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Function Transformation and Spatial Adaptability of Traditional Villages: the Case of Xixinan Village, Anhui Province

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FUNCTION TRANSFORMATION AND SPATIAL ADAPTABILITY OF TRADITIONAL VILLAGES: THE CASE OF XIXINAN VILLAGE, ANHUI PROVINCE

Xiaohua Chen[1], Mengying Cao[2], Junrong Ma[3], Lei Zhang[4]

ABSTRACT:
With the progress of rapid urbanization, the spatial decline caused by the transformation of rural functions has become an urgent problem, and restricted rural development. The aim of this paper is to improve rural functions and optimize rural spatial adaptability. Taking Xixinan village as an example, we came to the conclude that Xixinan village is undergoing the lifestyle change from tradition to modernization through functional transformation. Besides, it is experiencing function conversion from traditional agriculture to multi-functional, the traditional culture to multi-culture and with the implanted functions of tourism, cultural inheritance, ecological conservation, and social security. Because of the spatial development, over-commercialization of living space driven by tourism benefits, and production space with a single mode of commodity sales, the cultivated space was squeezed, and ecological space was destroyed. Finally, strategies for rural functional-space adaptive development were proposed, from three aspects such as including self-organized development, enriching the village environment and inheriting villages culture to stimulate the vitality of the village space. Research results of the present article could provide reference and enlightenment for the sustainable development of traditional villages.

Key-words: *urbanization, tourism, commercialize, sustainable development*

1. INTRODUCTION

In a critical period of rapid urbanization and industrialization, the Chinese urban-rural relationship has gradually shifted from the original antagonism and separation to the interaction and coordination. In this stage, the flow of urban-rural factors accelerated, and the industrial structure of urban-rural areas is adjusted and upgraded. These factors cause several problems to rural areas, including weak functions of traditional life, agriculture, religion (Kerselaers, 2013). With the improvement of economic level, diversified demands for different social groups have promoted the transformation from single function to multifunction in traditional villages(Pribadi et al., 2017). As the carrier of functions traditional rural space cannot bear the functional requirements of modern industrial civilization and urbanization variations and tends to decline even die out.

Rural areas not only provide food security for the promotion of urbanization, but also serve as the residence of the rural population and the preservation of traditional agricultural culture, as well as an important space for maintaining ecological security in urban-rural areas (May, 2019). Therefore, it is an urgent practical problem to improve rural function-

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spatial adaptability. In recent years, researches on rural functions mainly focus on the identification of rural multifunctional types (Philip et al., 2018; Koopmans et al., 2018), multifunctional transformation mechanism (Ma et al, 2019), functional differentiation characteristics of different regions (Wang & Tang, 2018) and multifunctional evaluation (Oostindie, 2018). Under the development of rural multi-functional transformation, rural spatial adaptability, as one of the principal research directions of rural geography, it is mainly focused on the adaptability of rural ecological adaptability(May et al., 2019; Khatibi, 2019), land use adaptability(Fielke, 2018), building adaptability(Wilson et al., 2018)and industrial adaptability(Carson & Carson., 2018), relevant research results are abundant.

In the present paper, there is no research on the status of rural functional transformation and whether space is suitable for the relationship between urban-rural development. As a special existence of the rural system, traditional villages also face similar problems, but they have not attracted much attention. Therefore, this study took Xixinan village as a case study to analyze and summarize the status of functional development and spatial adaptability, hoping to provide theoretical reference and a practical reference for the future development of traditional villages.

2. STUDY AREA AND DATA

The village of Xixinan in the province of Anhui (China) was selected as a case study (**Fig. 1**). It is a small rural community with 5273 residents, closing to Huangshan economic development zone and 1.5km from Huangshanbei Railway Station. It has more than 1,200 years, with a total area of 27,100 square meters of traditional construction during the Ming and qing dynasties (**Fig. 1**). In the traditional period, Xixinan was isolated self-sufficient.

