Chapter 2
A Multi-scaled Analysis of the Shrinking Population in a Region with Out-Migration: A Case Study of Hunan Province

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Abstract Using the international "shrinking city" theoretical framework and China's Fifth and Sixth National Census data, this study conducted quantitative analyses regarding the shrinking population phenomenon at multiple geographical scales, from provincial to township, in Hunan Province in central China. From the statistically based analysis, three main types of shrinkage were identified at the county scale: "A hollowed-out labor force," wherein the population shrinks and the economy develops slowly in low-level urbanizing areas because of labor output;" Population take-over," wherein population outflow and the economy develop slowly in urbanizing areas affected by central cities nearby that develop rapidly; and " Resource degradation," wherein the economy declines in highly urbanized areas with a shrinking population. Furthermore, one case study was conducted to further reveal the details of the shrinking mechanism as well as the relevant policy responses.

Keywords Shrinking cities · Out-migration · Multi-scaled analysis · Hunan Province · Central China

2.1 Introduction

With the slowing down of the global economy, studies investigating the concept of the "shrinking city" (SC) have raised concerns regarding the view that growth is the only path to development (Rieniets 2009). Those cities and regions that have suffered population and economic decline in the last century have become examples with which to explore alternative methods for sustainable urban development in no-growth environs (Leo and Brown 2000; Savitch and Kantor 2003; Camarda et al. 2015; Wiechmann and Bontje 2015). Literature on SCs and their urban policies in the last decade started by defining the concept of the SC to create a common ground for discussion (see Fig. 2.1) (Häußermann and Siebel 1988; Haase et al. 2014; Großmann et al. 2013; Beauregard 2007, 2009; Freixas and Fernandez 2014;

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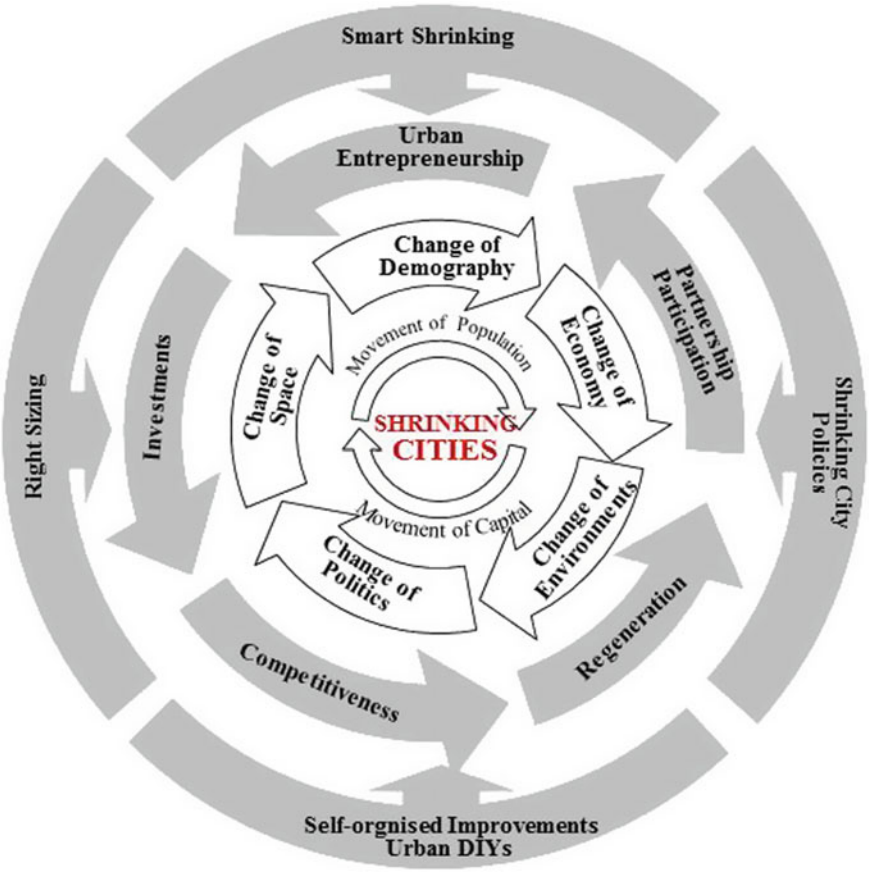

Fig. 2.1 The shrinking city research framework

Hollander and Németh 2011; Bernt et al. 2014; Audirac et al. 2010). Then, following the natural logic of shrinkage, researchers have contributed valuable findings about the "phenomenon," "causality," "mechanism," "typology," and "consequences" of urban shrinkage. Recently, a number of papers have examined policy strategies and planning responses as operational methods to react or adapt to shrinkage (Häußermann and Siebel 1988; Haase et al. 2014; Großmann et al. 2013; Beauregard 2007, 2009; Freixas and Fernandez 2014; Hollander and Németh 2011; Bernt et al. 2014; Audirac et al. 2010; Martinez-Fernandez et al. 2012a; Bontje 2001; Pallagst 2005; Turok and Mykhnenko 2007; Wiechmann 2008; Hollander et al. 2009; Schilling and Logan 2008).

Ever since the SC concept was first introduced to the academic community, researchers around the world have contributed case studies to reveal context-based (but similar) examples of population decline in city development. They started with old industrial cities like Manchester and Birmingham in the United Kingdom, and then moved toward much larger scaled deindustrialization cases in the northeast United States. While German and East European SCs resulted from political change, isolated cases in Japan and West European countries occurred because of a very complex situation involving globalization, aging populations, resource degradation, deindustrialization, and technological innovations. More recently, studies of SCs in Russia and Northeast Asia have shown a belt of abandoned urban habitats along the old Silk Road. Despite the prevalence of SCs, few studies have investigated the SCs of inland China, although this area has been clearly marked as an area of population decline in the world map of shrinking cities (2005–2015) produced by Oswalt (2005) in the book "Shrinking City."

