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Planning and Implementing Smart Shrinkage of Rural China: The Case of Chengdu's Rural Settlement Consolidation with SGME Model

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Abstract. *Accompanying China's fast urbanization, a paradox arises as rural China is decreasing in population but rural settlements are still expanding in the form of rural housing renovation and increased construction land, especially in migrant-sending areas. The urban-rural dual system in China is blamed as the main cause of this abnormal phenomenon, but as the dual system is fundamental to China's socio-economic development and China's central government adopts institutional reform in a step-by-step fashion, local governments have to work around this dual system. Many municipalities are planning and implementing smart shrinkage of rural settlements and Chengdu is among the best practices in the Chinese context. This research describes the latest SGME (small-scale settlement, group arrangement, micro pastoral scenery and ecological construction) model, which was initiated in 2013 to implement planned consolidation of rural settlements that fits the local development culture. In order to better allocate public service facilities and improve the efficiency of resource supply, six modes of spatial agglomeration are planned to consolidate villages scattered all over Chengdu. The SGME model achieved sound results, but with some problems still awaiting solution, including unsustainable funding and obscure rural characteristics. The findings of this study shed light on the planning of similar areas in other developing economies, especially those with a distinct urban-rural dual system.*

Keywords. *smart shrinkage, rural settlement consolidation, SGME model, China.*

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Abstrak. *Seiring urbanisasi yang cepat di Tiongkok, sebuah paradoks muncul ketika populasi perdesaan di Cina berkurang, tetapi permukiman di perdesaan masih berkembang dalam bentuk perumahan perdesaan yang telah direnovasi dan bertambahnya lahan konstruksi, terutama di daerah pengirim migran. Sistem ganda perkotaan-perdesaan di Cina disalahkan sebagai penyebab utama fenomena abnormal ini, tetapi karena sistem ganda ini mendasar bagi perkembangan sosial-ekonomi Tiongkok dan pemerintah Pusat Tiongkok mengadopsi reformasi kelembagaan dengan cara selangkah demi selangkah, pemerintah daerah harus mengatasi dua sistem ini. Banyak kota berencana dan menerapkan penyusutan cerdas dari permukiman perdesaan, dan Chengdu adalah salah satu praktik terbaik dalam konteks Cina. Penelitian ini menggambarkan model SGME terbaru (permukiman skala kecil, pengaturan kelompok,*

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pemandangan pastoral mikro dan konstruksi ekologis) yang dimulai pada tahun 2013 untuk mengimplementasikan konsolidasi yang direncanakan dari permukiman perdesaan yang sesuai dengan ideologi pembangunan lokal. Untuk mengalokasikan fasilitas layanan publik dengan lebih baik dan meningkatkan efisiensi pasokan sumber daya, enam mode aglomerasi spasial direncanakan untuk mengkonsolidasikan desa-desa yang tersebar di seluruh Chengdu. Model SGME telah mencapai hasil yang baik namun dengan beberapa masalah menunggu solusi, termasuk dana yang tidak berkelanjutan dan karakteristik perdesaan yang tidak jelas. Temuan-temuan ini akan menjelaskan perencanaan bidang-bidang serupa di negara-negara berkembang lainnya, terutama yang memiliki sistem ganda perkotaan-perdesaan yang berbeda.

Kata Kunci. *Penyusutan cerdas, konsolidasi pemukiman pedesaan, model SGME, Chengdu, Cina.*

Introduction

Experiencing great population outflow accompanied by rapid urbanization, rural China is confronted with a series of problems such as disordered settlement expansion with increasing construction land and housing but a decreasing population, inefficient supply of public service facilities and infrastructure, hollowed-out rural communities with diminished vitality, and deteriorated rural settlement conditions (Zhao et al., 2015), especially in migrant-sending areas. As the urban-rural dual system is blamed as the main cause of this abnormal phenomenon, intervention by the government is required to use its dominating role to allocate space for rural settlements in a planned manner, including consolidation of rural land, housing, infrastructure and public service facilities at an appropriate level, i.e. 'smart shrinkage' of rural settlement space under planning guidance (Zhao, 2014; You, 2017).

As the rural-urban dual system is fundamental to China's socio-economic development and China's central government adopts institutional reform in a step-by-step fashion, local governments have to work around this dual system. Many municipalities are planning and implementing smart shrinkage of rural settlements and Chengdu is among the best practices in the Chinese context. Under the guidance of the SGME concept, villages in rural Chengdu city are subject to demolition and merging. Such planning and practices are of great importance to realize 'smart shrinkage' of rural settlement environments in other regions with a similar socio-economic development context.