With the steady progress of urbanization in China, rural resources have been fully exploited, and the diversification of tourist demand leads to the inadaptability of traditional rural space to the transformation of modern functions (McManus et al., 2011; Chaves et al., 2019), which restricted the development of villages. The contradiction of progress in Xixnan village is a typical epitome of the common problems faced by traditional villages. Therefore, Xixnan village is selected as a case study to represent the development of traditional villages in the process of urbanization.

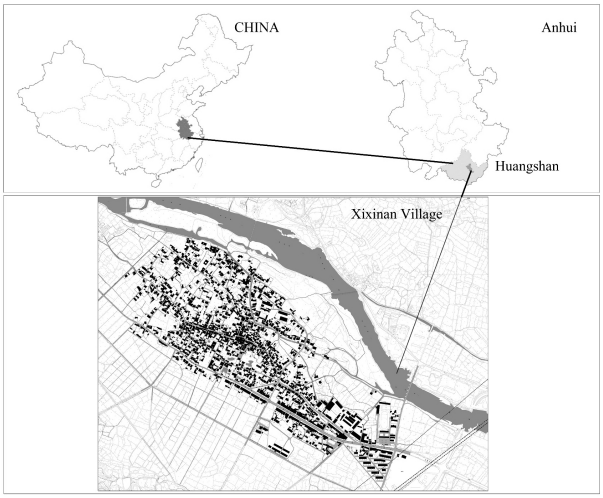

Fig. 1. Anhui province and Xixinan village *(Source: authors).*

The data used in this paper was mainly obtained through the following methods. First, through field visits to the Xixinan government and village committees, we obtained demographic and economic statistics and relevant planning documents. Secondly, the age of the modern building, function and spatial distribution of village nodes are marked. Finally, a questionnaire survey was used to obtain different demands of tourists and residents on the spatial functions of the village, and observe and record the distribution of people in different time and space.

3. METHODOLOGY

The PSPL(Public Space & Public Life Survey) research method was adopted to identify the modern functions of the village space through on-the-spot investigation (**Fig. 2**). By visiting residents and government personnel to understand the traditional functions of the village. Among them, the distribution of people and traffic flow in a real environment is obtained by the method of field counting. A total of 11 observation points were selected to record the dynamic activity of each section for 5 minutes. Explain the dynamic spatial distribution characteristics of different time and space, summarize the survey results to understand the different functional requirements of tourists and residents.

ArcGIS 10.2 tool has been used to analyze commercial core density, obtain the commercial points distribution space through current status punctuation and set 150 meters radiation radius, identify clustering areas and hot spots of commercial space distribution at the scale of villages (**Fig. 2**), explore the distribution rules and spatial vitality of commercial space facilities at the edge of villages, evaluate the current status of production space of villages.

The Distance /Cost Weighted tool of the Spatial Analyst module in ArcMap was be used to analyze the accessibility of the water system. Firstly, topographic map is used to extract the distribution of current water system, and set four grades of 0-10 meters, 10-20 meters, 20-30 meters and 30-40 meters for calculation, so as to analyze the coverage rate of the village residential water system and understand the current situation of the village living environment (**Fig. 2**).

