

Spatial morphology evolution of rural settlements induced by tourism:

A comparative study of three villages in Yesanpo tourism area, China

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Abstract: Rural tourism has become an important driving force of rural urbanization in China. As the main reception base and important tourism attraction, tourism village is the core element of the tourism destination system. Integrating the method of PRA (Participatory Rural Assessment), GIS technology and high-resolution remote sensing images, this study aims to analyze the spatial morphology evolution of rural settlements induced by tourism through a comparative study of three tourism villages in Yesanpo tourism area. The results suggest the emergence of a “core-periphery” pattern of the spatial evolution of rural settlements. The closer to the core scenic spot, the higher degree of land-use intensity the village shows, as well as the more mature tourism function and greater change in landscape pattern. In particular, Gougezhuang shows an increase of the floor area ratio from 0.17 to 0.44, with the most mature tourism function and the lowest authenticity index of 0.448. Liujiage has gone through the largest increase in construction land area from 17.3564 ha to 34.1128 ha, with moderately mature tourism function and relatively stable authenticity index of 0.566. Shangzhuang has the lowest construction land scale and intensity, with the poorest tourism function and most well-preserved landscape authenticity index of 0.942. Overall, in terms of the spatial morphology, the three villages show the characteristics of “modern town”, “semi-urbanization” and “traditional village” respectively, in corresponding to three land development types: “intensive reconstruction type”, “enclave extension type” and “in situ utilization type”. The spatial evolution patterns of these three villages imply the spatial characteristics of the touristization of traditional villages in different stages, and also have great representative value for the management of rural settlements in tourism areas in China.

Keywords: rural settlements; land use; spatial evolution; Yesanpo tourism area

1 Introduction

Since the implementation of reform and opening-up policy, China has gone through a rapid

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urbanization and industrialization process (Liu *et al.*, 2010a; Long *et al.*, 2012). This process has resulted in a rapid and far-reaching transition development of rural China, which is often referred to as rural transformation development (RTD). During the RTD process, traditional villages have been reshaped into different directions, which are accompanied with the land-use change, especially the changes of arable and residential land (Liu *et al.*, 2004; Long *et al.*, 2009a; Vos and Meekes, 1999). On the one hand, most of the traditional agriculture-dominated villages are gradually declining and becoming blighted by depopulation and the abandonment of buildings and land, which is called “village-hollowing” in China similar to the “Dying Village” in Europe (Long *et al.*, 2011). On the other hand, with the introduction and development of various industries in rural areas, some new types of villages (industry-dominated rural development type (IDT), rural development type focusing on business, tourism and services industries (BTT), and balanced rural development type (BDT)) are constantly emerging and have become the main forms of rural urbanization in China (Long *et al.*, 2009b). Tourism village in China has become an important new development type in rural China (Long *et al.*, 2009a). Different from other new types of villages, tourism villages are often in remote, backward regions, where tourism is always the principal driving force for local urbanization and RTD. Therefore, interpreting tourism influences on urbanization has important theoretical value to summarize rural urbanization and the processes of RTD in China. However, current studies on land-use change in rural China mainly focus on the agriculture-dominated villages, especially the hollowing villages (Cheng *et al.*, 2001; Feng and Chen, 2003; Lei, 2002; Li and Li, 2008; Long and Li, 2012; Wang *et al.*, 2005; Xu, 2004; Xue, 2001; Xue and Wu, 2001), paying little attention to new-type villages, which, to some extent, impedes a better comprehension of the rural urbanization process with Chinese characteristics during the last 30 years. Besides, volumes have been written on the tourism evolutionary models, including the widely popular lifecycle concept (Agarwal, 2001; Bulter, 1980; Papatheodorou, 2004), the core-peripheral structures (Christaller, 1963; Zurick, 1992), the morphology of attractions, destinations, and specialized resorts (Jansen-Verbeke, 1986; Leiper, 1990; Pearce, 1999), and the forms, functions, and expansion of resorts (Middleton, 1982; Pearce, 1978). However, these studies are mainly concerning on evolution process of the tourism area, attention to spatial evolution of rural settlements in the tourism area are scant. Thus, the summary of new urbanization in China and an understanding of tourism destination system’s evolution are limited. Based on these considerations, this study takes three tourism villages in Yesanpo tourism area as examples, with the concept of land use and spatial morphology evolution, trying to interpret the following questions: (1) What is the difference on the spatial expansion pattern of rural settlement in different tourism regions? (2) What is the driving force leading to these differences? (3) What is the policy implication behind the rural settlement spatial evolution pattern?