Despite radical growth in China's coastal metropolises, many cities and inland regions have endured continuous population loss in recent decades (Wu et al. 2015). With reference to international SC theory, which developed from cases in North America (Freixas and Fernandez 2014; Hollander and Németh 2011), Eastern Europe (Häußermann and Siebel 1988; Haase et al. 2014; Großmann et al. 2013; Beauregard 2007, 2009; Freixas and Fernandez 2014; Hollander and Németh 2011; Bernt et al. 2014; Audirac et al. 2010; Martinez-Fernandez et al. 2012a; Bontje 2001; Pallagst 2005; Turok and Mykhnenko 2007; Wiechmann 2008; Hollander et al. 2009; Schilling and Logan 2008), Japan (Martinez-Fernandez et al. 2012b), and the United Kingdom (Bernt et al. 2014), Chinese researchers now focus on revealing the situation, process, and mechanism of population shrinkage in Chinese cities. Their studies have claimed that uneven investment, out-flowing migration, changes to the global market, and resources depletion may be the reasons behind urban decline, even in China's period of rapid urbanization (Yang et al. 2013; Wang et al. 2014; Mao et al. 2015).

This chapter seeks to include a case study of Hunan in the international comparative study of SCs around the world. This province is a typical example of a central Chinese region, whereby population shrinkage is occurring within a process of rapid urbanizing. In recent decades, ambitious local governments (which have been very proactive in their attempts to reboot the economy despite issues surrounding environmental costs and sustainability) have worked hard to redevelop the "ghost towns" and "empty districts" in SCs in Hunan. To disentangle the problem of population decline in an era of rapid urbanization, this chapter first starts with a quantitative description of Hunan's demographic change and its spatial pattern at province, prefecture, and county levels. To follow, three counties were selected for an in-depth examination to reveal stories of decline as well as various policy responses at the local level.

2.2 Population Shrinkage in Hunan

Hunan Province is located in central China. In comparison to the economy of China's southeast coastal regions, it is a relatively underdeveloped region. In terms of GDP, it ranked 10th of 31 provincial administrations in 2010. Furthermore, since the start of China's boom period in 1979, Hunan Province has been considered a major supplier of labor. More than 6.5 million workers from the region traveled to coastal provinces like Guangzhou for work during 2000–2010. At the same time, the province has enjoyed significant urbanization, with its urbanized population growing from 29.8 to 49.4% between 2000 and 2010. However, that period also marked the start of the trend of population decline and this has become a main issue for local authorities in Hunan.

Using data from 2000 and 2010 national censuses, a map of demographic change in Hunan at a district/country level (on average, 20,000 population per unit) was produced (see Fig. 2.2). This map shows 1,727 districts/countries, and approximately 61% of these experienced a decline in population during the 10-year period. The map shows that the population surrounding the cities is also shrinking. Population shrinkage is obvious in this rapidly urbanizing province, as are the growth of some cities and the decline of others, and both are occurring at the same pace. To fully understand Hunan's shrinking population map, a multi-scaled analysis was conducted in which demographic change was further explained with other social and economic data using various geographical scales and administrative divisions.

2.3 History of Demographic Change and Trends

At the province level, the history and projection of demographic change provide necessary background information (see Fig. 2.3). Between 2000 and 2010, Hunan benefited from its "demographic dividend," with an abundant labor force and high labor allocation efficiency. Even after more than 6.5 million workers left the region for work (the dark gray area in Fig. 2.3), Hunan's total population still increased by 3.8%, and the working-age population (aged 15–64) increased by 3.15 million (the light gray area). Thus, despite the large out-migration, Hunan's urban population (the slash area) grew from 29.8 to 43.3% in this period. This develops trend continued in 2010–2015. However, as a consequence of the enforcement of China's one-child policy in the 1980s, Hunan's total population growth began to slow (see Fig. 2.4), foreshadowing a shrinking of the labor pool, which is already occurring according to recent statistics.

At the same time, the provincial government expects that the total population will reach about 78 million by 2020 (the upper dash-dot line in Fig. 2.3), while a mathematical model projects a smaller increase (68 million) (the upper dash-dot line). Therefore, Hunan's urbanization process in the next decade (targeting 58%, see Fig. 2.3) is expected to be driven by either further in-situ urbanization or the

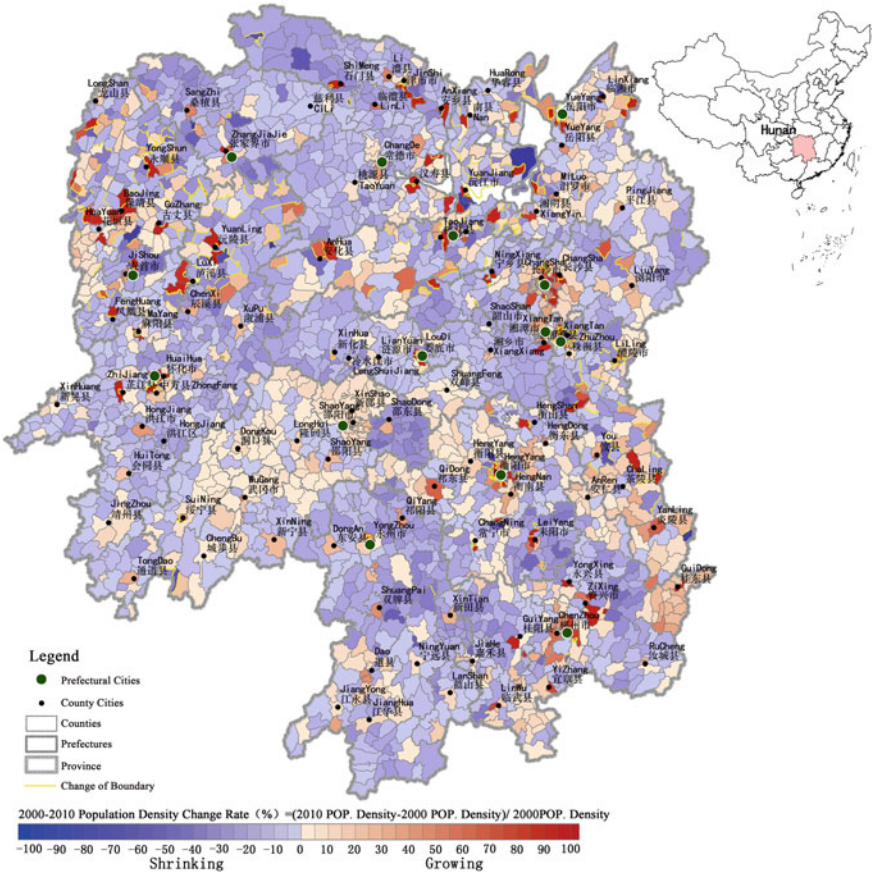

Fig. 2.2 Map of Hunan's shrinking population at the township level, 2000–2010

possible return of workers, which could exacerbate population shrinkage in some bordering areas.

