



# Restructuring rural settlements based on an analysis of inter-village social connections: A case in Hubei Province, Central China



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## ABSTRACT

Social connections are the consequences and causes of rural settlement distribution. Although numerous studies have examined rural restructuring, the relationship between social connections and rural restructuring has been neglected. This study proposed a novel restructuring method of rural settlement based on an analysis of inter-village social connections that include both spatial and non-spatial connections. A questionnaire survey was conducted from a sample comprising 925 people from Chengui Township in Hubei Province, Central China. The characteristics of the social networks of the residents were analyzed using a node degree and node symmetry index (NSI), and the causes of network formations were analyzed according to the connection types of the rural residents. Both consolidated settlements and relocation areas were identified using a measurement of ideal radius based on social connection analysis. Spatial connection orientation, non-spatial orientation and ideal radius orientation were proposed to guide rural settlement restructuring. The results indicated that the hierarchy of village-town systems can be effectively identified by the features of social connection networks. Social connection strength is an important guiding factor for rural reconstruction. This study puts forward a new view of rural settlement reconstruction and aids in our understanding of both the changing mechanism of rural settlement and the relationship between social connections and rural settlement reconstruction.

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## 1. Introduction

China is experiencing accelerated urbanization, which has encouraged more farmers to move to towns and cities (Bai, Shi, & Liu, 2014). In 2014, the rural population in China decreased by 10.95 million and the urban population increased by 18.05 million. A large floating population maintains double residential status (rural and urban) due to the restrictions of the household registration (*hukou*) system (Wang, Hui, Choguill, & Jia, 2015; Wu, Zhang, Xu, & Li, 2016). China has been facing the dilemma of increasing urban populations and decreasing rural populations over the past three decades. As cities attract rural labor, many rural settlements are left uninhabited or inefficiently utilized, leading to an increase in the number hollowed villages in rural residential

areas (Li, Long, Liu, & Tu, 2015; Long, Li, Liu, Woods, & Zou, 2012; Wu, Robinson, & Long, 2015). Rural settlements with scattered distributions and chaotic and poor living conditions are widespread in rural China.

In 2005, China's central government adopted a comprehensive strategy for building a new countryside to improve rural living and producing conditions and for forming an orderly spatial pattern through rural restructuring (Long, Liu, Li, & Chen, 2010). In keeping with this policy, a new popular wave of rural reconstruction has emerged in China over the past 10 years (Pan & Du, 2011). In contemporary China, rural reconstruction is a substantially executed project that is dominated by the central government, which has poured large sums of money into rural land consolidation in recent years (Jiang, Wang, Yun, & Zhang, 2015). Rural China, particularly the eastern countryside, has achieved remarkable rural construction and social development. However, blind-image construction projects and large-scale reconstruction, regardless of farmer interest, remain serious in the restructuring process. Farmers are essentially forced into newly developed apartment buildings (Bai et al., 2014). These ventures have resulted in social

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contradictions and have raised tension. An in-depth understanding of restructuring is necessary for both policy-makers and planners.

Rural settlement plays an important role in the living conditions, agricultural production and social communication of farmers. Numerous studies have been conducted to analyze the spatial differentiation characteristics of rural settlement, including numerous studies focused on the spatial analysis of conversion relationships between rural settlements and other land-use types (Tan & Li, 2013; Tian, Qiao, & Gao, 2014; Tian, Qiao, & Zhang, 2012). Factors affecting the distribution of rural settlements were also extensively discussed (Li et al., 2015; Zhou et al., 2013). In recent years, more researchers have turned their attention to socio-spatial transitions associated with rural land conversion (Tang, Hao, & Huang, 2016). These researchers realized that restructuring involves not only layout planning of rural settlements but also a socially constructed plan for farmers. Hoggart and Paniagua (2001) noted that restructuring is a dynamic process involving principal readjustments to a variety of life spheres. To some extent, the distribution of rural settlement reflects relatively stable social relationships among villages. Kim, Woosnam, Marcouiller, Aleshinloye, and Choi (2015) argued that social relationships play a key role in residential mobility. However, few studies have explained the relationships between inter-village social connections and rural settlement reconstruction or applied social network analysis in rural reconstruction. Our primary contribution is to propose a restructuring method for rural settlement from the social connection perspective and provide an example of its application using social network analysis to guide rural settlement reconstruction.