2 Rural tourism and land-use policy in China

Tourism has been frequently regarded as an alternative option for rural development and rural regeneration where traditional industries decline, no matter in developed or developing countries (Baležentis *et al.*, 2012; Lee *et al.*, 2013; Panyik *et al.*, 2011; Park *et al.*, 2012; Su, 2011). Rural tourism (RT) has become one of the most important drivers in rural urbaniza-

tion and RTD in China over the past 30 years (Long *et al.*, 2009b). According to statistics from China National Tourism Administration, rural tourism areas nationwide had received and entertained approximately 720 million tourists as of 2012, creating 216 billion RMB yuan in revenue, with approximately 85,000 villages engaged throughout 31 provinces (autonomous regions and municipalities) of China (Sun *et al.*, 2011). Rural tourism has significant effects on generating farmers' income and human capital, promoting local employment, optimizing rural economic structure, protecting rural environment, inheriting traditional rural culture, pleasing urban and rural residents and strengthening urban-rural communications (Su *et al.*, 2011).

The tourism village, as a crucial component of rural tourism attraction, dates back to the 1980s of 20th century, first appearing in the suburb of Chengdu (home of the panda) in western China, in the form of "Nongjiale" (Happy Farmer Home) (Su, 2011). With the increasing tourism demand, a series of RT-promoted activities were created by the China National Tourism Administration (CNTA), including "China Rural Tourism Year 1998," "China Eco-tourism Year 1999" and "Chinese Life Tourism Year 2004". In 2007, the CNTA and Ministry of Agriculture of China (CMOA) jointly launched the "Chinese Harmonious Urban and Rural Tours" project and "Rural Tourism Development Program (2009–2015)" aimed at building 1000 demonstrative tourist towns, 10 thousands demonstrative tourism villages, and achieving 771 million tourist visits. As a result, the number of rural communities has greatly increased in pursuit of different forms of RT, particularly "Nongjiale", the local agglomeration of which has fostered the continuous formation of tourism villages. Tourism villages have also developed into various spatial patterns, such as city-attached, scenic region-attached, traffic networks-attached and independent tourism destinations.

Rural tourism actually is the incorporation of agriculture and tourism and it has inevitable relation with rural land (Cheer *et al.*, 2013; Kytzia *et al.*, 2011; Maguigad, 2013). Obviously, the expansion of rural tourism has incurred huge demands in recreational land use and changes in the traditional land-use pattern. Tourism is one of the more dynamic and complex sets of land use. The strong growth in tourism land use has been accompanied by changes in form and distribution and its relationships to other land uses (Nelson, 2001; Nepal, 2007; Wall, 1996; Williams and Shaw, 2009; Xi *et al.*, 2011).

However, two types of land ownerships, namely, state and collective land coexist in the current land administration system in China. Land for rural tourism belongs to collective-owned land which bears the agricultural production, life safeguard and many other functions. Because of the incomplete property rights and policy limitations, in many areas, rural collective-owned land is in a spontaneous, scattered and chaotic state when it is used for rural tourism in the way of land-circulation. In the process, the farmers' revenue is often ignored, their benefits are seriously impaired; some farmers abuse their residential houses to gain greater profits. At the same time, the invisible land circulation market in rural tourism development can lead to the decline of cultivated land, the imbalance of land-use structure, the uncontrolled expansion of urban areas, etc. In a word, the design of land system may hamper rural tourism development. Moreover, for residential land, it is welfare for farmers. Farmers have the right to use their residential land to build new houses for commercial tourism activities, but the old ones must be pulled down, leading to the disappearance of architectural culture. Therefore the competition between welfare-oriented residential and

profit-oriented commercial land and the contradiction between economic development and environment protection have resulted in severe conflicts among local governments, enterprises, villagers and other stakeholders (Wu *et al.*, 2013), leading to a profound negative impact on the development of tourism villages. Above all, in the medium-term industrialization and urbanization, tourism demand is still increasing year by year. Therefore, how to coordinate rural tourism development and land use via land circulation policy deserves more attention.