Chengdu is a large city-region with a great agricultural farming tradition and a large population of rural laborers, who have now mostly out-migrated to the downtown areas of Chengdu or other megacities in Eastern China. However, due to the rural-urban dual system of China, those with a rural *hukou* registration are unwilling to give up their *de jure* identity as rural population and therefore Chengdu is decreasing in population while rural settlements are still expanding in terms of renovated rural housing and increased construction land. Meanwhile, scattered and hollowed-out rural settlements have resulted in inefficient allocation of public service facilities and infrastructure (Li, 2008; Wu, 2012). This is quite representative of rural China, especially in migrant-sending areas.

In order to achieve smart shrinkage of rural settlements in Chengdu, the municipality has planned and implemented four stages of rural settlement consolidation (You, 2018). The first stage was characterized by three concentration allocations (from 2003 to 2007), i.e. industrial concentration in intensive development areas, peasant concentration in new-type communities in towns, and land concentration for operation at appropriate scale. The second stage was

characterized by the four principles of post-disaster reconstruction (from 2008 to 2011), i.e. development, diversity, integrity and share ability. The third stage highlighted the integration of industry and village (from 2011 to 2013), which emphasized the construction of industrial villages that integrate the central community, the general community and the traditional forest while relying on a specialty industry. Lastly, the fourth stage was characterized by SGME (from 2013 to 2016), which stressed 'small-scale settlement, group arrangement, micro pastoral scenery and ecological construction' in the course of new village construction. These four development stages represent different concepts of local development with the essential objective of improving the quality of rural settlement space.

This paper focuses on the Chengdu municipal government's practice of village construction under the guidance of the SGME concept from 2013 to 2016. This model was proposed on the basis of two macro backgrounds at that time. It was first proposed at the 18th CPC National Congress to take a new type of urbanization path with Chinese characteristics, pointing out a new direction for rural development and construction. Secondly, in implementing the spirit of the 18th CPC National Congress, the Ministry of Housing and Urban-Rural Development proposed nationwide demonstration projects for the construction of beautiful and livable villages. In the meantime, some rural areas in Chengdu that were affected by the 4.20 Lushan earthquake in 2013, were once again confronted with the arduous task of post-disaster reconstruction.

In order to re-build rural Chengdu with a better settlement system, better allocated public service facilities and improved efficiency of resources supply, six modes of spatial agglomeration were planned to consolidate the villages scattered all over Chengdu. This implementation of the SGME model has achieved sound results but with some problems awaiting solution, including unsustainable funding and obscure rural characteristics. These findings shed light on the planning of similar areas in other developing economies, especially those with a distinct rural-urban dual system.

The SGME Model

Rationale of the SGME Model

SGME means 'small-scale settlement, group arrangement, micro pastoral scenery and ecological construction'. More specifically, small-scale settlement means that a new village's scale will be controlled to stay within 100 to 300 households on the basis of 'appropriate clustering and scattering' while sufficiently respecting the peasants' aspirations and offering conveniences for the peasants' production and living. In addition, new villages will be further divided into groups, with each group controlled to stay within a scale of 20 to 30 households, generally no more than 50 households.

Group arrangement means that new villages are combined in several small groups of different sizes. These groups should fully utilize forest, water, mountain and farmland to form a natural and organic layout, which highlights a spatial effect of appropriate clustering and relatively independent space. In addition, every new village should provide a standard public service center with an area coverage of at least 400 m^2.

Micro pastoral scenery means maintaning the front and backyard layout in residential planning of new villages. The people are encouraged to create a micro pastoral layout of their farmland, like a park and with fruit trees and beautiful flowers around the house.

Ecological construction refers to respect for nature and conformity with nature. High-quality arable land, forests, fields and gardens should be strictly protected. When building houses, the relationship between mountains, water, farms, forests and roads should be dealt with properly. Digging mountains, changing canals and roads without pond filling, deforestation, passageway or basic farmland occupation should be reduced. In addition, local features such as mountains, water bodies and forests should be fully visible so that the residents can enjoy the nostalgic scenery of mountains and water.

Through implementation of the SGME model, some rural areas of Chengdu have in essence reversed the disorderly sprawl of space for rural settlement and hollowing out; besides, some rural areas have even contracted their rural settlement space. Under the guidance of the SGME concept, the village distribution planning under the administrative region of Chengdu City was prepared, which stipulated the grade, function and scale of clustering points and further guided the formation of six main modes of smart shrinkage. Next, some experience gained from SGME is summarized for a number of aspects.

