Research papers

Comparison about the Spatial Distribution and Influencing Factors of Rural Settlements and Traditional Villages around the Yellow River Beach Area

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abstract

The surrounding area of the Yellow River beach area has an important ecological and strategic position. There are a large number of rural settlements and traditional villages with rich cultural and natural resources, making it a space carrier of a social-ecological complex system. How to grasp and understand the different spatial laws of different types of villages and their influencing factors, and then propose sustainable goals and strategies for the development of villages in beach areas, is an important topic in current research. This study uses multi-source geospatial and socio-economic data, with the help of geographic spatial indicators, to describe the spatial distribution similarities and differences between rural settlements and traditional villages within the beach area; use geographic detector tools to analyze the physical geography and socio-economic environment The degree of influence and interaction mechanism of all elements. The study found that the rural settlements and traditional villages around the Yellow River beach area showed a clustered distribution as a whole, but the two types of concentrated distribution areas did not overlap in space; the distribution of traditional villages between prefectures and cities had more significant imbalances , And is more closely related to the elements of the natural geographic environment; the physical geography around the Yellow River beach area has a strong correlation with the socio-economic environment, and the two work together on the spatial distribution pattern of the village. The study also discussed the influence of historical process, cultural radiation and policy intervention on the spatial distribution of the two types of villages.

keywords

Yellow River beach area; Rural settlements; Traditional villages; Spatial distribution; Influencing factors

1. Introduction

The Yellow River Beach Area refers to the floodplain formed by the rolling siltation of the riverbed between the Yellow River embankments (Pan et al., 2009), and is a place for flood discharge, flood detention, and sedimentation of the Yellow River. The surrounding space covers about 768km of beaches on both sides of the downstream river section, involving 15 cities in Henan and Shandong provinces in China. There are a large number of communities and residential areas around the Yellow River beach area, including dense rural residential areas, and national-level traditional villages with rich cultural and natural resources. Therefore, they are the space carriers of the social-ecological complex system (Ma., 2019). Since history, the Yellow River has created a rich and unique water source and cultural foundation for the villages in the beach areas on both sides of the bank, and at the same time threatened the ecological security of the

region (Zuo, 2019). Rural spaces such as traditional villages and rural residential areas around the Due to its important regional status and ecological significance, rural spaces such as traditional villages and rural settlements along this area (Zhang et al., 2020; Li et al, 2019) have also become key concerns in the two Chinese national strategies of rural revitalization, ecological protection of the Yellow River Basin, and high-quality development.

At present, the research on the Yellow River beaches by the disciplines related to urban and rural planning and landscape architecture can be classified into the following three types of paradigms. The first is to study the spatial distribution characteristics of villages in Henan and Shandong provinces, and there are more descriptions of the spatial morphology of typical village samples and explanations of their formation and development mechanisms (Liu, 2016; Wang, 2019; Huang, 2019; Li et al., 2018; Song et al, 2018). This type of research explores the dynamic law of spatial formation and evolution from the perspective of morphology, and attempts to describe the villages in a typified manner. However, most of the research scope is not aimed at the beach area, so it does not involve the special ecological evolution logic of the beach area. The second is to carry out research on the ecological space and production space around the Yellow River beach area (Zhang et al., 2008; Wang, 2009; Liang,2008), analyze the regional landscape pattern with the help of landscape ecology methods, and then guide the planning and design practice of ecological network and green space system at the regional scale (Li, 2020). This type of research has been influenced by the concept of resilient development in recent years, and some spatial evaluation systems with ecological security as the core goal have been formed (Li et al., 2021). The third is to carry out research on some non-material factors in the rural human settlement environment in the beach area, combining socio-economic statistics, field survey data and geospatial data to form basic research materials, and analyzing residents' local identity through quantitative methods. Organizational behavior and other soft environments (Zhang, 2017), which in turn provide suggestions for policies such as relocation, resettlement, and industrial development (Ding, 2014). It can be seen that the current research focuses on a relatively comprehensive coverage of various types of rural built environment and the surrounding natural and social environment; but at the same time, there are few spatial heterogeneities for the culture, nature, economy and other resources of the beach area. The multi-perspective comparative study is the key to deep understanding of the social-ecological complex system surrounding the beach area.

Rural residential areas are places where farmers rely on certain environmental conditions for production and life (Tian, 2002); the distribution space of traditional villages represents an area with excellent natural background and rich historical and cultural resources within a certain geographic range (Wang, 2020). This research compares the spatial pattern of rural settlements and traditional villages around the beach area, and then explores the development mechanisms and paths of different types of villages around the beach area, aiming to provide beneficial support for the spatial planning of rural revitalization around the Yellow River beach area.

2. Study area, data and methods

In this study, the study area was delimited by the administrative regions of the lower Yellow River flowing through the districts and counties (Figure 1). The eastern part of this area is located in the Huanghuaihai flood plain area in eastern Henan, and the western part is located at the junction of the western Shandong plain area and the mountainous and hilly area of central southern Shandong, and then enters the Yellow Sea through the northern Lubei plain. Among them, the Henan section covers an area of about 28169.05 km2, involving 32 districts and counties in 6 cities including Jiaozuo, Luoyang, Zhengzhou, Xinxiang, Kaifeng, and Puyang; the Shandong section covers an area of 31848.44 km2, involving Heze, Jining, Tai'an, Liaocheng, Jinan, and Dezhou 29 districts and counties in 9 cities, Zibo, Binzhou and Dongying. The study area has nurtured a heavy farming culture, there are a large number of rural settlements, and there are also a certain number of well-established traditional villages.