Although traditional rural society has become more “modern”, it is generally agreed that “the native” (*bentu*) and “the rural” (*xiangtu*) should not change in rural areas (Pan & Du, 2011). Forming and maintaining social bonds is one of the most powerful human motivators (Walton, Cohen, Cwir, & Spencer, 2012). Compared with urban residents, rural residents prefer more contact with their relatives and friends because this contact provides spiritual pleasure and a sense of self-identity and social identity. Rural social connections are a type of “field” connection, meaning that a restricted range of activities and a limited variety of social roles exist (Stewart, 1958). “Field” connections are those involving working, visiting, shopping, etc. that can be further classified into spatial or non-spatial connections. Spatial connections specifically refer to the movements and activities of people in their daily lives (Golledge & Stimson, 1997), whereas non-spatial connections emphasize the social ties of people via phone calls or social tools on the internet. These close personal social relations are very important in farm life and play a key role in the reorganization of rural social life (Day, 2008). However, rural restructuring in China is shaped by national macro-policies (Long et al., 2012), and current reconstruction patterns focus more on external conditions, such as resident population, construction scale and standards of land use. The internal needs of farmers, particularly in terms of social communication, are rarely considered in the reconstructing process, resulting in disorientation in rural reconstruction.

The direction of this reconstruction can be appropriately measured and depicted by social network analysis, which has been widely used in urban connection studies (Derudder & Parnreiter, 2014; Derudder, Witlox, & Taylor, 2007). However, corresponding research and application are infrequent in rural areas. According to Central Place Theory, the distribution of rural settlement is highly related to the social connections in rural areas (Mulligan, 1984). One of the major reasons for rural settlement formation in China is kinship (Fei, 1999). The distribution of rural settlement continues to be changed and restructured with the evolution of social connections. People tend to visit villages with high service abilities where their relatives or friends live. Relocated farmers are more likely to

accept these villages based on emotion. An analysis of rural social connections can help policy-makers and planners determine the proper direction for rural restructuring.

This restructuring direction can be further identified from the origin-destination (OD) information of local residents' daily activities. Milbourne and Kitchen (2014) identified everyday mobility in rural areas based on individual activities. These authors treated rural settlement as an intersection of socio-economic flows derived from people's aggregated activities. Although individual activities are typically affected by diverse factors such as personal characteristics, individual lifestyles, and economic foundations, these activities are actually derived from similar needs, such as working, visiting and shopping. Woods (2012) suggested that developing rural communities makes services accessible to rural people and provided more satisfaction in their lives. Similarly, rural reconstruction can facilitate social connections to farmers and improve their way of life. In addition, spatial and non-spatial flows intersected in different villages, forming different node degrees and node symmetry indexes (*NSI*) in respective networks (Limtanakool, Dijst, & Schwanen, 2007). The features of social connection networks reflect the hierarchy (central, general and marginal) of village-town systems that is essential for rural restructuring.

Scientific rural restructuring should combine the distribution of rural settlement with inter-village social connections. This gap should be filled in the restructuring process. This paper applies inter-village social network analysis to optimize the process of restructuring rural settlements. Spatial and non-spatial social connection networks are constructed based on a questionnaire survey obtained from a sample of 925 people in a typical town in Central China. The goals of this study are to address three pressing issues: 1) Which features in inter-village social connections exist in both space and non-space; 2) How to identify the hierarchy (central, general and marginal) of village-town systems according to social connections features; and 3) How to indicate the proper direction in rural restructuring to improve the convenience of social connections.

## 2. Materials and methods

### 2.1. Study area

Chengui Township (114° 43' to 114° 49' E, 30° 03' to 35° 30' N) is located in Daye City, which is in the southeast region of Hubei Province in Central China (Fig. 1). Hubei is currently undergoing rapid urbanization; the percentage of urbanization increased from 17.21% to 55.67% between 1981 and 2014 (Fig. 2). As one of the top 100 counties in China, Daye City has an urbanization rate as high as 58.16%. The Urban-Rural Master Plan of Daye (from 2013 to 2030) reveals that the estimated percentage of urbanization will reach 76% by 2030. Thus, nearly 20% of the rural population will transit into the urban population in the next 15 years. All the towns belonging to Daye City continue to face challenges from rural-to-urban migration and new situations resulting from rural reconstruction. Chengui covers an area of 160.40 km<sup>2</sup> and is composed of 19 administrative villages. The total area of rural settlements is 1060.70 ha, and the settlements contain a rural population of 58,428. The average per capita area is 181.54 m<sup>2</sup>, which is higher than the national standard of 150 m<sup>2</sup>. Chengui enjoys a rapidly developing economy, and the rural per capita net income increased from 4970 RMB in 2006 to 10,282 RMB in 2012.

However, with the transformation and upgrading of urban-rural development, hollowed villages and inefficient utilization of rural settlements have become serious problems in recent years.

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