Implementation Rules of the SGME Model

Hierarchy of Settlements

In the course of developing SGME, for the convenience of the management and formation of unified public service facilities, Chengdu promoted a two-level settlement configuration, 'central settlement + general settlement', in villages subject to town jurisdiction (Figure 1).

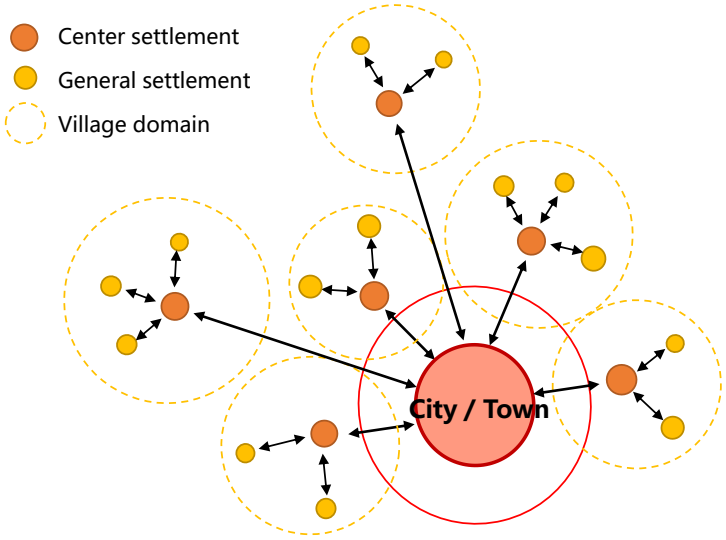

Figure 1. Rural 'Central Settlement – General Settlement' system.
(Source: drawn by the author.)

In principle, a central settlement should be appointed for each administrative village that can be developed on the basis of the original administrative village. For some larger villages, a completely new site for settlement can be adopted. The central settlement is usually the administration and service center of villages with larger populations. In the '1 + 13' standard from 2008 listed in Appendix A, which was later upgraded to the '1 + 21' standard in 2012

listed in Appendix B, facilities covering public administration, education, medical care, literature and sports, social welfare, municipal services, finance, etc. should be equipped in the central settlement. Besides, the central settlement should be located in villages with better basic conditions. If a central settlement is completely new, it should be chosen in an area with a moderate geographical location, an appropriate service radius and good traffic conditions.

General settlement refers to settlements on different scales with more than 20 households, apart from the central settlement. General settlement covers new construction, reconstruction, expansion, landscape transformation, forest management, reconstruction of dilapidated buildings, resettlement of displaced persons, land acquisition and demolition, etc., to which the necessary infrastructure should be provided.

Function of the Settlements

The SGME settlements can be functionally divided into three categories, i.e. agricultural-based, tourism-based and comprehensive settlements.

An agricultural settlement is a traditional settlement where villagers are still mainly engaged in agricultural production. This is the most universal and basic category of settlement. This category accounts for more than 50% of all rural settlements in Chengdu. As the main area for agricultural production, its mode of production should be actively transformed into large-scale and technology-based modernized agriculture.

Some villagers in tourism-based settlements are engaged in part-time work, such as the Zhouhebian settlement in Qionglai City, where villagers mainly run rural hotels or are engaged in tourism projects. Their minority income comes from farming with the majority from travel services. The development of tourism-based settlements relies much on their own geographical advantages and tourism resources, for instance, a waterfront village based on large-scale lake wetlands or rural tourism based on mountain resources, reservoirs and farmland landscapes, etc.

Generally, comprehensive settlements are central settlements where the villagers are universally engaged in part-time work, including other non-agricultural industries in addition to tourism such as agricultural product processing, handicraft industry, culture, education, production and service industries, etc. These comprehensive settlements are usually capable of gathering more resources and sustaining a larger population, and thus they are considered potential urban development zones.

Size of the Settlements

Apart from the establishment of the hierarchical system of central and general settlements in accordance with the abovementioned requirements for management and public services, there is also a size system based on the number of households and population. Among others, a large-sized settlement has more than 300 households, while a medium-sized settlement has 100 to 300 households, and a small-sized settlement has less than 100 but more than 50 households. Each administrative village is eventually developed according to the model of ‘one large and medium-sized settlement + several small and medium-sized general settlements’. Their levels, functions and sizes are as follows: in case of tourism-based and comprehensive settlements, large-sized settlements should be built correspondingly; in the case of some tourism-based and agricultural-based settlements, medium-sized settlements can be built correspondingly.