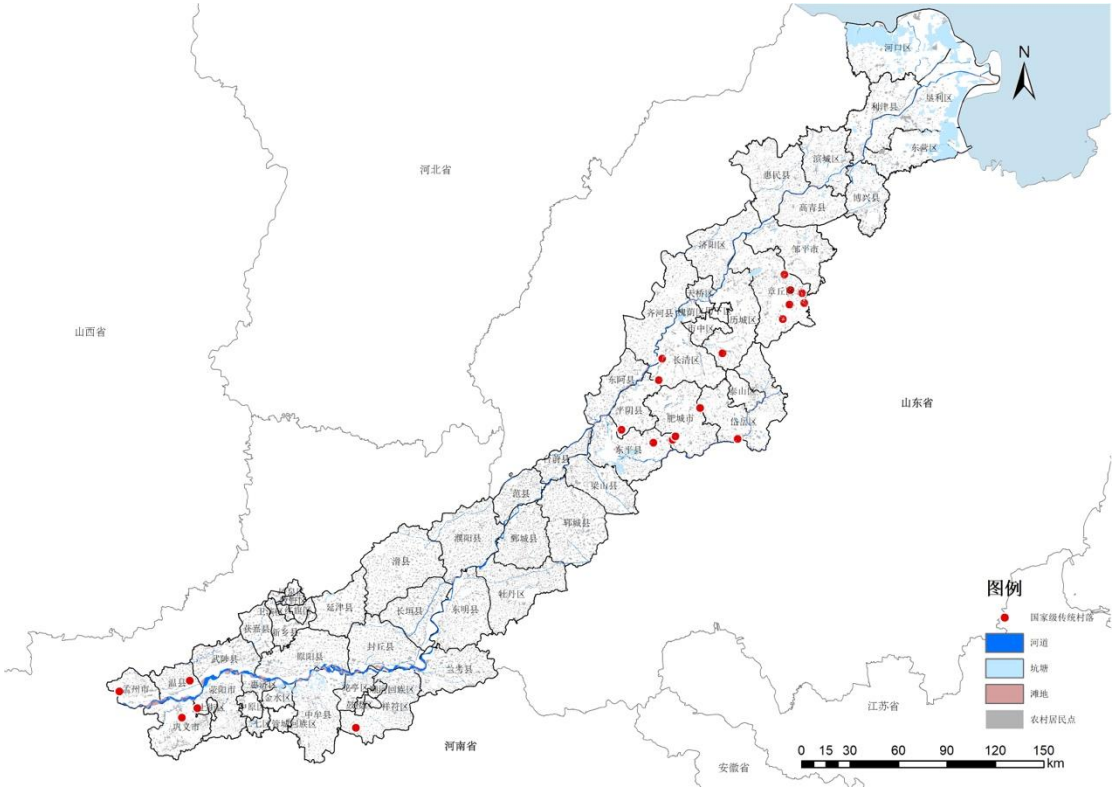

Figure 1. Study area

The spatial data used in this study mainly includes: The 2020 100m precision land use raster data released by the Resource and Environment Data Center of the Chinese Academy of Sciences, which is produced using Landsat TM/ETM remote sensing images in each phase as the main data source, and generated by manual visual interpretation The research scope is 30m precision DEM digital elevation data; the five batches of Chinese traditional village lists jointly issued by 6 ministries and commissions including the Ministry of Housing and Urban-Rural Development, use crawlers to obtain geographic spatial data of villages in the research scope through the Baidu map API interface; within the research scope Road traffic vector data. The demographic and economic data come from the 2020 Statistical Yearbook issued by the Henan and Shandong Provincial Statistics Bureau.

The study uses the spatial analysis function of ArcGIS 10.3 software to calculate the nearest neighbor index, geographic concentration index, nuclear density and other indicators, and to basically describe the spatial characteristics of rural residential areas and traditional villages. Furthermore, through the factor detection and interactive detection of geographic detectors, we try to explain the correlation factors behind the spatial distribution of the two.

3. Results

This study uses corresponding indicators to discuss the differences in spatial distribution between rural settlements and traditional villages around beach areas from three perspectives: spatial distribution types, spatial distribution balance, and spatial distribution patterns.

3.1. Type of spatial distribution

Average nearest neighbor analysis is a spatial analysis method of human geography, especially urban geography, which can compare the size of different data aggregation levels (Ren, 2014). The method is to measure the distance between the centroid of each element and the centroid position of its nearest neighbor, and then calculate the average of all these nearest neighbor distances. If the average value is less than 1 (that is, the average distance under the assumption of random distribution), the analyzed feature distribution will be regarded as a clustered feature; otherwise, the feature will be regarded as a scattered feature.

Using the Spatial Statistics Toolbox—Analysis Model Tool Set—Average Nearest Neighbor tool in ArcGIS 10.3 software to calculate the average nearest neighbor index of rural settlements and traditional villages within the Yellow River beach area respectively, the results obtained are as follows Table 1 shows. Among them, the NN (Nearest neighbor) value is the average of the nearest neighbor distance, the NNZ value represents the multiple of the standard deviation, and the p value represents the probability. The results show that the rural settlements and traditional villages around the beach area are characterized by agglomeration spatial distribution. In addition, the spatial distribution of traditional villages is clustered within the overall range of the beach area, but it shows scattered characteristics in the two provinces, and the Henan section is more prominent.