3 Materials and methods

3.1 Study area

The study villages are located in Yesanpo tourism area (115.16°–115.30°E, 39.35°–39.40°N), which is a famous tourist resort in northern China, 100 km away from Beijing, with mountainous and hilly landforms and a total area of 498.5 km², including 6 independent tourism regions, among which Bailixia canyon is the main attraction (Figure 1). Yesanpo was designated as a five-star (5A) tourism area by CNTA in 2011. It has rich tourism resources, such as steep canyons and beautiful rivers, which is quite popular with Beijing citizens because of the well-preserved eco-environment and proximity. Yesanpo had received 2.24 million tourists and generated 670 million RMB yuan in revenue as of 2011. We choose these three villages as study cases based on the following considerations: (1) They have all played important roles in providing tourism services and all have been designated as national demonstrated sites of rural tourism. (2) They have different locations, with Gougezhuang village 2 km away from the entrance of Bailixia canyon in the north, Liujahe village 4 km in the east

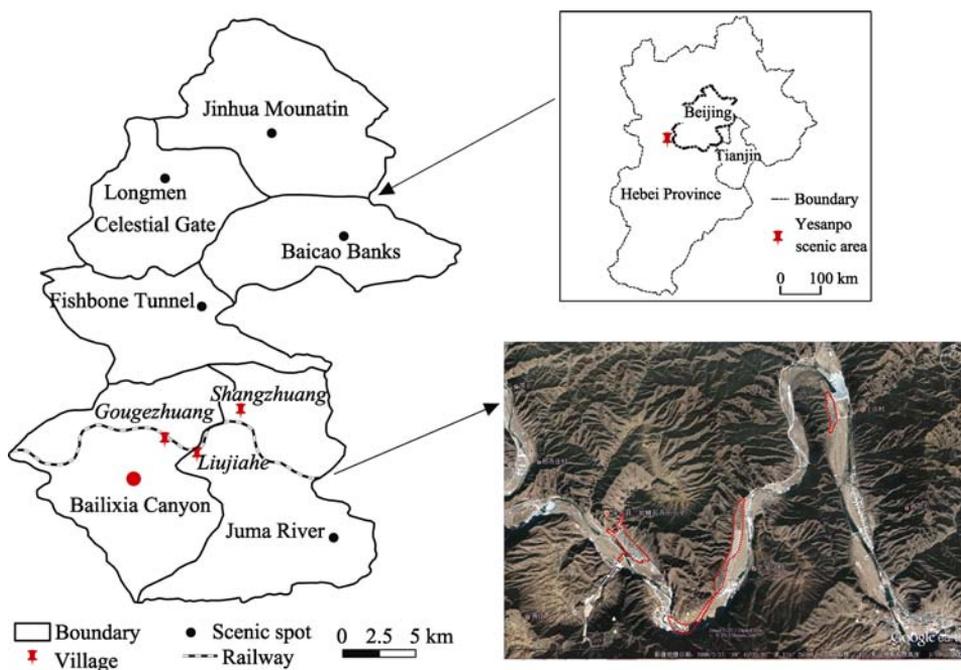


Figure 1 The location of the study villages

and Shangzhuang village 6 km in the northeast. (3) The development levels and stages of rural tourism in the three villages are different from each other. Gougezhuang village, with the highest development level, firstly started to engage in rural tourism in 1986; rural tourism in Liujiahe village dates back to 2004, with a moderate level of development; while Shangzhuang village has not involved in tourism until 2007, with the lowest development level currently. In other words, the three villages are representative for all the villages in Yesanpo tourism area with different development stages, thus the study on their spatial evolution processes is supposed to indicate the impacts of rural tourism on land-use pattern in tourism villages. The outline of the three villages is shown in Table 1.

Table 1 The outline of the three villages (2010)

Village	Household number	Labor number	Number of tourism employees	Per capita income (yuan/person)	Distance to the Bailixia Canyon scenic area (km)
Gougezhuang	542	446	942	6500	0.5
Liujiahe	159	177	178	5500	2
Shangzhuang	202	191	86	4200	7.5

3.2 Data sources

Based on a survey about the tourism development of Yesanpo in 2010, we did a supplementary investigation between January and April of 2013 to update the information. Both qualitative and quantitative data were collected using primary and secondary data sources. The main tool used to collect primary data was the Participatory Rural Appraisal (PRA) method. Secondary data sources on the land-use evolution of the three villages were also used and it comprised published and unpublished literature on tourism development and land-use change in the Yesanpo tourism area, including policy documents, journal articles, land-use map (1:2000) of 2007 provided by local governments and high-resolution remote sensing image from Google earth. The detailed data acquisition process and tourist village land-use classification are available in the reference (Xi *et al.*, 2011).

3.3 Geographical analysis

Land use is a dynamic process representing the way and purpose of land use and can be elaborated from three aspects: land-use spatial expansion, land function change and the resultant landscape alteration. Land-use change from 1986 to 2010 was analyzed with ArcGIS9.3, combining the cartographic and census data sources previously described. To elucidate the characteristics of land-use change in various stages, we adopted the following indices.

3.3.1 Land-use spatial expansion of rural settlement

In this paper, the speed and intensity of spatial expansion of construction land are quantified from both horizontal and vertical dimensions.