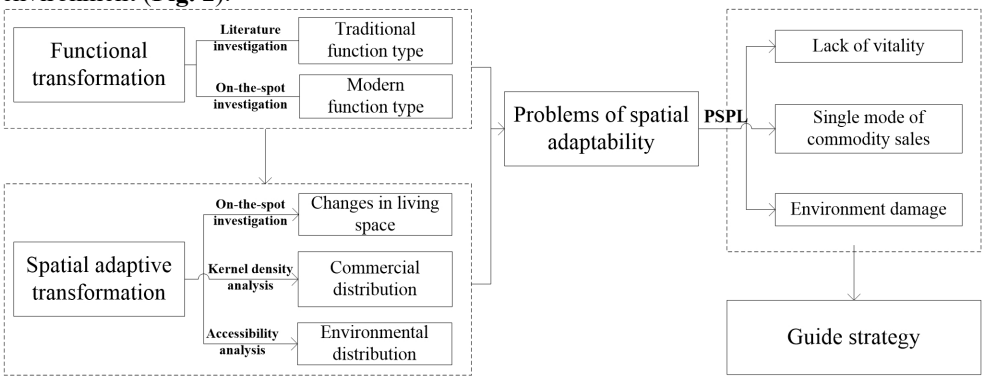

Fig. 2. Technical route*(Source: authors)***.**

4. RESULTS AND DISCUSSIONS

4.1. Functional transformation and development

The transformation of lifestyle from tradition to modernization reflected in three aspects. First of all, with the increase of resident income and the change of consumption concept, residents expand or build houses independently to improve the comfort of living space. Secondly, driven by tourism, the number of homestays has increased rapidly (**Table 1**). Represented by the Shang villages, as a settlement site for residents of Xixinan village, it has been transformed into a commercial area with homestay concentrated under the guidance of government investment. Also, on both sides of the main road, such as 046 township road, Zhong Street, Shang Street and Xia Street, the traditional residential space is mostly reconstructed to form a functional space for both commercial and residential purposes.

Traditional agricultural function to multifunctional industrial transformation. In the traditional period, Xixnan village provided food, oil and other products for society through production space to meet the basic needs of life. With the advent of the non-agricultural and diversified period, Xixnan village relies on tourism resources and a superior geographical location that the modernization industry is booming. Currently, the industry is dominated by beekeeping and tourism (**Table 1**).

The function conversion from traditional culture to multi-culture. The traditional culture of Xixinan village mainly includes Confucianism and Neo-Confucianism thought, which have a long history and distinct regional characteristics. Xixnan village was the residence of Wu habitation in the ancient society, with many clan branches and ancestral temples. Now the central school is situated on the former site of Wu ancestral hall, and Wangshan commune is located on the former site of Simu temple. The Turenscape Academy and other research societies have established research bases in Xixinan village (**Table 1**). Village culture is becoming more diversified.

The village also has tourism and leisure functions, cultural heritage functions, ecological protection functions, social security functions and other new functions. The implantation of new functions makes Xixinan village adapt to the development of urbanization and modern development. In this context, the surrounding space of Xixinan village continues to build new modern buildings, which derailed from the internal space of the village. Due to the strict protection of the core protection area, the traditional space cannot match the emerging function, resulting in the separation of function and space.

Table 1.

Current functional transformation.

Functions	Element	Traditional function	Modern function
Traditional lifestyle	Yuqing's residence	Residential	Homestay
	Yao's residence	Residential	Exhibition
	Qulet as a club	Residential	Entertainment
	Xixi South story	Residential	Exhibition
Traditional agricultural function	Pond	Natural landscape	Garden
	Mountain body	Natural landscape	Tourist sites
	Forest land	Natural landscape	Garden
Traditional culture	Villa Wangshan •Hetianli	Sacrifice, Administrative	Hotel
	Huangshan Huizhou Creek Villa	Sacrifice	Folk-art
	The Turenscape Academy	Sacrifice	Education
	Xixinan Central School	Sacrifice	Education

4.2 Spatial adaptive transformation

The traditional residential space has been transformed from the original living space of residents to the living space of tourists. In the traditional period, the ancient dwellings faced the south, with brick and wood structure, good lighting and ventilation, to adapt the living conditions of residents. With the promotion of tourism, the influx of a large number of tourists has driven the development of homestay and residents' pursuit of quality of life. At present, there are more than 600 residential buildings in the village, and about 40 abandoned or vacant houses (**Fig. 3**). The hollowing rate is about 0.06%. Among them, there are 45 rebuilt homestays, and 6 traditional buildings with catering and entertainment functions in the core section carrying. It has more than 170 businesses and 3 factories. The living space of some residents has been completely transformed into tourism and commercial space, and the production space has also been transformed into composite space based on tourism services. The commercial atmosphere in the village has become more intense.