Table 1 Average nearest neighbor analysis

Type	Scope	NN	NNZ	P	Confidence
Rural settlements	The whole beach area	0.763	-67.928	0.000	99.0%
	The whole beach area	0.804	-1.674	0.094	90.0%
Traditional villages	Within Henan	2.812	7.752	0.000	99.0%
	Within Shandong	1.094	0.693	0.088	90.0%

3.2. Balance of spatial distribution

The disequilibrium index is a method of the degree of concentration of geographical research, which can measure the balance of the distribution of rural settlements and traditional villages in various districts and counties in the beach area (Yan et al., 2017). The imbalance index is related to the number of districts and counties in the study area n, and the cumulative percentage Yi of the number of elements contained within each district and county. The calculation method is as follows:

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

If the elements are uniformly distributed in each area, then S=0. After calculation, the geographic concentration of rural settlements around the beach area S1=0.06, and it can be considered that the spatial distribution of rural settlements in the beach area is more balanced within each district and county. The geographical concentration of traditional villages around the beach area is S2=0.25. Therefore, compared with rural residential areas, the spatial distribution of traditional villages in various districts and counties is relatively low.

Specifically, Huimin County, Qihe County, Daiyue District, Yuncheng County and Mudan District in Shandong Province, as well as Puyang County and Huaxian County of Henan Province account for a higher proportion of rural settlements (Table 2-1). The counties with a higher proportion of traditional villages are Zhangqiu District, Daiyue District, Changqing District, Feicheng City in Shandong Province, and Wen County

and Mengzhou City in Henan Province (Table 3). A horizontal comparison of the 12 districts and counties involved shows that only Daiyue District occupies a relatively high proportion.

Table 2 Statistics of rural settlements in each district and county (2021)

Province	District/County	Number	Pro %	Density pcs/km²	Province	District/County	Number	Pro %	Density pcs/km²
	Lijin	267	1.19%	0.25		Zhongyuan	57	0.25%	0.29
	Hekou	148	0.66%	0.07		Erqi	100	0.45%	0.64
	Kenli	236	1.05%	0.12		Guancheng	43	0.19%	0.21
	Dongying	140	0.63%	0.12		Jinshui	42	0.19%	0.17
	Boxing	324	1.45%	0.36		Shanjie	32	0.14%	0.56
	Bincheng	621	2.77%	0.60		Huiji	79	0.35%	0.34
	Huimin	976	4.36%	0.71		Zhongmu	574	2.56%	0.40
	Zouping	623	2.78%	0.50		Gongyi	479	2.14%	0.47
	Gaoqing	569	2.54%	0.68		Xingyang	634	2.83%	0.72
	Zhangqiu	677	3.02%	0.39		Longting	123	0.55%	0.31
	Jiyang	668	2.98%	0.62		Shunhe	34	0.15%	0.46
	Shizhong	44	0.20%	0.15		Gulou	27	0.12%	0.42
	Lixia	3	0.01%	0.03		Yuwangtai	22	0.10%	0.39
	Licheng	407	1.82%	0.31		Xiangfu	660	2.95%	0.54
	Tianqiao	96	0.43%	0.37	Henan	Lankao	479	2.14%	0.43
Shandong	Huaiyin	36	0.16%	0.24		Huaxian	811	3.62%	0.46
	Changqing	439	1.96%	0.36		Hongqi	39	0.17%	0.28
	Pingyin	249	1.11%	0.35		Weibin	18	0.08%	0.28
	Qihe	813	3.63%	0.58		Fengquan	21	0.09%	0.18
	Dong'e	334	1.49%	0.45		Muye	24	0.11%	0.25
	Feicheng	578	2.58%	0.45		XInxiang	114	0.51%	0.30
	Daiyue	906	4.05%	0.52		Huojia	173	0.77%	0.37
	Taishan	107	0.48%	0.32		Yuanyang	482	2.15%	0.38
	Dongping	584	2.61%	0.44		Yanjin	314	1.40%	0.35
	Liangshan	490	2.19%	0.51		Fengqiu	487	2.18%	0.40
	Huicheng	958	4.28%	0.59		Changyuan	489	2.18%	0.47
	Zhencheng	780	3.48%	0.75		Wushe	280	1.25%	0.34
	Mudan	1043	4.66%	0.73		Wenxian	204	0.91%	0.38
	Dongming	613	2.74%	0.47		Mengzhou	234	1.05%	0.45

Henan	Taiqian	262	1.17%	0.59		Fanxian	418	1.87%	0.69
	Puyang	902	4.03%	0.62					

Table 3 Statistics of traditional villages in each district and county

Province	District/County	Number	Pro %	Density pcs/km²	Province	District/County	Number	Pro %	Density pcs/km²
Shandong	Zhangqiu	6.00	0.30	0.003	Henan	Gongyi	1.00	0.05	0.001
	Licheng	1.00	0.05	0.001		Yingyang	1.00	0.05	0.001
	Changqing	2.00	0.10	0.002		Xiangfu	1.00	0.05	0.001
	Pingyin	1.00	0.05	0.001		Wen	1.00	0.05	0.002
	Feicheng	2.00	0.10	0.002		Mengzhou	1.00	0.05	0.002
	Daiyue	2.00	0.10	0.001					
	Dongping	1.00	0.05	0.001					

3.3 Pattern of spatial distribution

Kernel density represents the probability of occurrence of a certain event in different geographic spaces. Because it considers the location influence of the first law of geography, it has certain advantages in spatial analysis (Yu et al., 2015). Using the spatial analysis toolbox—density analysis—kernel density analysis tool in ArcGIS 10.3 software, using 2000m and 5000m as the search radius to analyze the nuclear density of rural settlements and traditional villages around the beach area, and the results are as follows as shown in Figure 2.

It can be seen that the distribution pattern of rural settlements around the beach area generally presents three concentrated and contiguous distributions, which are located in the western, central and eastern part of the beach area. Among them, it is most concentrated in the area at the junction of Henan and Shandong. It is distributed continuously in the north side of the Yellow River in the Shandong section, and is also concentrated and relatively large in the south side of the Yellow River in the western section of Henan. In addition, there is also a relatively concentrated distribution in the southern part of Shandong. The spatial distribution of traditional villages is centered in the middle part of Shandong, and there is also a secondary core in western Henan. The distribution of areas outside is basically blank, and the spatial distribution is uneven. It can be seen that the distribution centers of traditional villages and rural settlements in the beach area do not overlap with each other, and this rule is particularly significant in the Shandong section.