The medium and small-sized settlements correspond to general settlements with tourism-based or agriculture-based functions (Table 1).

Table 1. Level, Function and Size of SGME Model.

Level	Function	Size	
Central settlement	Comprehensive, tourism-based	Large-sized settlement	> 300 households
Central settlement General settlement	Tourism-based, agricultural-based	Medium-sized settlement	100-300 households
General settlement	Tourism-based, agricultural-based	Small-sized settlement	50-100 households

Implementing Planned Rural Settlement Consolidation with Six Types of SGME Models in Chengdu

According to the distance between the rural settlements and the town, and topographic features such as plains, hills and mountains, through the SGME model, the following types of spatial consolidation can be realized.

Move Into A City Model

This mode is generally applied to settlements within an urban planning area or close to an urban area, usually located 1 km around a plain region, 2 km from a mound, or within 3 km from a mountain region (Figure 2). Because of the convenient conditions of the geographical location, very few villagers are engaged in farm work. Instead, they are generally engaged in secondary and tertiary industries. Thus, they can better integrate themselves with cities and towns in terms of production and lifestyle. In addition, this mode still has to fulfill the relevant requirements of urban planning.

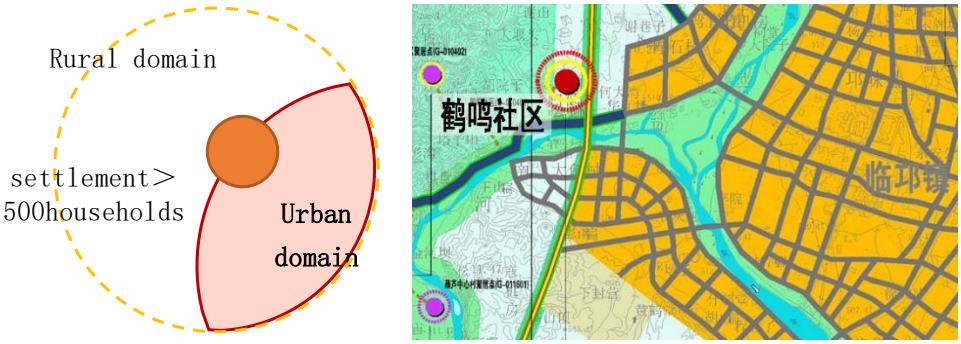

Figure 2. Move Into A City model. (Source: the left figure is drawn by the author and the right figure is from the new village planning of Linqiong Town.)

The construction mode of settlements in conformity with the said conditions is designated as the Move Into A City Model. Correspondingly, the rural inhabitants within this scope can gather in settlements in urban areas that share supporting facilities with a town. In terms of scale, settlements with the Move Into A City Model, with more than 500 households, are much larger than other rural settlements. On the right in Figure 2, the Heming Community Settlement close to Linqiong Town in Qionglai is shown.

Large Settlement Consolidation Model in Plain Regions

This model applies to large-scale villages scattered in plain areas. Generally, it has the following characteristics. The village generally covers an area of about 3 km^2 with a radius of about 1 km. The cultivation radius is small and the villagers' daily distance travelled for getting around is short. The total population of the village is about 3000 people or approximately 1000 households. Among others, 80% are mainly gathered in one or two large and medium-sized settlements of a large scale and with a centralized layout. Moreover, public service facilities are usually placed in the central settlement. After construction, these central settlements are generally designated as large-sized settlements with comprehensive functions and large populations (Figure 3).

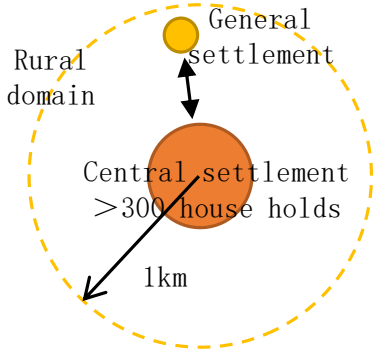

Figure 3. The Large Settlement model in plain regions.
(Source: drawn by the author.)

For the specific characteristics of this model, in terms of its scale, 1~2 central settlements have more than 300 households individually and are supported by non-agricultural industries such as tourism, agricultural products processing, production and service.

Group Settlement Consolidation Model in Plain Regions

This mode applies to villages with few changes scattered in plain regions and is especially preferable for scattered groups with better forest and tourism resources. Its construction should follow the principle of 'small-scale and group arrangement' to form 1~2 large and medium-sized settlements, generally large-scale and with multiple groups. In terms of its size, the central settlement should have over 300 households with 20-50 households for each group, which is more appropriate (Figure 4). Industry guidance should persist in 'micro pastoral scenery and ecological construction', on which basis the development of rural tourism and modern agriculture are promoted simultaneously. Public service facilities should be concentrated in the central settlement.