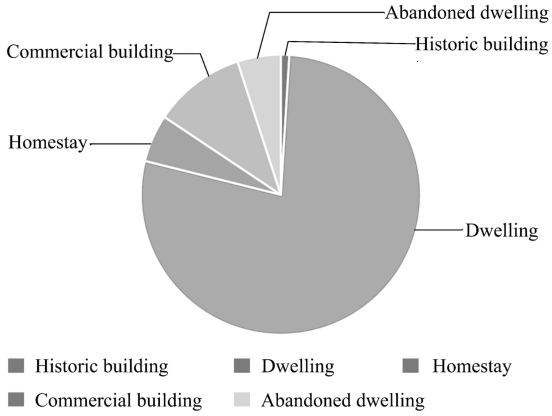

Fig. 3. Current architectural functions.

Under the process of urbanization, the expansion of urban space and the infiltration of functions have led to the decline of traditional agriculture and the squeeze of cultivated land (**Fig. 4**). The traditional production space has gradually been transformed to be adapted to multifunctional land.

On the one hand, labor force shortages due to the influx of young people from villages into cities. The agricultural production function is gradually weakened. Some families with cultivating land are no longer engaged in agricultural production. On the other hand, cultivated land has been gradually converted to the commercial and tourism land in the edge area of the village (**Fig. 5**). Also, with the increasing demand for tourism public facilities, the land mainly addresses the need for a parking lot, retail, catering, accommodation, and tourism service center in the edge area. The mixed functions of construction land and the interference between various functions have reduced the quality of the living environment and the efficiency of the town operation, resulting in very tight land resources in Xixnan village and extensive land use.

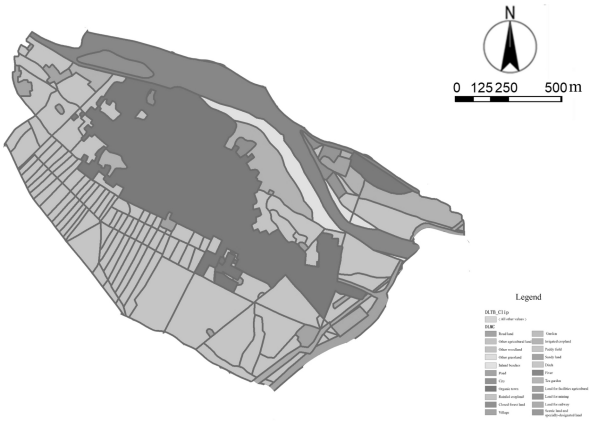

Fig. 4. Business functions kernel density *(Source: authors)***.**

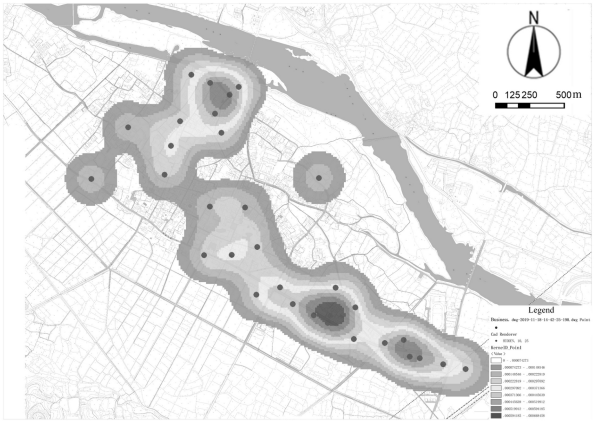

Fig. 5. Present situation of land use *(Source: authors)*.