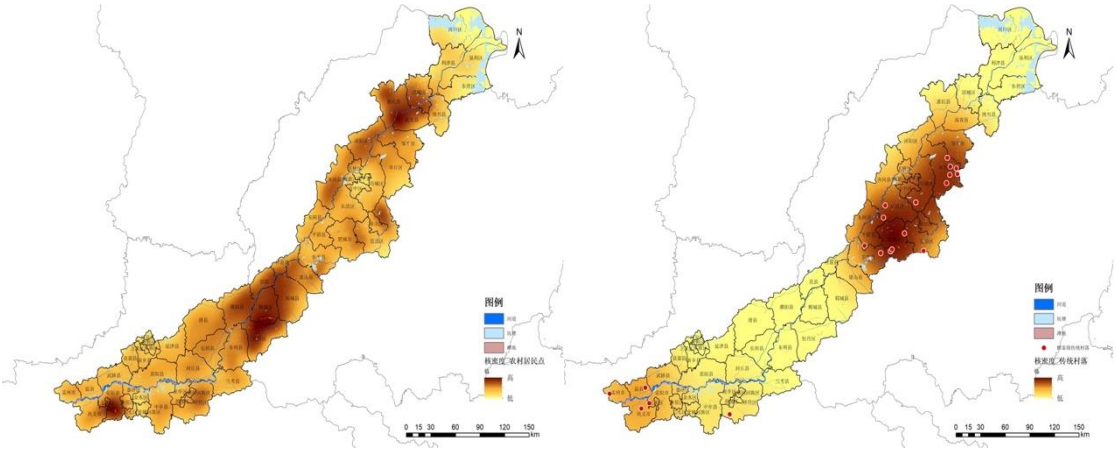

Figure 2 Kernel density analysis of rural settlements (left) and traditional villages (right)

4. Conclusion

The spatial distribution and morphology of residential areas are the result of the combined effects of multiple factors contained in the natural geographic environment and the socio-economic environment. In this study, the impact of various related factors around the beach area was specifically verified and compared and analyzed.

Geo detector is a statistical method to detect spatial differentiation and explain the driving factors behind it (Tong, 2014). It can test the coupling relationship between the dependent variable (spatial distribution) and the independent variable (environment), and then evaluate the explanatory power of different environmental factors to the spatial distribution, and it can also analyze the interaction between the dependent variables on the dependent variable (Wang et al., 2016). This study uses geographic detector tools to test the significance and degree of influence of various factors affecting the spatial distribution of rural settlements and traditional villages in beach areas, and compare the two.

Taking into account the availability of data and combining the characteristics of beach areas, the natural geographic environment is divided into altitude and water network density, and the socio-economic environment is divided into road density, population density, and per capita disposable income of rural residents. Five independent variables. The nuclear density of rural residential areas and the nuclear density of traditional villages were respectively used as dependent variables.

The results of factor detection (Table 4) show that the five environmental factors have a significant impact on the spatial distribution of rural settlements, among which the socio-economic environment has a high degree of influence on the distribution of rural settlements; at the same time, there is no evidence that road density It has a significant impact on the spatial differentiation of traditional villages, and the natural geographic environment is more closely related to the spatial distribution of traditional villages. The results of the interaction detection (Table 5) show that the influence of the interaction of the two factors is greater than the influence of the individual factors, and the pairwise interaction of most factors is greater than the sum of the forces of the two factors, indicating that, on the whole, There is a strong correlation between the physical geography and the socio-economic environment around the Yellow River beach area, and the two influence each other and work together on the spatial distribution pattern of the village.

Table 4 Impact factor detection

Dependent variable		Physical geography			Social economy	
		X1: Terrain	*X2: River*	*X3: Road*	*X4: Per capita disposable income of farmers*	*X5: The population density*
Y1: Spatial distribution of rural settlements	*q1*	0.096	0.065	0.065	**0.206**	**0.282**
	p1	***	***	***	***	***
Y2: Spatial distribution of traditional villages	*q2*	**0.372**	0.052	0.009	0.201	0.141
	p2	***	***	0.017	***	***