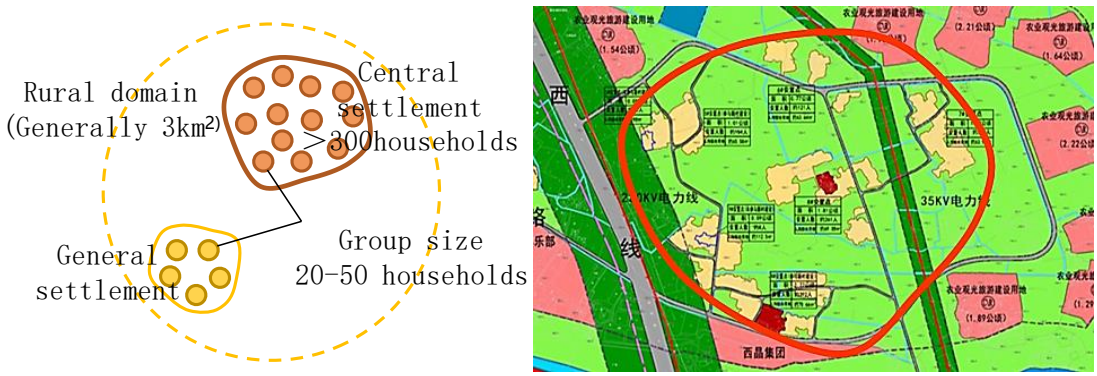

Figure 4. Group Settlement Consolidation Model in plain regions.
(Source: The left figure is drawn by the author, and the right figure is from the village planning of Qinggangshu Village, Sandaoyan Town in Pixian County.)

This model is represented by Qinggangshu Village, Sandaoyan Town, Pixian County. This village relies on the former site of Linpan in West Sichuan Province. With its ecological background and natural conditions, it has actively developed rural tourism via SGME and was proclaimed as a beautiful leisure village by the Ministry of Agriculture in 2016 (Figure 5).

Figure 5. Qinggangshu Village, Sandaoyan Town in Pixian County.
(Source: Pixian Official WeChat for Culture and Tourism.)

Small Settlement Consolidation Model in Plain Regions

This model applies to agricultural plain areas. Mainly restricted by the management level and capital conditions, it is a transitional model to the development of large settlements in plain regions (Figure 6). The model gathers more than 80% of the population mainly in 5 to 6 medium-sized settlements and their public service facilities can only be relatively concentrated. In terms of scale, each settlement generally contains 100 to 200 households and does not have an obvious central settlement. In terms of industry, medium-scale agricultural production prevails, which can be guided toward modern agriculture. As a central settlement fails to stand out, some public service facilities under this mode can be scattered in other settlements to achieve co-construction and sharing.

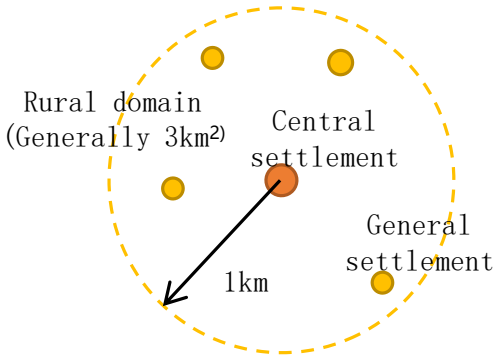

Figure 6. Small Settlement Consolidation model in plain regions.
(Source: drawn by the author.)

Overall, the survey data from the departments concerned indicate sound farmer engagement in farming under the Small Settlement model (Table 2). On the one hand, the flat terrain in plain regions guarantees convenient traffic; on the other hand, the popularization of motor vehicles has greatly expanded the scope of agricultural operations. However, 14% of the surveyed respondents still believes that inconvenient farming results from the unaccustomedness to a new life-style in addition to the longer distance to farming land (accounting for 39%).

Table 2. Survey on Farming Engagement under Small Settlement Model in Plain Regions
(Source: Survey Data from Chengdu Planning Bureau.)