This expectation of growth is better explained in a prefecture-level analysis.[1] According to census data, only the provincial capital city (Changsha) enjoyed double-digit population growth between 2000 and 2010. The total population of all 14 prefectures grew by 3.8%. However, this figure is expected to reach 19.84% between 2010 and 2020 by adding together the population projections included in the local government's urban master plan (see Table 2.1). Despite the growth rate being generally low (even negative) in the last decade, many prefectures are planning for growth to meet the so-called land finance requirements, in which local governments have placed a heavy reliance on land-leasing revenues in recent decades. This practice has

[1] Prefecture-level cities in the context of China refer to administrations under provincial government that govern not only urban areas and surrounding counties but also rural areas within their boundary.

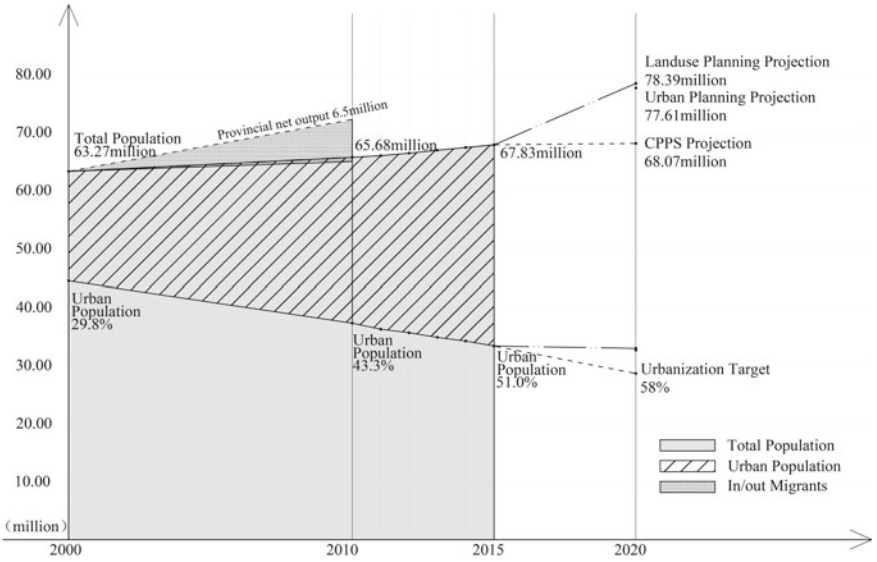

Fig. 2.3 Hunan's urbanization pathway and projection

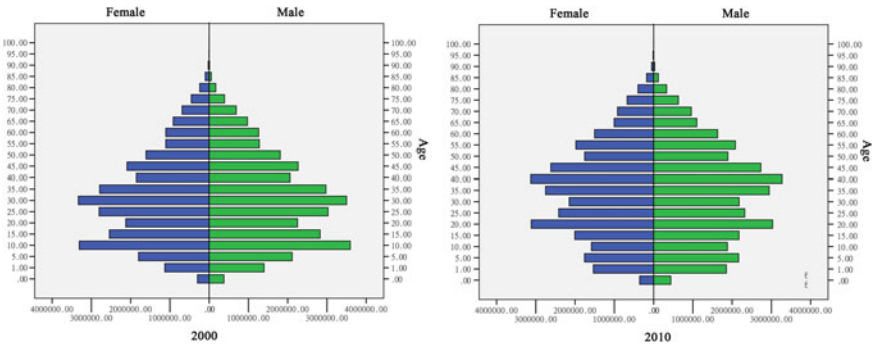

Fig. 2.4 Age structure change in Hunan (2000–2010)

attracted widespread criticism because of the various potential risks and problems. Such a mismatch between a high growth expectation and shrinking population has led local governments to overinvest in urban infrastructures, creating a number of ghost towns, empty industrial parks, and "depressed shopping streets," as well as large local government debts.

Table 2.1 Population change and projections for prefectures in Hunan (million)

Prefectures	2000	2010		2020 urban master plans	
	Population	Population	Growth from 2000 (%)	Projection	Growth from 2010 (%)
Changsha	6.14	7.04	14.7	10.00	42.0
Zhuzhou	3.58	3.86	7.8	4.25	10.1
Xiangtan	2.67	2.75	3.0	3.40	23.6
Hengyang	6.78	7.15	5.5	7.60	6.3
Shaoyang	6.96	7.07	1.6	8.20	16.0
Yueyang	5.01	5.48	9.4	5.90	7.7
Changde	5.74	5.71	−0.5	6.70	17.3
Zhangjiajie	1.49	1.48	−0.7	1.72	16.2
Yiyang	4.31	4.31	0.0	5.00	16.0
Chenzhou	4.32	4.58	6.0	5.05	10.3
Yongzhou	5.37	5.19	−3.4	6.36	22.5
Huaihua	4.64	4.74	2.2	5.75	21.3
Loudi	3.78	3.78	0.0	4.55	20.4
Xiangxi	2.46	2.55	3.7	3.13	22.7
Total	6.33	6.57	3.8	7.76	18.2

2.4 Identification and Classification

At the county level,[2] an analysis that combines demographic census data with socioeconomic data could help to further identify shrinking administrations and reveal a possibly exhaustive set of shrinkage categories.