*p < 0.1, ** p < 0.05, *** p < 0.01

Table 5 Interactive detection

Interaction factor	*Y1*		*Y2*	
	q1 (A ∩ B)	Interaction	*q2 (A ∩ B)*	Interaction
X1 ∩ X4	0.311	*q*(*X1*∩*X4*) > *q*(*X1*)+ *q*(*X4*)	0.507	*q*(*X1*∩*X4*) > Max(*q*(*X1*), *q*(*X4*))
X1 ∩ X5	0.353	*q*(*X1* ∩ *X5*) > Max(*q*(*X1*), *q*(*X5*))	0.524	*q*(*X1* ∩ *X5*) > *q*(*X1*)+ *q*(*X5*)
X1 ∩ X2	0.208	*q*(*X1*∩*X2*) > *q*(*X1*)+ *q*(*X2*)	0.426	*q*(*X1*∩*X2*) > *q*(*X1*)+ *q*(*X2*)
X1 ∩ X3	0.276	*q*(*X1*∩*X3*) > *q*(*X1*)+ *q*(*X3*)	0.456	*q*(*X1*∩*X3*) > *q*(*X1*)+ *q*(*X3*)
X4 ∩ X5	0.469	*q*(*X4*∩*X5*) > Max(*q*(*X4*), *q*(*X5*))	0.371	*q*(*X4*∩*X5*) > *q*(*X4*)+ *q*(*X5*)
X4 ∩ X2	0.277	*q*(*X4*∩*X2*) > *q*(*X4*)+ *q*(*X2*)	0.286	*q*(*X4*∩*X2*) > *q*(*X4*)+ *q*(*X2*)
X4 ∩ X3	0.347	*q*(*X4*∩*X3*) > *q*(*X4*)+ *q*(*X3*)	0.285	*q*(*X4*∩*X3*) > *q*(*X4*)+ *q*(*X3*)
X5 ∩ X2	0.349	*q*(*X5*∩*X2*) > *q*(*X5*)+ *q*(*X2*)	0.199	*q*(*X5*∩*X2*) > *q*(*X5*)+ *q*(*X2*)
X5 ∩ X3	0.384	*q*(*X5*∩*X3*) > *q*(*X5*)+ *q*(*X3*)	0.192	*q*(*X5*∩*X3*) > *q*(*X5*)+ *q*(*X3*)
X2 ∩ X3	0.176	*q*(*X2*∩*X3*) > *q*(*X2*)+ *q*(*X3*)	0.126	*q*(*X2*∩*X3*) > *q*(*X2*)+ *q*(*X3*)

4.1 Terrain

The terrain elements around the beach area are closely related to the spatial distribution of traditional villages, and they are also an important natural geographic factor that affects the spatial distribution of rural settlements. Superimposing the locations of traditional villages and rural settlements on the topographic map of the beach area (Figure 3) shows that most traditional villages are located in areas where elevation changes, and almost all traditional villages are above 100m above sea level. Even in the beach area formed by water power, more traditional cultural landscape resources still present a more concentrated distribution in areas with large topographic changes. In Shandong Province, this feature is particularly prominent. Combined with the nuclear density map, it can also be seen that the possible distribution cores of traditional villages and hilly areas above 200m are highly coincident in space. The distribution cores of rural settlements are all located in areas below 100m above sea level.

In northern China, the distribution of farmland is not constrained by broken terrain, so it is mostly cultivated in contiguous flat areas (Wang et al., 2017). These places are convenient to divert water for irrigation and are more suitable for early agricultural development. With the improvement of productivity, flat land is also suitable for mechanized large-scale production. As a result, more rural settlements are distributed in the area, reaching altitude and flat areas.

Existing studies have proved the correlation between the topography and characteristic villages in various regions of China, that is, rich landform features and livable altitude are conducive to the formation of rural characteristics (Yin et al., 2010; Li, 2015; Wang et al., 2016). This study proves that the spatial distribution of traditional villages around the Yellow River beach area also conforms to this general law. It is worth noting that if we discuss from the perspective of strict definition, the geographic scope of the Yellow River beach area does not involve these higher altitude zones, but discussing this issue within the scope of the administrative region will be more conducive to the overall planning of the rural space in the auxiliary region.

