population density, and the spatial balance and coordination degree are also high. China's rural tourism is in a stage of rapid development, and a stable source of tourists provides important support for the development of key rural tourism villages in the country. In addition, Jiangsu, Henan, Guangdong, Shandong, Beijing, Shanghai, Sichuan, and other places

had a large population and frequent human activities since ancient times, forming a unique regional culture. A large number of villages with architectural culture, folk culture, and food culture are suitable to be created as key villages for rural tourism. And these areas with high population density are also economically developed areas, such as Beijing-Tianjin-Hebei, the Yangtze River Delta, and the Chengdu-Chongqing area, where residents travel vigorously. It will certainly make rural tourism develop rapidly, and it is suitable to become the key village of rural tourism in the country.

Macroeconomic Policy Factors

The rapid development of rural tourism in China benefits from the support of a series of policies at the national level and has distinct characteristics of policy guidance. In particular, the implementation of the rural revitalization strategy has created favorable conditions for the improvement of the quality of rural tourism development. Zhou Yan [33] summarized the relevant policies of rural tourism development in China, which were divided into the the embryonic period (2004 to 2010), development period (2011 to 2015), and the perfect period (2016 to 2019). Each period was strongly supported by national policies. In the embryonic period, China's rural tourism development policy was integrated into the "three rural" policy, and rural tourism, as a field of "three rural" policy, began to appear in government documents. For example, in 2009, the central No. 1 document put forward the strategy of developing ecological tourism in mountainous areas, and in the same year, the State Council issued opinions on accelerating the development of tourism, proposing

to accelerate the development of rural tourism products such as agricultural tourism and tourist villages and towns. During the development period, the development of rural tourism as an important carrier to solve the problem of "three farmers", affirmed the prominent role of rural tourism integration and development. For example, the No. 1 Central document in 2015 clearly proposed the use of cultural resources to promote the development of rural tourism and formulated supporting policies such as land use, finance, and taxation for rural tourism development. During the improvement period, for example, in 2018, 17 departments, including the Ministry of Culture and Tourism and the National Development and Reform Commission, jointly issued guidelines on promoting the sustainable development of rural tourism, covering various aspects such as planning and design, infrastructure, cultural connotation, brand building, poverty alleviation, and so on, providing huge policy support for the sustainable development of rural tourism. In addition, various provinces and autonomous regions have also introduced tourism development plans, as well as the injection of relevant support funds, which have greatly promoted the rapid development of rural tourism.

Road Traffic Factors

The development of rural tourism activities has a strong dependence on traffic accessibility. Good tourism traffic can expand the scope of the tourist source market and become a channel between the tourist destination, and the tourist source. At present, most rural tourism activities focus on short-range tours, with self-drive cars, bicycles, and passenger buses as the main modes
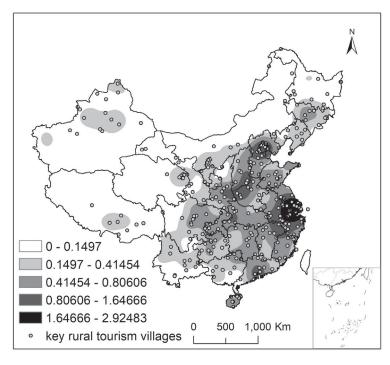

Fig. 8. The spatial distribution of the shortest distance between key villages of rural tourism and main roads in China.

Table 1. Statistical value of the distance from key villages of rural tourism to main roads in China.

Distance from main road/km	Number	Percentage/%
0<L≤10	219	68.44
10<L≤20	57	17.81
20<L≤30	22	6.88
30<L≤40	8	2.50
40<L≤50	2	0.63
60<L	12	3.75

of transportation. Based on the Baidu map, the shortest straight-line distance between each key rural tourism village and the national highway or expressway is measured and used as attribute data for spatial interpolation to generate the spatial distribution of the distance between the key rural tourism village and the national highway, as shown in Fig. 8. It can be seen that the distance from the main road of rural tourism in China is mainly between 0 to 30 km (Table 1), and the accessibility is high. There are 298 villages in total, accounting for 93.13% of the total. The areas far away from the main road are mainly distributed in northern Inner Mongolia, northern Xinjiang, and southern Tibet. The above analysis shows that road traffic has an important impact on the spatial distribution of key rural tourism villages in the country, and convenient transportation helps the key rural tourism villages form the effect of "visiting slowly and traveling fast", which will increase the number of tourists and help the construction of beautiful villages.