Will the farming be convenient after consolidation	Proportion (%)	Reasons for inconvenient farming	Proportion (%)
Very convenient	32.6	The fixed-output-quota farmlands are too high in number and too scattered.	8.2
Relatively convenient	43.3	The fixed-output-quota farmlands are far away from home	39
Not too convenient	10.1	Far away from town	20.5
Not convenient	11	It is inconvenient to have no tool house	25.1
Very inconvenient	3	It is inconvenient to have no open space for airing corps	22.1

Centralized-Scattered Model in Hilly Regions

Villages in hilly regions generally have the following characteristics:

1. The village region is generally larger, reaching about 5 km^2 with a radius of about 1.5 kilometer;
2. As affected by the terrain, the residents have a larger radius of farming with long daily distance travelled for getting around;
3. The village generally has about 3000 people, about 1000 households.

The consolidation model combining scattering and cluttering in hilly regions mainly concentrates 50-80% of the population from 3 to 5 medium-sized settlements to form a relatively large-scale central settlement (about 200 households) and general settlements (100-150 households). The public service facilities are relatively concentrated and the main

supporting facilities are located in the central settlement while some facilities can be co-constructed and shared with other settlements. This model is mainly applicable to agricultural production-oriented villages in hilly regions (Figure 7).

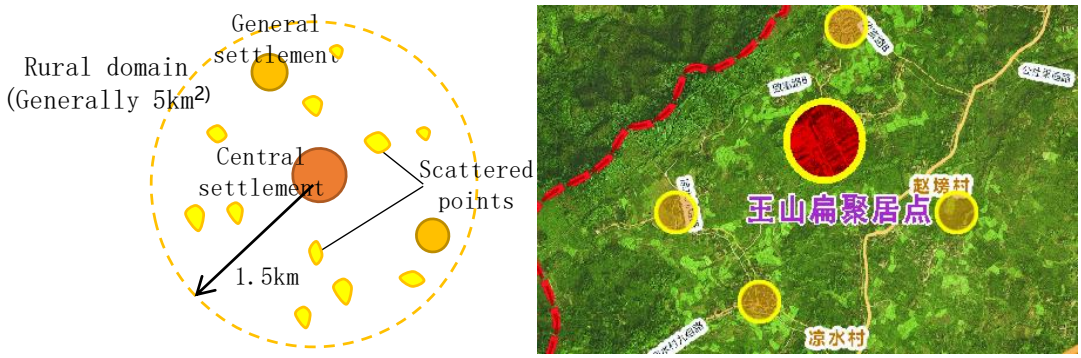

Figure 7. The Scattering-Clustering Consolidation Model in Hilly Regions.
(Source: The left figure is drawn by the author and the right figure is redrawn according to the post-disaster reconstruction planning of Linji Town in Qionglai City.)

Large Settlement Model in Mountain Regions

Villages in mountain regions generally have the following characteristics:

1. A large area with different shapes, about 10 m^2 on average and a radius of about 2 to 3 km;
2. Similar to hilly regions, as affected by the terrain, the residents' farming radius is large with long daily distance travelled for getting around;
3. The village has about 1,000 residents from about 300 households (Figure 8).

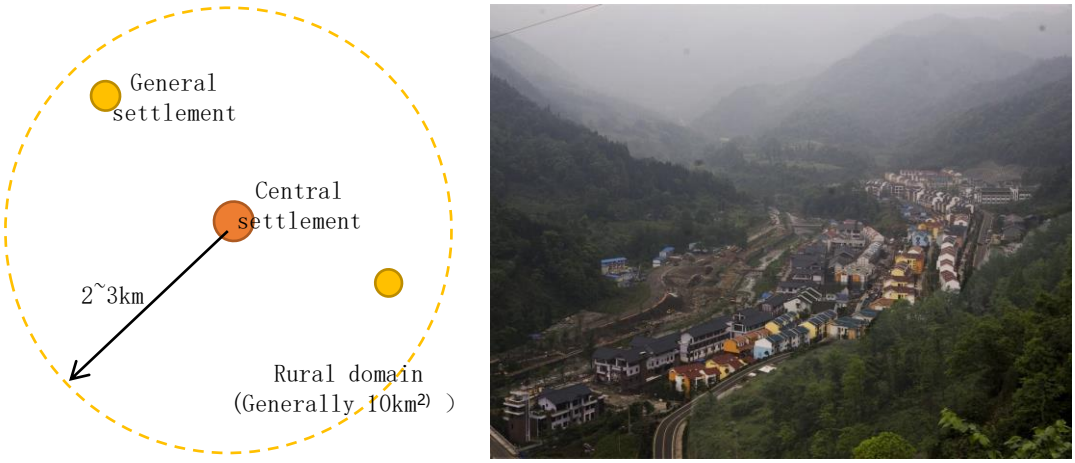

Figure 8. Consolidation Model of Large Settlements in Mountain Regions
(Source: the left figure is drawn by the author and the right figure is a photo of the rural settlement in Pengzhou City.)