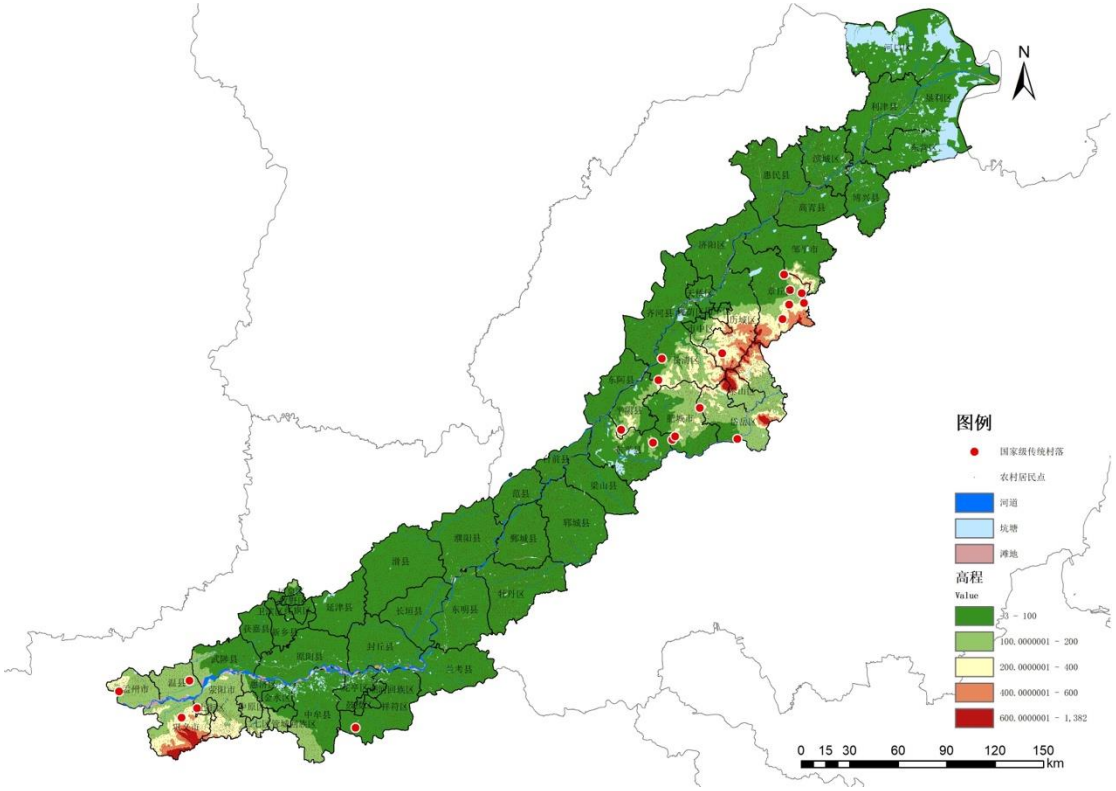

Figure 3 Topography and village points of the Yellow River beach area

4.2 Water system

Beach area is a special physical relationship between water and land, and water is the driving force and material basis for its formation. Therefore, the water system is an important focus for studying the driving factors of the spatial layout of settlements around beach areas. By superimposing the water system in the study area on the nuclear density distribution map of rural residential areas (Figure 4), it can be seen that several distribution cores of rural residential areas are distributed along the main channel of the Yellow River, and there is a clear direction of development along the river, indicating The main channel of the Yellow River is the key motivation for the formation and development of rural settlements surrounding the beach area. In terms of traditional villages, the four traditional villages surrounding the beach area in Henan Province are all located within a 5km buffer area on both sides of the main river. There are only two

traditional villages (Shuangru Village and Fangyu Village in Jinan City) around the beach area in Shandong Province. In this range. The possible reason is that the lower reaches of the river are more affected by flooding and diversion, and the stability of the surrounding land is lower. It is worth pointing out that the water system developed in the mountains in the southern part of the Yellow River flows into the Yellow River to the north. There are more traditional villages on both sides of these tributaries, which can still reflect the support role of the water system in the long-term development of settlements.

Researchers recognize that as a severely threatened ecosystem, rivers are facing multiple pressures across different time and space scales (Best, 2019; Weigelhofer et al., 2021). However, some rural settlements closely related to rivers can still maintain their distinctive locality in terms of traditional spatial pattern and culture, and show strong resilience under the challenge of environmental changes (Adams, 1993; Goldstein et al., 2011; Komakech et al., 2011; Meng et al., 2019). China is one of the countries with the most rivers in the world. In the northern region, the residents of the villages surrounding the Yellow River beach area have taken the initiative to transform and use water resources, which also reflects the ability of the people in the beach area to adapt to the changing water environment. The traditional villages distributed along the Yellow River provide precious learning samples for the ecological wisdom of water adaptability.

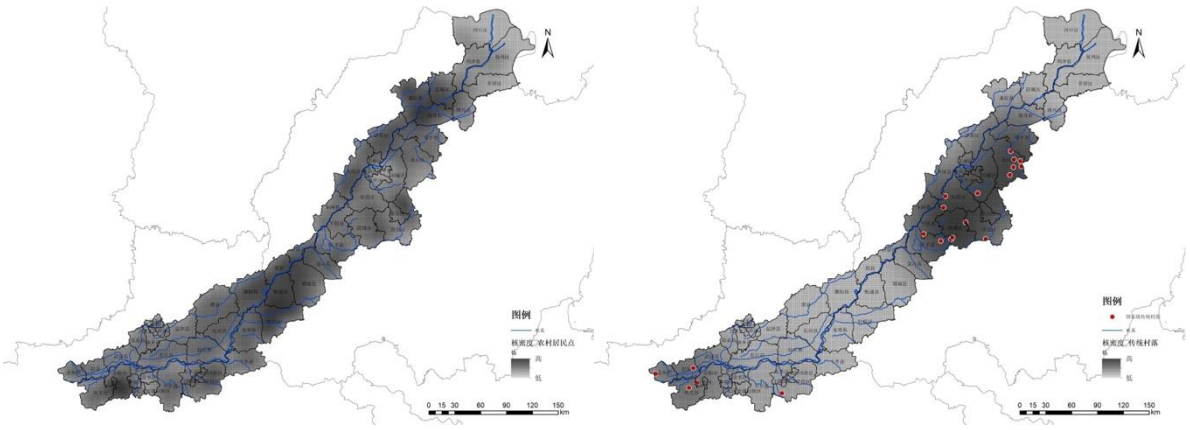

Figure 4 Rivernet and village points of the Yellow River beach area

4.3 Traffic

Traffic is the basis of material exchange and population flow. The development degree of traffic can reflect the regional economic development level to a certain extent. The factor detection did not find that the road density can have a significant impact on the spatial distribution of the two types of villages. The following discusses the relationship between the highway, National Road, provincial road and county road networks around the Yellow River beach area and traditional villages and rural residential areas respectively.

The points of the traditional villages are superimposed on the road network map (Figure 5). It can be seen that the traditional villages within the Yellow River beach area are all located within the radiation range of the transportation infrastructure, that is, wherever they are located, they have convenient transportation conditions. Traditional villages did not show a tendency to be close to a certain class of roads, which is related to the relatively developed road network and flat terrain in Shandong and Henan provinces. For rural residential areas, the distribution core is obviously closely related to provincial roads. The provincial road network covers a large area, and connects the upper and lower levels of roads, providing infrastructure guarantee for the active foreign exchanges of the rural settlements in the beach area.