(1) Land-use dynamic index (K) is used to represent the extent to which the construction lands horizontally has expanded during a certain period of time (Sun *et al.*, 2011). It can be calculated as follows:

$$K = \frac{U_b - U_a}{U_a} \times \frac{1}{T} \times 100 \quad (1)$$

where U_b and U_a respectively stand for the area of construction land at the initial and final time points; T is the length of the study period (a).

(2) Floor area ratio (F) is the ratio of buildings' total floor area to the size of the piece of land upon which they are built (Zou, 1994). It can be used to represent the land-use intensity of research area, and it is calculated as follows:

$$F = R / H \quad (2)$$

where R refers to the total covered area on all floors of all buildings on a certain plot and H is the area of the plot.

3.3.2 Land-use function change of rural settlement

Value of the functional change (IV), represents how important a certain type of land function change is compared with other types in the research area and can be used to reveal the dominant trend of land function change (Zhu *et al.*, 2001). This index can be calculated as follows:

$$IV = \left(\frac{D_i}{D} + \frac{B_i}{B} \right) \times 100\% \quad (3)$$

where D_i is the spot number of a certain kind type; D is the spot number of all kinds of changes; B_i is the area of a certain change and B is the total area of all kinds of changes.

3.3.3 Landscape change of rural settlement

Landscape change in this paper mainly refers to the villages' spatial morphology change, which can be defined by quoting the definition of authenticity and integrity that are widely applied to cultural heritage studies. Authenticity is a measure of the degree to which the values of a heritage property may be understood to be truthfully, genuinely and credibly. Generally speaking, it mainly includes form and design, materials and substance, use and function, traditions, techniques and management systems, location and setting, language, and so on (Chhabra *et al.*, 2003; Daugstad and Kirchengast, 2013). Integrity is a measure of the wholeness and intactness of the natural or cultural heritage and its attributes. Examining the conditions of integrity requires assessing the extent to which the property: (a) includes all elements necessary to express its outstanding universal value; (b) is of adequate size to ensure the complete representation of the features and processes which convey the property's significance; (c) suffers from adverse effects of development and neglect. Based on this, the index system to evaluate the rural settlement landscape authenticity was built (Table 2) and the Authenticity Index was calculated as follows.

$$AI = \frac{\sum_{i=1} p_i f_i}{\sum_{i=1} p_i f_{\max}} \quad (4)$$

where p is the weight of evaluation index, which is attained by analytic hierarchy process (AHP), $\sum p_i = 1$; f is the estimate of index value; F_{\max} is the maximum of index in theory.

Table 2 Evaluation index system of rural settlement landscape authenticity

Subject	Index	Standard		
		(3–5 scores)	(1–3 scores)	(1 score)
Building	History	Built before 1970	Built during 1970–1980	Built after 1990
	Typicality	Buildings with obvious geographical features	Buildings with relatively obvious geographical features	Buildings with poor geographical features
	Locality	Traditional building	Traditional Building with modern decoration	Modern building
Yard	The gardening degree of yard	Natural plant	A small amount of modern decoration	Modern decoration
	The living function of yard	Entirely living function	Half living and tourism function	Entirely tourism function
	The distance among yards	Nature configuration and distance	Regular configuration and the large distance	Regular configuration and equidistant, small distance
Settlement	The variety of rural public space	With traditional public space at the center	With traditional public space away from the center	With other space at the center
	The convenience of internal village traffic	Natural materials, with low accessibility	Semi-natural materials, with certain accessibility	Human materials, with high accessibility
	The integrity of settlement	With more than 75% perfectly reserved historic appearance	With 25%–75% perfectly reserved historic appearance	With less than 25% perfectly reserved historic appearance

4 Results

4.1 The spatial expansion of three villages

Table 3 indicates the intensity and speed of the horizontal expansion of the three villages. From 1986 to 2010, the construction land of Liujiahe village expanded at the fastest rate, with an annual increase of 6981.8 m², followed by Gougezhuang village (3012.0 m²/a) and then Shangzhuang village (1237.6 m²/a).

Table 3 Construction expansion of three villages during the period of study

Village	Construction area of initial phase (m ²)	Construction area of current phase (m ²)	Expansion area (m ²)	Expansion speed (m ² /a)	K (%/a)
Gougezhuang	87794	160082	72288	3012.0	3.40
Liujiahe	173564	341128	167564	6981.8	4.00
Shangzhuang	49727	79430	29703	1237.6	2.50

Figure 2 presents the spatial pattern of land expansion of the three villages. Specifically, Gougezhuang village and Shangzhuang village followed the “core–periphery” pattern, showing the characteristics of linear expansion. Whereas, Liujiahe village has experienced a spatially discontinuous expansion, with some new buildings occurred in the southwest of the village next to the scenic cableway of Bailixia canyon and the eastern part of the village ad-

adjacent to the Juma River. The increase of construction land in Shangzhuang village was limited to a slight expansion in the northern and southern parts of the village.