To identify shrinking administrations, counties with shrinking population and working-age population have been mapped (see Fig. 2.5), and density data were also included to eliminate the possible influence of changing boundaries. Of the 101 county-level administrations, 44 have experienced population shrinkage, 33 a decline in their working-age populations, and 45 have faced a decline in population density. Similarly, 36 counties experienced a decrease in working-age population density. For 31 counties, the synchronized shrinking of all four categories of census data are a result of the migration of labor force, which means the aging issue has not been a major cause of population decline, to date. Therefore, the working-age population was chosen as the index for demographic change at the county level.

In Hunan between 2000 and 2010, a three-dimensional index was used to classify the shrinking counties: (1) population change (i.e., working-age population), (2)

[2]County-level cities refer to administrations under the prefectural government that governs surrounding towns and rural areas within the boundary.

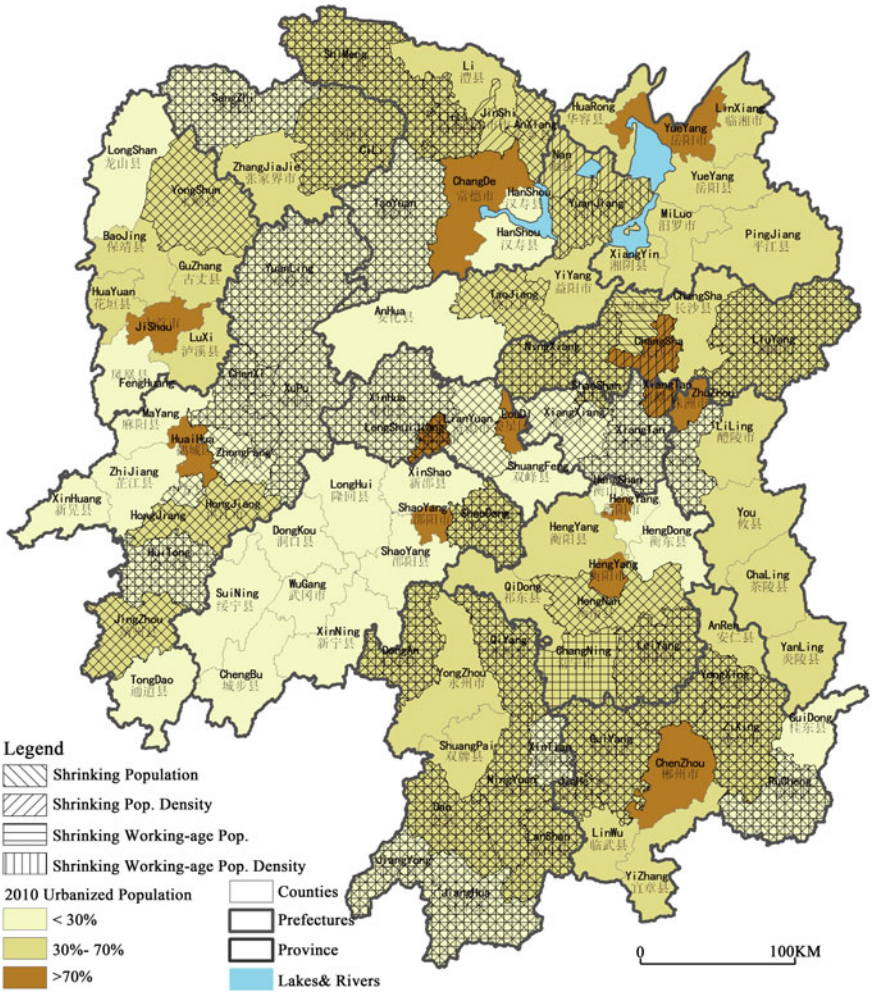

Fig. 2.5 Population shrinkage and urbanization rates of counties in Hunan

economic status (i.e., GDP growth rate compared with the provincial average), and (3) urbanization phrase (i.e., achieving urbanization rates of 30 and 70%) (see Table 2.2).

Looking at all 101 counties (see Fig. 2.6), three types of shrinking administrations were identified: (1) "A hollowed-out labor force," wherein the population shrinks and the economy develops slowly in low-level urbanizing areas because of the loss of the labor force to other areas, for example, Taoyuan (桃源县), Rucheng (汝城县), Xupu (溆浦县), Dongkou (洞口县), Wugang (武冈县), and Huitong (会同县); (2) "Population take-over," whereby in an area that previously enjoyed strong urbanization, a proportion of the population migrates to other areas and the economy slows down because of competition from nearby cities, for example, Shaodong (邵东县),

Table 2.2 Cross-tables of population shrinkage and urbanization, and GDP growth in counties in Hunan, 2000–2010

Working-age population change	Pre-urbanization <30%	Urbanizing 30–70%	Urbanized >70%	Economy growth high	Economy growth average	Economy growth low
Severe shrinking <−10%	–	Shaodong, Wangcheng, Qiyang, Shimeng	–	Shaodong	Wangcheng, Shimeng, Qiyang	–
Minor shrinking −10 to −5%	Taoyuan, Rucheng, Xupu, Xiangtan, Zhuzhou, Shangzhi, Xintian, Jianghua, Xinhua	Shaoshan, Guiyang, Jiahe, Dao, Ningyuan, Ningxiang	–	Taoyuan, Rucheng, Xupu	Xiangtan, Zhuzhou, Shaoshan, Shangzhi, Guiyang, Jiahe, Dao, Ningyuan, Xintian, Jianghua, Xinhua	Ningxiang
Stagnation −5 to 5%	Dongkou, Wugang, Huitong, Xiangxiang, Hengyang, Hengshan, Longhui, Xingning, Anhua, Jiangyong, Yuanling, Chenxi, Xinghuang, Tongdao	Hengnan, Leiyang, Changning, Pingjiang, Anxiang, Li, Liling, Cili,Taojiang, Yuanjiang, Yongxing, Linwu, Zixing, Dongan, Shuangpai, Lanshan, Hongjiang, Yongshun, Liuyang	Lengshuijiang	Dongkou, Wugang, Huitong	Xiangxiang, Hengyang, Hengnan, Hengshan, Leiyang, Changning, Longhui, Xinning, Pingjiang, Anxiang, Li, Liling, Cili, Taojiang, Anhua, Yuanjiang, Yongxing, Linwu, Zixing, Dongan, Shuangpai, Jiangyong, Lanshan, Yuanling, Chenxi, Xinghuang, Tongdao, Hongjiang, Lengshuijiang, Yongshun	Liuyang