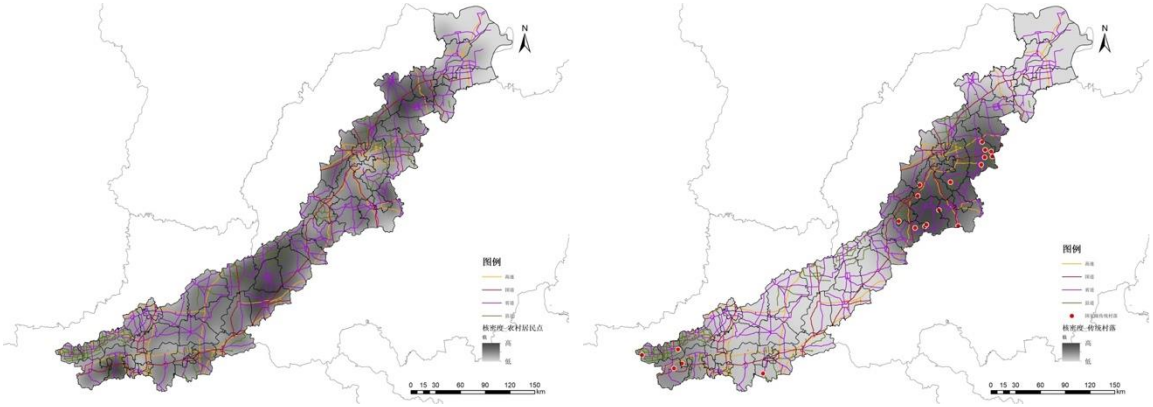

Figure 5 Road network and village points in the Yellow River beach area

4.4 Per capita disposable income and population density of rural residents

The population density of the surrounding districts and counties of the Yellow River beach area (Figure 5) and the per capita disposable income of rural residents (Figure 6) were visualized separately, and the locations of traditional villages and rural residents were superimposed for analysis.

From the perspective of population density, except for the district-level administrative units around the beach area, the population density of each county is relatively even, indicating that the regional population is the basis for the protection and inheritance of traditional villages, but there is no obvious correlation (Kang, 2016). From the perspective of the per capita disposable income of farmers, the per capita disposable income of rural villages in the districts and counties where the traditional villages are located is 1.46-2.30 million yuan, which is similar to the value of the province's rural per capita disposable income in 2020 (18,700 yuan, respectively) in Shandong and Henan provinces. , 11,600 yuan), the overall level is at or above the regional average. In contrast, the core area of rural settlements spatially overlaps with the lower-middle disposable income of rural residential areas, which to a certain extent reflects those traditional villages and surrounding areas around beach areas have better incomes. On the one hand, abundant arable land resources provide farmers with basic economic security; on the other hand, large-scale forest land resources and tourism and cultural resources can bring more economic income to the region. Therefore, the wider beaches and villages should understand and make use of the differences in their natural and cultural resources and surrounding areas, and focus on designing the realization path of local characteristic industries.