The way of consolidation is mainly to guide the villagers in the mountain regions to migrate to hilly and plain regions first and then highly cluster the remaining residents, similar to large settlements in plain regions. This model is conducive to allocating public service facilities or concentrate tourism development.

The scale of the settlements under this mode is generally 150 to 250 households in small and medium-sized settlements. The industry there gives priority to economic forest, alpine farming or characteristic rural holiday tourism. For public service facilities, in addition to the central settlements, the general settlements should also be taken into appropriate consideration.

Challenges for the Implementation of SGME Model

While the Chengdu municipality has re-built its rural areas according to the SGME model, there are also some inevitable problems awaiting solution: sustainable funding, emerging new-type 'hollow villages', and maintaining rural characteristics.

Sustainable Funding

The funding for rural settlement space development in Chengdu primarily comes from three sources. First of all, government finance. Financial appropriation is a steady source of funding for rural construction. In 2015, for example, the general public budget revenue from the whole year was RMB 115.76 billion, of which RMB 3.481 billion[3] was invested in agriculture, mainly used for promoting the development of modern agriculture, ensuring moderate scale management of agriculture, promoting the development of rural tourism and guaranteeing the construction of farmland with high standards. In addition, some corresponding financial investments were also made in relevant urban and rural infrastructures, environmental protection, education, poverty alleviation and other agriculture-related sectors. The financial appropriation is stable but limited in total amount. It is mainly used for basic financial guarantees.

Secondly, land property transaction. In October 2008, Chengdu established the first comprehensive trading market of rural property rights in China, on which the contractual management land right, the use right of constructive group land, indicators of the homestead reclamation of farmland balance, can be circulated. At the end of 2012, the Chengdu Rural Property Exchange had accomplished 16,000 transactions in total and realized an investment of RMB 37.972 billion of social capital to rural areas. In addition, rural properties were mortgaged up to RMB 1.713 billion[4] direct loans. The rural construction funds acquired from land property transactions are huge, but these funds are obviously affected by industrial development because they are linked to urban construction land, especially industrial land. In recent years, with the recession of the manufacturing industry and under the situation of de-stocking and de-capacity, the growth of industrial land in Chengdu has obviously slowed down, which will directly affect the amount of rural construction funds as acquired from property right transactions.

Thirdly, the post-disaster reconstruction fund. Chengdu experienced the Wenchuan earthquake in 2008 and the Lushan earthquake in 2011, which locally caused huge losses, however, the post-disaster reconstruction has also provided rare opportunities for rural development. For example, Chengdu raised more than RMB 30 billion[5] for post-disaster reconstruction after the Wenchuan earthquake and the central government subsidized RMB 46 billion[6] for three years

[3]http://www.cdcz.chengdu.gov.cn/zwgk/detail.jsp?id=2610

[4]http://news.ifeng.com/exclusive/lecture/special/difang/content-4/detail_2014_01/10/32912380_0.shtml

[5] http://news.xinhuanet.com/newscenter/2009-05/04/content_11311873.htm

[6] http://e.chengdu.cn/html/2013-07/21/content_414068.htm

after the Lushan earthquake, which was comprehensively arranged by the Sichuan provincial governement in a unified manner. The post-disaster reconstruction funds were regarded as large funds with a specific function. As one-time sources of funding, their sustainability is restricted (Anggita, 2013).

Emerging New-type 'Hollow Villages'

With the implementation of a strict land management system, Chengdu has very strict restrictions on newly-built houses in rural areas. As stipulated, a villager in a rural area can only possess one homestead and in principle the construction of new homesteads will not be approved any more. This has greatly reduced the trend of rural settlement. For those who really need to build a new house, they should withdraw from their old homestead and reclaim and pass the inspection and acceptance according to the regulations and only then can enter a centralized relocation site under unified planning and construction. Although the new residential buildings have a good architectural style, construction quality and residential environment, it has been found during the research that the vacancy of these newly-built residential buildings was even more obvious than in the case of the old ones in the villages. One of the important reasons for this phenomenon lies in the discrepancy between the ability of building a house and the actual need of it for living in. Although new houses are subsidized by national policy, including transaction revenue of the homestead reclamation index and post-disaster reconstruction subsidies, etc., they still cost much for some rural families after deduction of these subsidies because the majority of these families are engaged in agricultural production locally and greatly desire to improve their housing conditions but generally have low income and only a low portion conducts demolition and replacement. As a result, the majority of farmers who have constructed new houses at a relocation site still worked outside with better economic conditions, but they didn't actually live locally, resulting in a new type of 'hollowness'.