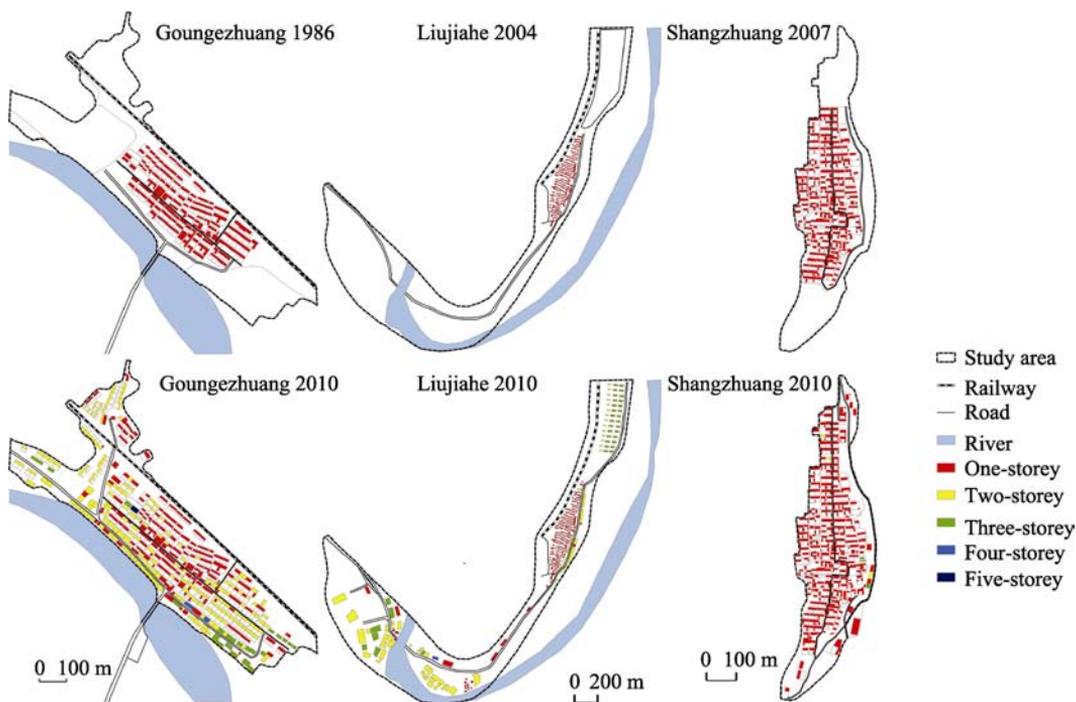


Figure 2 Spatial-temporal changes of land-use expansion of the three villages during the study period

As shown in Table 4, land use-intensity of the three villages had changed to different degrees from 1986 to 2010. The floor area ratio of Liujiahe village and Gougezhuang village increased to a large extent, whereas that of Shangzhuang village decreased slightly. In other words, the construction land of Shangzhuang village mainly expanded in horizontal dimension, while Liujiahe village and Gougezhuang village expanded in both horizontal and vertical dimensions.

Table 4 Changes of the villages' plot ratio during the study period

The plot ratio	Gougezhuang (1986–2010)	Liujiahe (2004–2010)	Shangzhuang (2007–2010)
The initial phase	0.17	0.08	0.28
The current phase	0.44	0.34	0.26
The changes	0.27	0.26	-0.02

4.2 Changes in land-use function

As shown in Figure 3 and Table 5, the expansion of construction land was accompanied by tourism. The land functions of the three villages were changed from meeting villagers' living needs satisfying tourists' demand, it can be reflected in the construction of accommodations, shopping, caterings and entertainments. Compared with Shangzhuang village, Gougezhuang village and Liujiahe village have experienced a relatively drastic alteration of land function.