Note (1) Working-age population data are from the 5th and 6th national censuses; (2) Urban population data are from the "Hunan Statistical Yearbook 2011". (3) "Economic growth low" means that the GDP growth rate is more than 1 std. below the provincial average (13.9%), i.e., <10.3%; "Economic growth average" means that the GDP growth rate is between 1 std. above and below the provincial average (13.9%), i.e., 10.3–18.4%; and "Economic growth high" means that the GDP growth rate is more than 1 std. above the provincial average (13.9%), i.e., >18.4%

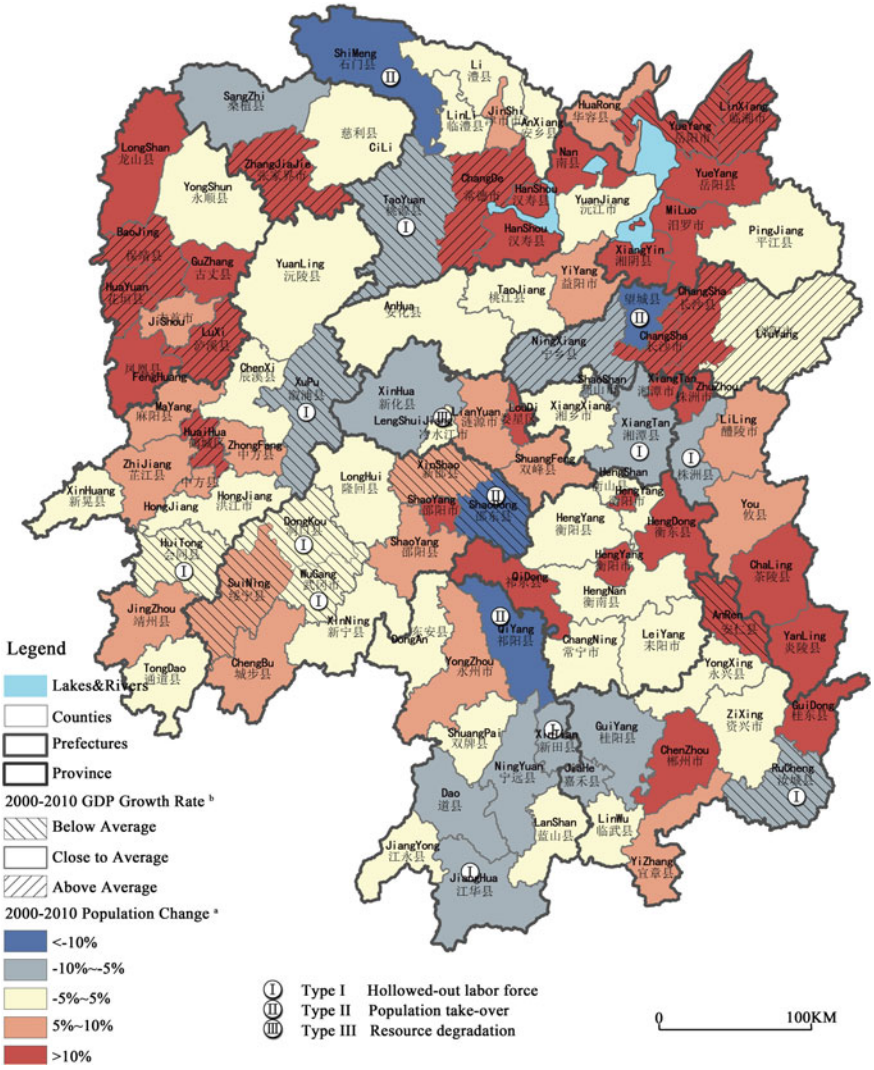

Fig. 2.6 Population shrinkage and GDP growth rates of counties in Hunan

Wangcheng (望城县), Qiyang (祁阳县), and Shimeng (石门县); and (3) "Resource degradation," wherein the economy declines in highly urbanized areas with a shrinking population, for example, Lengshuijiang (冷水江市).

Regarding the three types of shrinking administrations, one case study was conducted to further reveal the details of the shrinking mechanism as well as the relevant policy responses.

2.5 Case Studies

2.5.1 Taoyuan

Located in western Hunan, Taoyuan County is a typical agricultural-based inland administration with poor road access and weak economic conditions. With limited natural resources to exploit and a lack of investments from the outside, Taoyuan's economic development and its urban infrastructures sit far behind that of other counties in Hunan. Because of these backward conditions, the only solution to the poverty issue was to encourage people to find work outside the county. As a result, 18.94% of the registered population in Taoyuan was working outside the county as of 2010, which created a depopulated region with many shrinking towns and villages.

Local government's responses to the out-migration of the labor force have dramatically changed in recent decades. Between 2000 and 2010, workers were advised to seek employment outside the county, and this policy was considered an effective measure to fight poverty. The county government actually encouraged young people to move out of the area, even provided necessary job training for them, with the hope that their wages would increase the average household income. The government also hoped to develop a nationwide reputation for producing a high-quality workforce, with the expectation that the workers would return with their savings and technical expertise to develop their hometown. It was not until 2011 that the local government realized that out-migration would not necessarily boost local development. Despite best intentions, Taoyuan's "hollowed-out labor force" is now a major concern of policymakers, as the strategy has also resulted in numerous abandoned farmlands and broken social ties. Therefore, the development strategy has been reframed to include an awareness of population shrinkage to strengthen Taoyuan's own autonomy in economic and urban development.