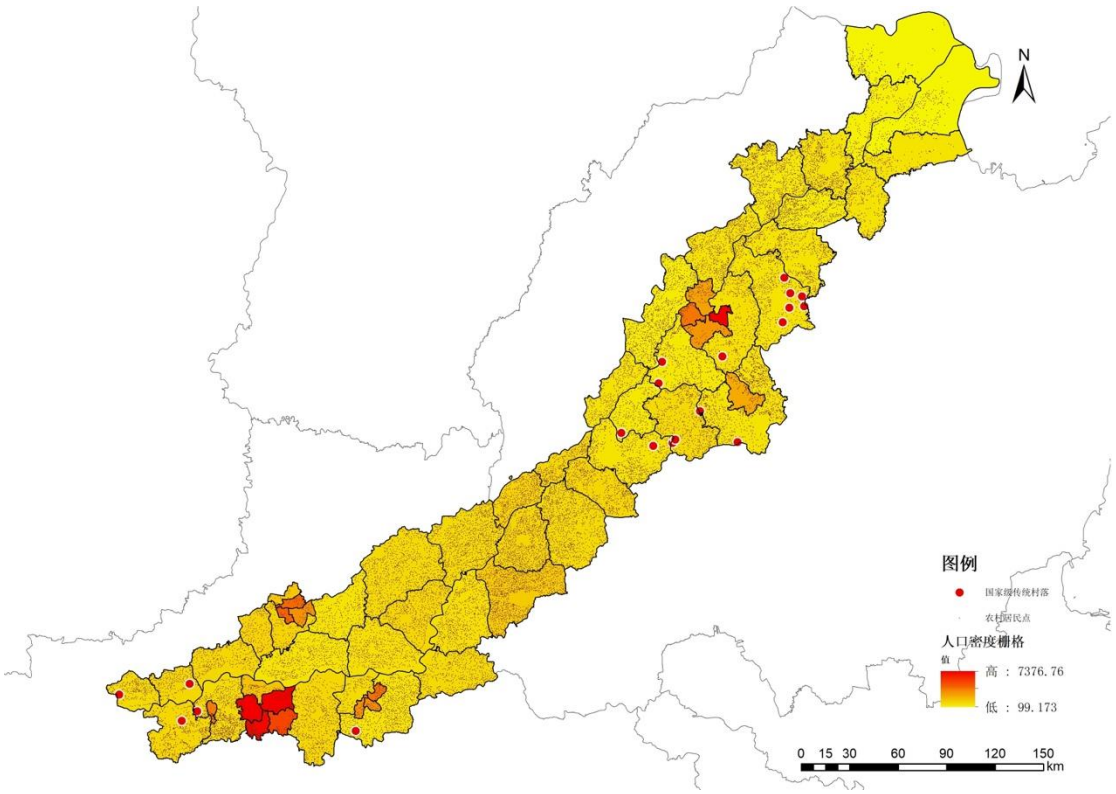

Figure 5 Population density and villages in the Yellow River beach area

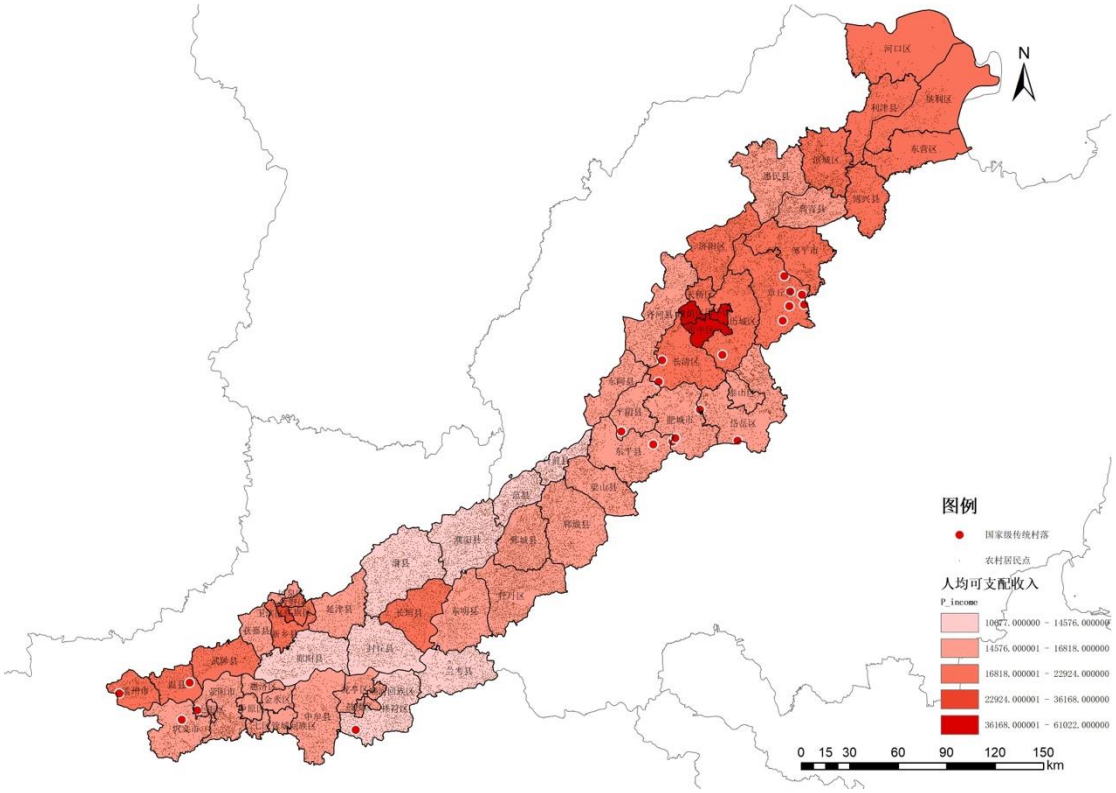

Figure 6 Farmers' per capita disposable income and villages in the Yellow River beach area

4.5 Historical factors and policy orientation

In addition to physical geography and socio-economic factors, historical reasons and policy guidance also affect the spatial pattern of rural settlements and traditional villages in beach areas. The middle and lower reaches of the Yellow River in Henan Province is the location of the Central Plains, which has always held an important military strategic position in history. Especially under the influence of the Song-Yuan War and the Song-Jin War, there have been several large-scale population migrations [7]. For this reason, the traditional cultural landscapes of the villages have not been protected and survived for a long time, so there are few traditional villages distributed.

For a long time, the Yellow River has made natural contributions to the coastal ecology, and at the same time, the flooding has threatened the ecological security of the rural spaces in the beach areas on both sides of the bank. Affected by factors such as the threat of flooding during the flood season, the infrastructure of the beach area is relatively weak, and the economic and social development is relatively backward (Xu, 2019). After the founding of the People's Republic of China, under the firm determination and thinking of governance, the Yellow River governance technology has made progress, and the party and people creatively fulfilled the historic task of governance of the Yellow River (Zhang, 2021). Many rural settlements have achieved relatively stable development in the past half a century. At present, the party and the state have made important new arrangements for the construction of ecological civilization in the Yellow River Basin. In the Yellow River Beach Resident Relocation Projects implemented in Shandong and Henan provinces, the Yellow River Beach Resident Resettlement Community will be built to help millions of beach residents stay away from floods and at the same time drive the development of infrastructure and public service facilities. Land circulation and community layout under the policy intervention model also affect the spatial pattern of rural settlements around beach areas.

5. Discussion

The effect of natural geographic factors on rural space and the re-arrangement and adjustment of rural space by human factors have jointly triggered and interfered with the spatial layout of traditional villages and rural settlements around the Yellow River beach area. Based on the comparative study of the spatial distribution and influencing factors of rural settlements and traditional villages in the Yellow River beach area, this study has reached the following conclusions: 1. The rural settlements and traditional villages around the beach area are generally distributed in an agglomeration pattern, but in inter-provincial areas There are differences between them; two, there are three concentrated distribution areas in rural settlements, traditional villages have one main and two concentrated distribution areas, and the two types of concentrated distribution areas do not overlap in space; third, compared with rural settlements, traditional villages There is a more significant imbalance in the distribution between prefectures and cities; fourth, the natural geographic environment has a more significant impact on the spatial pattern of traditional villages, but the natural geographic and socio-economic environment around the Yellow River beach area has a strong overall Correlation, the two together affect the spatial distribution pattern of villages.

The "Strategic Plan for Rural Revitalization (2018-2022)" promulgated by the Chinese government proposes to classify and advance according to the development status, location conditions, and resource endowments of different villages, according to the ideas of agglomeration promotion, integration into towns, characteristic protection, relocation and relocation Rural revitalization, and the village is divided into four types of villages: agglomeration and promotion, suburban integration, characteristic protection, and relocation and merger. At present, the surrounding villages in the Yellow River beach area have basically completed the relocation and relocation. The classification and development of the remaining three types of villages still have to go through a period of running-in process, and accumulate experience

in research and practice, and build a long-term mechanism for rural spatial development. At the same time, avoid homogeneous and unbalanced development in rural areas. It should be pointed out that this research still has a lot of room for improvement in the multi-source data, but from the perspective of research ideas and methods, it can provide support for the development goals and strategies of typified villages around beach areas.

6. References

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