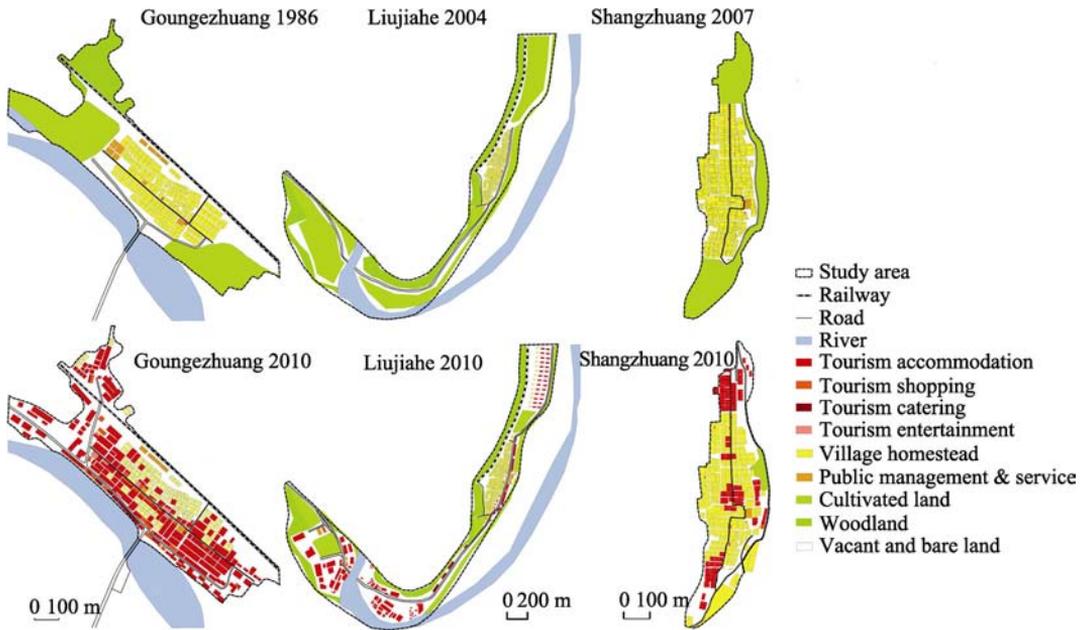


Figure 3 Land-use function changes of the three villages during the study period

Table 5 Dominant types of land-use change in different villages during the study period

Original land use type	Conversion of land-use type	IV		
		Gougezhuang	Liujiahe	Shangzhuang
Public service land	Tourist accommodation	4.607	0.000	3.334
	Ordinary residential land	0.000	0.000	3.198
	Other land	0.000	0.000	21.202
Ordinary residential land	Tourist accommodation	821.881	1.236	26.313
	Tourist shopping	65.781	0.000	5.289
	Tourist entertainment	167.390	0.000	0.000
	Other land	0.000	17.623	0.000
Cultivated land	Public service land	0.000	1.645	9.388
	Other land	677.165	677.165	59.106
	Ordinary residential land	0.000	4.333	19.551
	Tourist accommodation	25.560	28.785	34.982
	Tourist shopping	2.940	1.064	1.240
Other land vacant and bare land	Tourist entertainment	1.350	1.350	0.000
	Ordinary residential land	10.976	18.598	11.490
	Tourist accommodation	0.867	18.989	4.907
	Tourist shopping	233.617	0.987	0.000
	Tourist catering	100.824	0.987	0.000
	Tourist entertainment	1.524	0.611	0.000
	Public service land	0.000	1.621	0.000

The transition process of land function in Gougezhuang village was most complicated, with forestry land transformed to tourism accommodation land, residential land transformed to tourism accommodation and entertainment land and other land transformed to tourism shopping and catering land. For Liujiache village, the conversion from traditional residential land and other land to tourism accommodation land was the dominant transition type. The conversion of land function change in Shangzhuang village was relatively simple, with traditional residential land and cultivated land transformed to tourism accommodation land.

Figure 3 and Table 4 also present the spatial pattern of land-use change in the three villages. For Gougezhuang village, traditional residential land shrank into a small region in the northwest of the village, away from the main street. Tourism shopping, catering and entertainment land transformed from residential land were scattered along the Juma River and the main street of the village. While, tourism accommodation land agglomerated in the northwest and southeast of the village. For Liujiache village, the spatial pattern of land-use change also showed the characteristics of discontinuity: the majority of traditional residential land was preserved; a small amount of tourism accommodations and shops were located along the main street of the village, and a lot of tourism accommodations agglomerated at the upstream of the Juma River next to the cableway of Bailixia canyon. In Shangzhuang village, tourism accommodations were scattered along the main street.

4.3 The authenticity of the villages landscape

As shown in Table 6 and Figure 4, the landscape of the three villages had experienced great changes from 1986 to 2010. For Gougezhuang village, rural landscape was seriously damaged; most of the traditional residences with yard were transformed to modern multi-storey buildings. For Liujiache village, the traditional residences in the central part of the village were well preserved. In the southwest next to the cableway, there are some new buildings with disordered distribution. While, in the northeast, new buildings were arranged in an ordered way similar to that in urban areas. For Shangzhuang village, traditional rural landscape was preserved very well, most buildings are still one-story, built by stones with natural distribution pattern.