Taoyuan's strategy is to target both the depopulation problem and its economic problem (see Fig. 2.7). On the one hand, to set local urbanization on track, the strategy aims to attract both urban inhabitants and tourists. The former relies on urbanizing the rural population and the return of migrant workers, for whom there are new housing developments in place. The latter is to promote tourism by marketing the natural environment using the region's name—Taoyuan (which is a well-known cultural metaphor for escapism and utopia in Chinese literature). However, the local economy is expected to be further driven by establishing labor-intensive factories or hi-tech businesses in an enterprise zone, as well as a new service sector with connections to eco-agriculture and tourism.

2.5.2 Shaodong

The inland county of Shaodong has also struggled in the past to address poverty in the region; however, when the concept of the market economy was first introduced, some

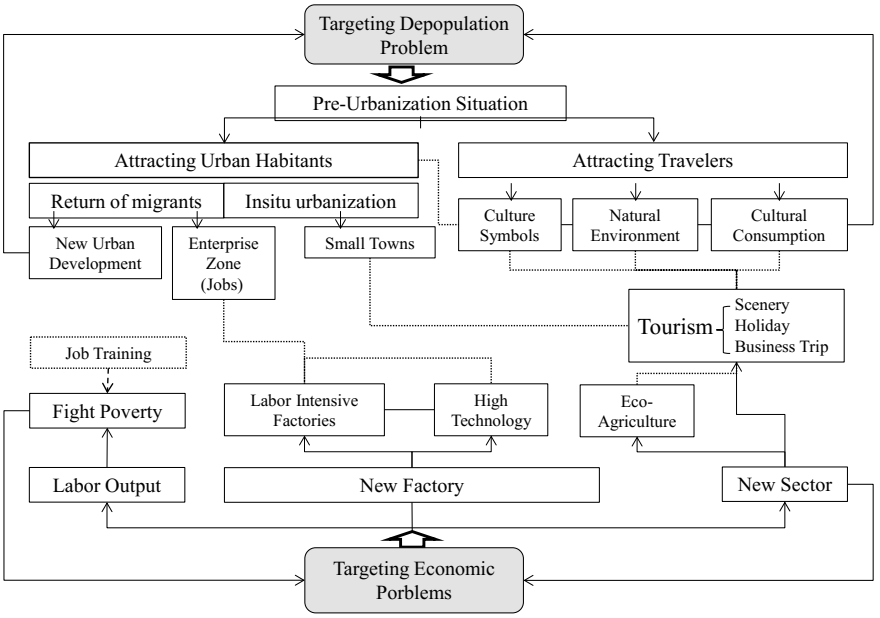

Fig. 2.7 Taoyuan's policy responses to a shrinking population

locals recognized the opportunities presented by China's reform and opening-up in the early 1980s. Local merchants starting purchasing and selling goods nationwide, and they were then able to create successful retail and wholesale businesses. At its peak in the 1990s, there were over 80 specialized trading centers in Shaodong, which were all built and managed by private investors. This resulted in high GDP and local government revenue in the 1980s and 1990s. At one stage, Shaodong ranked 5th in the province in terms of economic strength. With such remarkable economic achievements, this inland county was named the first "Experimental Zone for Development of Private Economy" (民营经济改革与发展试验区) in Hunan.

However, the market changed with the coming of the new millennium. First, an increase of politically powerful competitors with better road access, such as Changsha and Shaoyang (a prefectural city), soon took over Shaodong's business as well as its population. Second, the introduction of online shopping in China further accelerated the devastation of Shaodong's small commodity businesses. The number of registered vendors dropped from 6,800 in 1998 to 5,800 in 2002, and then to 150 in 2010. Shops were closed and the owners left the area with their employees, looking for business opportunities elsewhere. As a result, Shaodong's registered population living outside the county increased from 7.5% in 2000 to 34.7% in 2010, while the loss of the itinerant market workers has also exacerbated the situation.

Local government's responses to the change in the market can be categorized into three phases. First, between 2000 and 2005, efforts were made by local government to reclaim the region's business success by refurbishing, rebuilding, and reorganizing

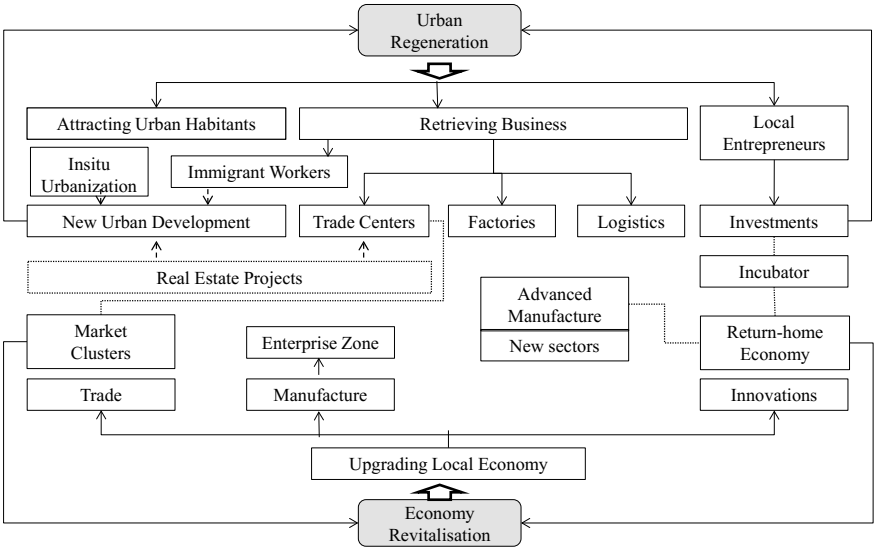

Fig. 2.8 Shaodong's policy responses to its shrinking population

existing trading venues with the hope that improvements to the physical environment (as well as the management standard) of the markets could once again attract business. Obviously, this attempt failed. Second, the local government's vision for urban regeneration was extended to include other aspects of the city between 2006 and 2015. Thus, Shaodong aimed to strengthen its manufacturing sector by welcoming investments in enterprise zones, and to create a better living environment for residents and businesses. Third, recognizing the value of a social network for those successful entrepreneurs who earned their first profit in Shaodong many years ago, the local government introduced a policy initiative in 2016 called the "return-home economy" (返乡经济). The aim was to use investments from local entrepreneurs to set up new factories that would become business incubators for small enterprises and technological innovation. Thus, Shaodong's strategy is to transform the former merchant city into a fully functional modern city through urban regeneration and economy revitalization practices, while also recognizing the importance of human resources in the process (see Fig. 2.8).