Discussion

The key rural tourism villages in China show the characteristics of spatial distribution and agglomeration, and the unbalanced and agglomerated spatial distribution is conducive to the optimal allocation and efficient utilization of various resources and development factors. The spatial distribution of key rural tourism villages has a great geographical correlation rate with regional economy, resource endowment, and population density, which is consistent with the conclusions obtained by predecessors on the influencing factors of the spatial distribution of A-level scenic spots and the influencing factors of provincial rural tourism key villages [20, 22-26, 27]. In future development, we should seize the opportunity of economic development, give full play to the advantages of resource endowment, tap the connotation of history and culture, and realize the high-quality development of rural tourism key villages. This paper puts forward the following suggestions:

First, tackle conservation, then development. Most of the key villages of rural tourism often have unique architectural relics, folk culture, natural scenery, ecological environments, and other resources. However, due to their spatial proximity to central cities, especially in the context of the rapid development of new urbanization, the development and construction of these key rural tourism villages are bound to bring certain threats and impacts. This requires that the focus for rural tourism in development and construction adhere to the principle of protection priority and not unilaterally pursue economic benefits and ignore the protection of rural tourism resources and the ecological environment. At the same time, in the process of development, the relationship between indigenous people, developers, and tourists should be properly handled, and in the process of focusing on improving the quality of local residents, it is also necessary to appeal to them to maintain the authenticity of the countryside.

Second, use multiple marketing methods to strengthen publicity. In the Internet era, network tools have become an important carrier of rural tourism publicity. However, when using Internet tools to search the information of relevant key rural tourism villages, it is found that most of the key rural tourism villages lack tourism information or resources on the Internet, and only a few rural tourism key villages have a complete official website and real-time update. It shows that the existing marketing and publicity of the key rural tourism villages are still in the initial stages. Especially in the era of new media, Wechat, Weibo, TikTok, and Hornet's Nest enable every tourist to become a "voice". The key villages in rural tourism should change the traditional marketing model and concept with the help of new media tools. For example, TikTok is used to publicize, create microblog topic events, hold festival activities, and broadcast video live, etc. Finally, the promotion and publicity with the highest visibility can be achieved with a small investment so as to further attract tourists.

Third, rely on culture to develop products. Culture is the soul of rural tourism development, and a mature tourism product system is the skeleton of rural tourism. In the development and construction of key rural tourism villages, it is necessary to create tourism projects that are in line with their own cultural resources, such as sightseeing, leisure and entertainment, participation, and other tourism products at different levels. Taking sightseeing as an example, cultural sightseeing products such as characteristic ancient villages, ethnic costumes, handicrafts, wine and tea tastings, farming displays, and revolutionary relics can be designed. At the same time, the design of rural tourism products should meet aesthetic requirements. Be able to highlight features and clear themes. It is also necessary to pay attention to the integration of rural tourism and multi-dimensional cultures such as health culture, food culture, science and technology culture, and research culture so that the design and development of product projects can be innovative, improve cultural taste, and avoid the phenomenon of "thousands of villages are uniform".

Fourth, pay attention to the foundation and improve the service. According to the existing statistical results, it can be concluded that the key rural tourism villages in the country are relatively accessible. At present, the maintenance of existing road traffic should be strengthened to eliminate a series of problems affecting the image of rural tourism, such as road damage, unclear road traffic signs, and traffic disorder. At the same time, strengthen the construction of infrastructure such as parking lots, tourist toilets, signage systems, and ecological tour trails, and encourage qualified rural tourism key villages to build smart rural tourism demonstration sites. Strengthen the management and training of rural tourism practitioners. For example, the establishment of perfect rural tourism management rules and regulations to carry out rural tourism practitioners professional ethics, professional skills, social quality, and other basic quality training and professional skills training.

This paper systematically combs the spatial distribution characteristics and influencing factors of the key rural tourism villages in China, and reveals their spatial distribution characteristics and rules. However, due to the availability of research data and information, the scale structure and economic benefit analysis of key rural tourism villages need further attention in future studies.

Conclusions

By using the ArcGIS10.3 software and using spatial analysis and quantitative geography research methods such as nearest proximity index, equilibrium measurement, kernel density analysis, multi-distance spatial clustering, and hot spot analysis, this paper analyzes the spatial distribution characteristics and influencing factors of key rural tourism villages in China and draws the following conclusions:

1. The closest proximity index and the variation coefficient of the Voronoi polygon area both indicate that the spatial distribution type of key rural tourism villages in China is condensed. The geographical concentration index, Gini coefficient, and imbalance index show that the distribution of key rural tourism villages is relatively balanced at the provincial scale.

2. The spatial distribution of key rural tourism villages in China has formed a high-density distribution area with the core of Beijing-Tianjin-Hebei, South Jiangsu, southeast Anhui, northwest Zhejiang, and Shanghai, and a sub-core distribution area surrounded by central Anhui, southeast Hubei, northeast Guizhou, Sichuan, Chongqing, and northeast Fujian at the junction of central Gansu and Qinghai. On the whole, the key rural tourism villages in China show a spatial distribution pattern of "two cores, three plates, and the rest of the close clusters" and the characteristics of more east and less west, with more distribution in the edge and border areas of provinces and regions.

3. The hot spot analysis results show that the hot spot and cold spot regions of the key rural tourism villages in the country present obvious "cluster" distribution characteristics from east to west on the provincial scale.

4. By introducing the theory of cultural ecology into the study, it is found that the tourist market, resource endowment, social economy, population density, macro policy, and road traffic are the main factors affecting the spatial distribution of key rural tourism villages in China. In the process of developing rural tourism, it is necessary to accurately position its tourist source market, rely on its resources to develop products, and pay attention to the construction of infrastructure such as roads.

Conflict of Interest

The authors declare no conflict of interest.

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