Table 6 Total scores of the authenticity of the three villages

Mandatory layer	Index	Village score		
		Gougezhuang	Liujiache	Shangzhuang
Building style	History	0.277	2.254	4.896
	Typicality	0.254	2.569	4.653
	Locality	0.251	2.988	4.264
Yard structure	The gardening degree of yard	0.364	2.421	4.699
	The living function of yard	0.132	3.237	4.635
	The special distance between households	0.222	2.452	4.633
Settlement pattern	The variety of rural public space	0.225	2.136	4.256
	The convenience of internal village traffic	0.336	2.251	4.231
	The integrity of settlements	0.256	2.241	4.987
<i>AI</i>		0.048	0.566	0.942

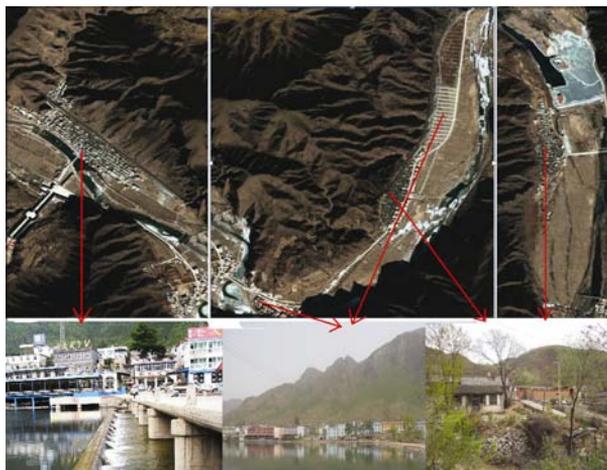


Figure 4 The remote sensing image in 2008 and villages landscape style schematic of Gougezhuang village (left), Liujiahe village (middle), and Shangzhuang village (right) in 2010

5 Conclusions and discussion

5.1 Conclusions

As the main reception base and important tourism attraction, tourism village is the core element of the tourism destination system. Integrating the method of PRA (Participatory Rural Assessment), GIS technology and high-resolution remote sensing images, this study tries to analyze the spatial evolution of rural settlements induced by tourism through a comparative study of three tourism villages in Yesanpo tourism area. The results suggest the emergence of a “core-periphery” pattern of the spatial evolution of rural settlements with different locations. The closer to the core scenic spot, the higher degree of land-use intensity a village shows, as well as the more mature tourism function and greater change in landscape pattern. In particular, Gougezhuang village shows an increase of the floor area ratio from 0.17 to 0.44, with the most mature tourism function and destroyed landscape authenticity as well and it has the lowest authenticity index of 0.448. Liujiahe village has gone through a largest increase of 96.54% in construction land area, with moderately mature tourism function and relatively stable authenticity of 0.566. Shangzhuang village, in contrast, has the lowest construction land scale and intensity, with the poorest tourism function and most well-preserved landscape authenticity of 0.942. Overall, in terms of the spatial morphology, Gougezhuang, Liujiahe and Shangzhuang have shown the characteristics of “modern town”, “semi-urbanization” and “traditional village” respectively, in corresponding to three land development types: “intensive reconstruction type”, “enclave extension type” and “in situ using type”. The spatial evolution patterns of the three villages are of great representative value for the management of rural settlements in tourism areas.

5.2 Discussion

Recently, rural tourism has become an important driving force for rural urbanization in China, especially in the remote and backward regions. Xi *et al.* (2011) investigated the