Through planning and design, the traditional ecological landscape has been developed to accommodate commercial villages. In the traditional period, the natural topography and river systems of the village are related to the safety and convenience of ethnic groups. Xixinan village is located in the Huizhou basin, close to the Fengle river and surrounded by mountains. And because of the four major water systems and a unique geographical location, and water conservancy and irrigation development were earlier. Basing on the analysis of the water system buffer zone, the accessibility of residents to the surrounding water system is within 100m, and the distance of more than half of the residents to the water system is no more than 40m (Fig. 6). The internal environmental elements such as gardens and woodlands in the village are evenly distributed and suitable for living. Now, to improve the popularity of Xixinan village and shape the image of the characteristic village, the ecological space is designed and the original historical landscape elements are protected. Also, constructed the landscape pavilions, landscape squares, parks, and landscape belts along the river to provide more places for leisure and entertainment.

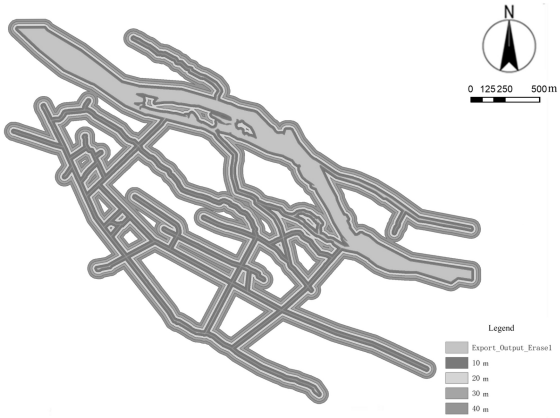

Fig. 6. Buffer analysis of river systems *(Source: authors)***.**

4.3 The problem of spatial adaptability

The living space is over-commercialized and the public space is inadequate. According to the daily life rules of residents, select 11 points for the village from 8:45-8:50, 11:30-11:35, 14:00-14:05, 17:25-17:30. Carry out the number of people and traffic (**Fig. 7**). We find the supporting facilities inside the village are deficient, and the overall space vitality is insufficient.

The spatial vitality of the village is relatively strong in the south and north, and relatively low in the middle, among which the historical core protection area and the area near the 046 township road show an obvious spatial separation. Within the same time range, the vehicle traffic volume of the 046 township road is always at the peak, while the human flow is less. The main reason is that various commercial facilities and public service facilities are gathered in the eastern part of the 046 township road, but the buildings give way to narrow space on both sides of the road, which is not suitable for pedestrians to travel or stay safe. Due to the lack of leisure space for tourists, the core protection area is mainly for walking, because there is less leisure space for tourists, fewer activities to participate in, and the signpost is not clear, most tourists choose to stay in a few node spaces such as the square.

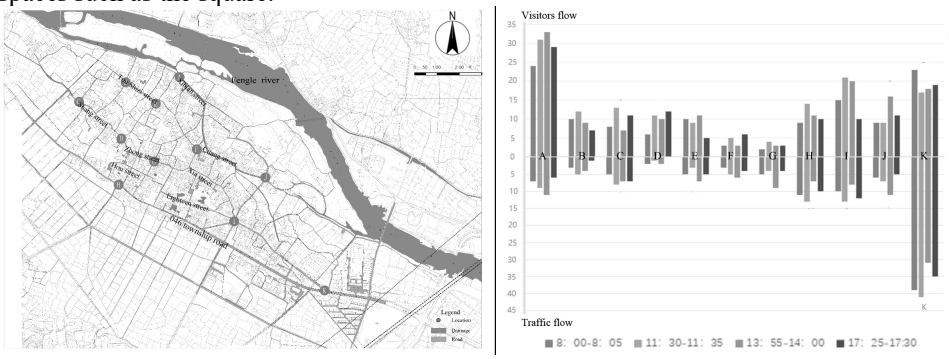

Fig. 7. People and vehicles flow at different times and places *(Source: authors)***.**