Maintaining Rural Characteristics

Similar to China's proposal of building a new socialist countryside and building beautiful and happy new villages, the model as adopted by the rural construction of Chengdu is also strongly promoted from top to bottom. Taking SGME as an example, the early SGME was utilized as a reference by other rural areas in Chengdu for local rural construction; however, with the acceleration of rural construction in a later period, the managerial level increasingly demanded a simple, efficient and uniform tool to cope with more and more issues in rural construction (Bell et al., 2010). In this case, SGME gradually became a kind of standard and identity. As the SGME standard, Chengdu has specially formulated a set of rules and regulations, that all construction of residential areas in Chengdu must fulfill.

In fact, it is a kind of rough management, which will be likely to eradicate the characteristics of rural construction and limit a diversified development of rural space as well. SGME, as an identity, is related to Chengdu's capital support of all districts, counties and villages. Only approved villages with outstanding conditions that meet the requirements can wave the SGME flag and can be supported by the government at all levels in terms of policy and capital. As a matter of fact, the majority of villages that have been selected usually already had good conditions of development on their own, for example, a superior geographical location, a special agricultural product or good natural resources. The SGME flag and the further support has only provided icing on the cake. However, the many villages that missed the selection need timely assistance but have difficulty in obtaining external support; therefore, their development will

inevitably be limited. Thus, the practice of SGME has widened the gap in rural development to a certain extent.

Conclusion and Discussion

The six types of SGME models represent some of the best practices of planning and implementing smart shrinkage in rural China (Table 3). On the basis of the aforementioned six models, there are three major basic principles.

First, 'guide the villagers to go downhill from mountain regions', or, to be more specific, guide mountain villagers to transfer to adjacent plains or hilly regions while no longer increasing the population, no longer developing comprehensive villages, and no longer undermining the natural environment in mountain regions.

Secondly, 'guide the villagers from hilly regions to move into towns', or, to be more specific, guide villagers in hilly regions to cluster in plain regions or towns. Meanwhile, the hilly regions will be mainly utilized for developing production forestry, alpine farming or tourism.

Table 3. Comparison of SGME Spatial Consolidation Models
(Source: drawn by the author.)

	Small settlements in plain regions	**Large settlements in plain/mountain regions**	**Group settlements in plain regions**	**Scattering-clustering combination in hilly regions**
Settlement hierarchy	Moderate（50%-80%）	High（＞80%）	High（＞80%）	Moderate (50%-80%）
Supporting cost	Moderate	Low	Moderate	High
Scope of application	Plain villages lacking management and capital; traditional farming-based villages	Comprehensive villages in plain regions; mountain regions	Small change. This mode is preferred in tourism-oriented regions and regions with sound forest resources	Hilly agricultural regions with large populations
Characteristics and problems	Suitable to develop modern agriculture	Demand for industrial support, otherwise the traditional farming mode is unsustainable, employment and life will be difficult; low supporting cost	The ecological condition is good and conducive to forest reservation, suitable for diversified development	Hard for agriculture to achieve scale and modernized development, can be transformed to specialized development.

Thirdly, 'first develop the plain regions'. For the villages in plain regions, on the one hand, the protection of traditional forests in West Sichuan Province should be enhanced and the construction of large and medium-sized settlements by means of group settlement in Linpan landscape should be encouraged; on the other hand, the boundaries of settlements should be strictly controlled to prevent disorderly spread. After concentration, original village homesteads

should be strictly reclaimed, checked and accepted as stipulated. In terms of industry, traditional agriculture should be upgraded towards mechanization, scale and precision (Kustiwan, 1997).

In clustering scattered villages to better allocate public service facilities and improve the efficiency of resource supply, SGME has achieved favorable results through all six models of planning and construction. In the meantime, some problems have not been solved, such as unsustainable funding and obscure rural characteristics, etc.

Concerning the six models for rural human settlement shrinkage of Chengdu, it can be concluded that the key factors for success lie in the high-level economic development and urbanization of Chengdu itself, accompanied by the strong trend of rural-urban population flow. For other developing countries, under the premise of meeting these two conditions, Chengdu's specific practices could be a good reference. These findings shed light on the planning of similar areas in other developing economies, especially those with a distinct rural-urban dual system.

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