2.5.3 Lengshuijiang

Lengshuijiang, a SC in Hunan categorized as suffering "resource degradation," follows the same trajectory as similar areas elsewhere in the world. The key contributing elements toward Lengshuijiang's resource degradation, the so-called "resource curse," are antimony, iron, and coal mining. The depletion of natural resources

together with ever-tightening regulations enforced by national government (which has committed to move toward a green economy) has put an end to the area's centuries-old reliance on mining and metallurgy. Mining operations began to close down, following other small firms sitting at the end of the industrial chain. More than 30% of the population left Lengshuijiang's mining cities between 2000 and 2010, leaving behind a heavily polluted environment and damaged ecology. The mining town Xikuangshan (the mining town) and Lengshuijiang (the main city), were then trapped in a typical and vicious circle of urban shrinkage.

Seeking to revitalize both the economy and the city, the local government reached out to the national government for funds and aid, aligning local actions with the central government's desire to move toward sustainable economic development. Lengshuijiang was included in a list of 44 resource-exhausted cities published by the state council in 2009, and 1.3 billion RMB was channeled into the area via various resources. Some of the funds were designated to remedy the polluted land/water and the ecological degradation, and another portion was earmarked to improve urban living by supporting necessary public services such as education and medical care. National government also supported Lengshuijiang to restructure its economy by providing subsidies for technological upgrades and compensation for the closing mining/metallurgy factories.

A further strategy was to find possible triggers for new urban developments. For example, Lengshuijiang's master plan aims to attract middle-class populations to settle in the city by creating a new urban expansion with quality spaces for modern urban living. With the hope of attracting tourists, attempts have also been made to rebrand the city from a place of "resource degradation" to a landscape with rich cultural memories and industrial heritage (see Fig. 2.9).

2.6 Conclusion

Statistically based forecasts at the province level predict an imminent slowing down of total population growth and an ongoing decline of the working-age population in Hunan Province. Based on such predictions, Hunan's urbanization process in the next 10 years will be driven mainly by either the "possible return of migrants" or "further in-situ urbanization," which could exacerbate population shrinkage in some bordering areas. A comparison of historical demographic data with the prefecture planning proposals reveals that government's expectations for further population growth are too high (Zhou et al. 2017a).

Furthermore, an evaluation of population changes data and urbanization and GDP growth rates between 2000 and 2010 at the county level show three main reasons for decline: a hollowed-out labor force, population takeover, and resource degradation. Counties like Taoyuan once encouraged their workers to move to other regions as a means to reduce poverty. However, that county now needs to identify the necessary endogenous drivers for sustainable economic development, without losing a significant proportion of its population. Counties like Shaodong, who enjoyed a glory

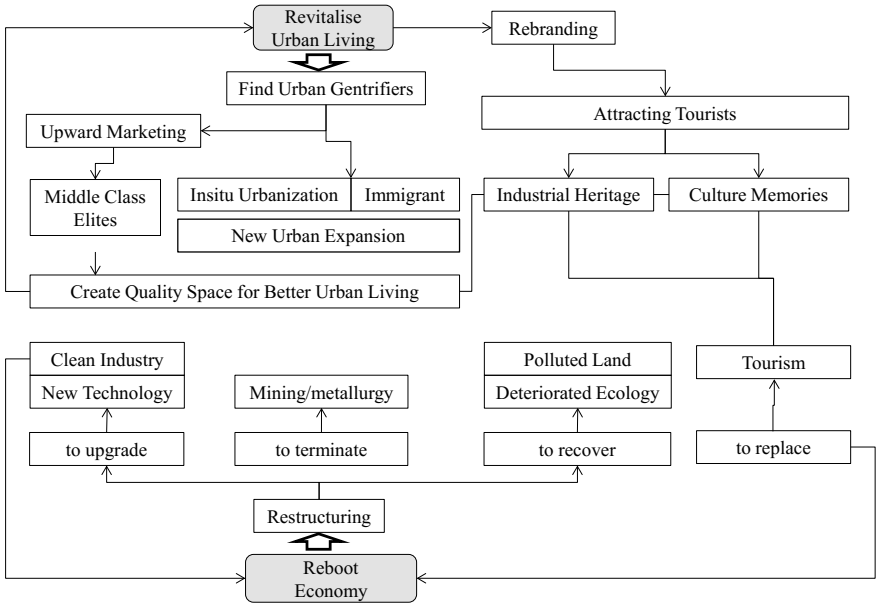

Fig. 2.9 Lengshuijiang's policy responses to its shrinking population

time in China's period of economic reform, face the challenge of a rapidly changing market. If local government is not able to properly react, Shaodong could easily become an SC. Counties like Lengshuijiang have received a large amount of funding from the national government. However, if the local population cannot be retained, the aggressive urban development of the local government will only further hinder attempts to revitalize the region.

Population shrinkages in regions with out-migration, such as many provinces in central or western China, are closely linked to the rapid urbanization of megacities in coastal regions, mostly led by migration flows and then by the return of workers. By studying Hunan's shrinking administrations, it is clear to see that population growth and decline in a rapidly urbanizing China are two sides of the same coin (Zhou et al. 2017b). Taking a broader view, the same can be said for economic and demographic growth and decline within the urbanization process on a global scale. To fully understand growth, insights into cases of decline must be investigated, and vice versa. Thus, China's contribution to international comparative research is its exploration into SCs, investigating both decline and growth within the same story (Zhou and Qian 2015).