The commercial density of the village is polarized, with low commercial density in the core protection zone and high commercial density in the periphery of the village, and production space with a single mode of commodity sales. The form of industry status is simplified, and the business shows two extreme distribution. From the overall perspective, business is mainly concentrated in the entrance of the village in the direction of high-speed and the entrance of Xixnan town in the direction of Huangshan north railway station. The entrance of Xixnan town is mainly a traffic road with diversified commercial forms, while the entrance of the Fengle river in the north of the village, at the main entrance of the scenic area, gathers a large number of homestay and retail business. However, owing to the small number of buildings with exhibition and leisure functions inside the village, the commodity sales are single that cannot meet the needs of tourists so that the space vitality is low. Depending on the questionnaire statistics, residents believe that industry development without local characteristics and brands. Tourists think that the main commercial facilities are far away from the village attractions. There are no tea breaks in the village and retail is too fragmented (**Fig. 8**).

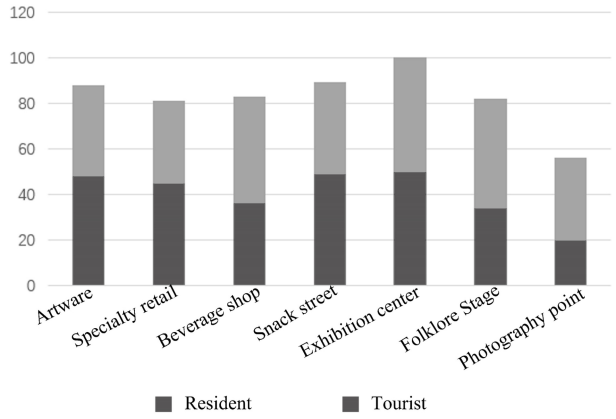

Fig. 8. Analysis of the needs of tourists and residents.

Unreasonable production behavior leads to ecological environment degradation. During the investigation, as some of the canals were under construction and the reservoir was built on the upper reaches of the Fengle river, which dried up and resulting in a shortage of irrigation water for farmland. The Fengle river is the main habitat of egrets, whose ecological diversity is threatened and the rural landscape is seriously damaged.

Under the development of industrial transformation and, the short-term interests of the villagers' pursuit have contradicted the persistence of ecological protection. According to the questionnaire statistics, about 68% of residents still have cultivated land. Apart from the main income, they are still engaged in agricultural farming. However, to save labor in agricultural production, farmers still use pesticide spraying to control diseases and insect pests. Traditional farmers lack professional technical guidance in agricultural production, which leads to widespread abuse of chemical fertilizers and pesticides. Now, agricultural pollution, industrial production, livestock, and poultry breeding are the main sources of agricultural ecological pollution in Xixinan village.

4.4 Guide strategies

To solve the problem that the traditional space cannot be adaptively the current function development. First of all, residents play the most important role in the development of villages. Higher autonomous organizational consciousness and ability can provide support for the transformation of architectural space, production space and ecological space. However, residents are not comprehensive about the development of the village. Therefore, it is necessary to formulate relevant policies under the government to guide the land use structure adjustment and the development of industrial layout, to provide the blueprint and direction for the villagers.

Secondly, as the main economic source of Xixinan village, tourism should expand the tourism reception capacity and tourism service scope, build tourist attractions with scale and own characteristics, improve the quality and level of tourism services. Residents are encouraged to open the Hui cuisine restaurant and sell characteristic products. Build rural art centers, village museums and art galleries to enhance the vitality of traditional space and promote industrial development.

Finally, establish an effective rural cultural management mechanism, community cultural participation mechanism, and management compensation mechanism. For the protection of traditional historical buildings, the local architectural features should be preserved in terms of color, layout, and function and give them new functions. With the development of the local cultural industry, the records and files of representative intangible cultural projects should be preserved and combined, so that intangible cultural can become a part of the economic source of residents' income. Digging village folk custom, legend and propaganda historical culture to enhance the cultural identity of residents.