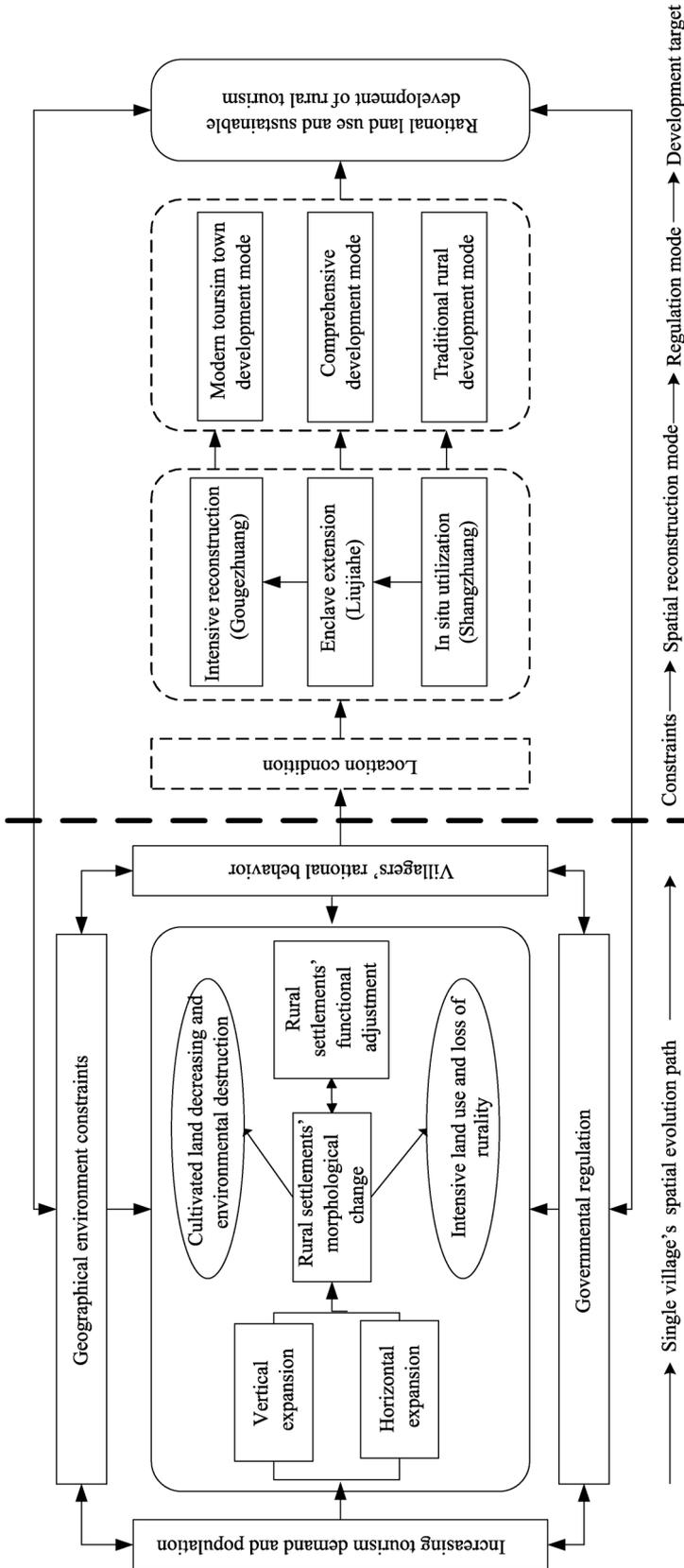


Figure 5 The evolutionary path and its development trend of rural settlements in different geographical locations in Yesanpo tourism area

transformation process of a single village to modern tourism town, under the interaction among natural geographical environment, tourism demand, villagers' rational behavior and governmental regulation. Whereas the different spatial evolution patterns of the three villages with different locations actually imply the spatial feature of the villages' touristization process in different stages, among which the final stage is characterized by the modern tourism town. Furthermore, the self-organized evolution of rural settlements in Yesanpo has exhibited a "core-periphery" pattern, which is consistent with the findings (2007) in the Annapurna region of Nepal. This spatial differentiation also indicates that location is the core factor determining not only the evolution stage of rural settlements, but also the evolution path (Figure 5).

Rurality is the unique selling point of rural tourism and an important prerequisite for sustainable development of rural tourism (Lane, 1994). Contrary to the hollowing trend of traditional villages resulted from land abandonment and depopulation, substantial population inflow dominated by tourists in tourism villages has raised demands for adequate reception capacity and consequently led to the increase of land-use intensity, which, to some extent, has given rise to the loss of rurality. As for the three villages analyzed in this paper, Gougezhuang village goes furthest in the urbanization process, with the highest land-use intensity and the largest reception capacity. The loss of rurality, however, is also most serious there. Liujiahe has well preserved the traditional settlements and also satisfied the demands on reception capacity through the construction of new settlements. In comparison, the traditional rural landscape is best preserved in Shangzhuang village, where the reception capacity and development level however, are quite limited. Apparently, there exist great conflicts between the protection of rurality and expansion of reception capacity, the balance between which should be achieved in order for the sustainable development of rural tourism.

In addition, different land-use policies and management measures are also required for tourism villages within different evolution stages. For villages like Gougezhuang, the agglomeration of tourism industry through tourism function zoning is emphasized to satisfy the market demands better. For villages like Liujiahe, the coordination between tourism development and protecting rurality is highlighted. Whereas the protective development mode is appropriate for villages like Shangzhuang. These various development modes should be specifically implemented from the dimensions of rural governance, institutional improvement and cultural reconstruction

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