References

Audirac I, Fol S, Martinez-Fernandez C (2010) Shrinking cities in a time of crisis. Berkeley Plan J 23(1):51–57. http://escholarship.org/uc/item/8956c002

Beauregard R (2007) Shrinking cities in the United States in historical perspective: a research note. The future of shrinking cities—problems, patterns and strategies of urban transformation in a global context

Beauregard RA (2009) Urban population loss in historical perspective: United States, 1820–2000. Environ Plan 41(3):514–528. https://doi.org/10.1068/a40139a

Bernt M, Haase A, Großmann K et al (2014) How does(n't) urban shrinkage get onto the agenda? Experiences from Leipzig, Liverpool, Genoa and Bytom. Int J Urban Reg Res 38(5):1749–1766. https://doi.org/10.1111/1468-2427.12101

Bontje M (2001) Dealing with deconcentration: population deconcentration and planning response in polynucleated urban regions in north-west Europe. Urban Stud 38(4):769–785. https://doi.org/10.1080/00420980120035330

Camarda D, Rotondo F, Selicato F (2015) Strategies for dealing with urban shrinkage: issues and scenarios in Taranto. Eur Plan Stud 23(1):126–146. https://doi.org/10.1080/09654313.2013.820099

Freixas C, Fernandez PIM (2014) shrinking cities: a sustainability assessment of eco-urbanism strategies. In: The mediated city conference

Großmann K, Bontje M, Haase A et al (2013) Shrinking cities: notes for the further research agenda. Cities 35(4):221–225. https://doi.org/10.1016/j.cities.2013.07.007

Haase A, Rink D, Grossmann K et al (2014) Conceptualizing urban shrinkage. Environ Plan A 46(7):1519–1534. https://doi.org/10.1068/a46269

Häußermann H, Siebel W (1988) Die Schrumpfende Stadt und die Stadtsoziologie. In: Friedrichs J (ed) Soziologische Stadtforschung. Westdeutscher Verlag, Opladen, pp 78–94

Hollander JB, Németh J (2011) The bounds of smart decline: a foundational theory for planning shrinking cities. Hous Policy Debate 21(3):349–367. https://doi.org/10.1080/10511482.2011.585164

Hollander JB, Pallagst K, Schwarz T et al (2009) Planning shrinking cities. Woking Paper, pp 1–37

Leo C, Brown W (2000) Slow growth and urban development policy. J Urban Affairs 22(2):193–213. https://doi.org/10.1111/0735-2166.00050

Mao Q, Long Y, Wu K (2015) Spatio-temporal changes of population density and exploration on urbanization pattern in China: 2000–2010. City Plan Rev 39(2):38–43. https://doi.org/10.11819/cpr20150207a

Martinez-Fernandez C, Audirac I, Fol S et al (2012a) Shrinking cities: urban challenges of globalization. Int J Urban Reg Res 36(2):213–225. https://doi.org/10.1111/j.1468-2427.2011.01092.x

Martinez-Fernandez C, Wu C-T, Laura K, Schatz NT et al (2012b) The shrinking mining city: urban dynamics and contested territory. Int J Urban Reg Res 36(2):245–260. https://doi.org/10.1111/j.1468-2427.2011.01094.x

Oswalt P (eds) (2005) Shrinking cities volume 1: international research. Hatje Cantz Press, Germany

Pallagst K (2005) The end of the growth machine—new requirements for regional governance in an era of shrinking cities. In: Association of Collegiate Schools of Planning's 46th annual conference

Rieniets T (2009) Shrinking cities: causes and effects of urban population losses in the twentieth century. Nat Cult 4(3):231–254. https://doi.org/10.3167/nc.2009.040302

Savitch HV, Kantor P (2003) Urban strategies for a global era, a cross national comparison. Am Behav Sci 46(8):1002–1033. https://doi.org/10.1177/0002764202250492

Schilling J, Logan J (2008) Greening the Rust Belt: a green infrastructure model for right sizing America's shrinking cities. J Am Plan Assoc 74(4):451–466. https://doi.org/10.1080/01944360802354956

Turok I, Mykhnenko V (2007) The trajectories of European cities 1960–2005. Cities 24(3):165–182. https://doi.org/10.1016/j.cities.2007.01.007

Wang L, Feng Z, Yang Y et al (2014) The change of population density and its influencing factors from 2000 to 2010 in China on county scale. Acta Geogr Sin 69(12):1790–1798. https://doi.org/10.11821/dlxb201412005

Wiechmann T (2008) Errors expected—aligning urban strategy with demographic uncertainty in shrinking cities. Int Plan Stud 13(4):431–446. https://doi.org/10.1080/13563470802519097

Wiechmann T, Bontje M (2015) Responding to tough times: policy and planning strategies in shrinking cities. Eur Plan Stud 23(1):1–11. https://doi.org/10.1080/09654313.2013.820077

Wu K, Long Y, Mao Q (2015) Featured graphic. Mushrooming Jiedaos, growing cities: an alternative perspective on urbanizing China. Environ Plan A 47(1):1–2. https://doi.org/10.1068/a140066g

Yang Y, Feng Z, Zhao Y et al (2013) Coordination between urban land expansion and population growth in China. Geogr Res 32(9):1668–1678. https://doi.org/10.11821/dlyj201309009

Zhou K, Qian F (2015) Shrinking city: on searching for urban development in non-growing scenarios. Mod Urban Res 2015(9):2–13. https://doi.org/10.3969/j.issn.1009-6000.2015.09.001

Zhou K, Qian F, Yan Y (2017a) A multi-scaled analysis of the "shrinking map" of the population in Hunan province. Geogr Res 36(2):267–280. https://doi.org/10.11821/dlyj201702006

Zhou K, Gu C, Qian F (2017b) Compact urban development in the new normal. Planners 33(1):12–17. https://doi.org/10.3969/j.issn.1006-0022.2017.01.002