5. CONCLUSIONS

Characteristics of Xixinan village on functional transformation and spatial adaptive development were studied, and it’s found that functional transformation lead to a series of problems in spatial development. The strategies discussed are not only applicable to Huizhou traditional villages, but also to other villages with a long history under the tourism development model. Although the rural space and function have been analyzed from multiple perspectives, there is still a lack of research on the influencing factors of functional transformation and the quantitative analysis of spatial adaptability will be improved in future studies.

REFERENCES

Ashkenazy, A., Chebach, T. C., Knickel, K., Sarah, P., Boaz, H. & Rivka, O. (2018) Operationalising resilience in farms and rural regions–findings from fourteen case studies[J]. *Journal of rural studies*, 59, 211-221.

Chaves, M., Macintyre, T., Verschoor, G. & Wals, A. E. J. (2018) Radical ruralities in practice: Negotiating buen vivir in a Colombian network of sustainability[J]. *Journal of Rural Studies*, 59, 153-162.

Carson, D. A. & Carson, D. B. (2018) International lifestyle immigrants and their contributions to rural tourism innovation: Experiences from Sweden's far north[J]. *Journal of rural studies*, 64, 230-240.

Fielke, S. J., Kaye-Blake, W., Mackay, A., Smith, W., Rendel, J. & Dominatid, E. (2018) Learning from resilience research: Findings from four projects in New Zealand[J]. *Land use policy*, 70, 322-333.

Khatibi, S. A., Golkarian, A., Mosaedi, A. & Qeidari, H. S. (2019) Assessment of Resilience to Drought of Rural Communities in Iran[J]. *Journal of Social Service Research*, 45(2), 151-165.

Kerselaers, E., Rogge, E., Vanempten, E., Lauwers, L. & Huylenbroeck, G. V. (2013) Changing land use in the countryside: Stakeholders' perception of the ongoing rural planning processes in Flanders[J]. *Land use policy*, 32, 197-206.

Koopmans, M. E., Rogge, E., Mettepenningen, E., Knickel, K. & Šūmane, S. (2018) The role of multi-actor governance in aligning farm modernization and sustainable rural development[J]. *Journal of rural studies*, 59, 252-262.

May, C. K. (2019) Resilience, vulnerability, & transformation: Exploring community adaptability in coastal North Carolina[J]. *Ocean & coastal management*, 169, 86-95.

McManus, P., Walmsley, J., Argent, N., Baum, S., Bourke, L., Martin, J., Pritchard, B. & Sorensen, T. (2011) Rural Community and Rural Resilience: What is important to farmers in keeping their country towns alive? [J]. *Journal of Rural Studies*, 28(1), 20-29.

Ma, W., Jiang, G., Li, W., Zhou, T. & Zhang, R. (2019) Multifunctionality assessment of the land use system in rural residential areas: Confronting land use supply with rural sustainability demand[J]. *Journal of environmental management*, 231, 73-85.

Oostindie, H. (2018) Unpacking Dutch multifunctional agrarian pathways as processes of peasantisation and agrarianisation[J]. *Journal of rural studies*, 61, 255-264.

Pribadi, D. O., Zasada, I., Muller, K., & Pauleit, S. (2017) Multifunctional adaptation of farmers as response to urban growth in the Jabodetabek Metropolitan Area, Indonesia[J]. *Journal of rural studies*, 55, 100- 111.

Philip, L. J. & MacLeod, M. (2018) Tales from a Small Island: Applying the 'Path-Dependency' Thesis to Explore Migration to a Remote Rural Community[J]. *Sociologia ruralis*, 58(1), 147-170.

Wang, C. & Tang, N. (2018) Spatio-temporal characteristics and evolution of rural production-living-ecological space function coupling coordination in Chongqing Municipality. *Geographical Research*, 37(06), 1100-1114.

Wilson, G. A., Hu, Z. & Rahman, S. (2018) Community resilience in rural China: the case of Hu Village, Sichuan Province[J]. *Journal of Rural Studies*, 60, 130-140.