

THE IMPACT OF URBAN SPRAWL ON SOCIAL SEGREGATION IN BEIJING AND A LIMITED ROLE FOR SPATIAL PLANNING

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ABSTRACT

Exploring the links between urban sprawl and social segregation is an important theme in urban research. Although many studies are available, conclusions are still mixed. This paper contributes to our existing understanding of the impact of sprawl on social segregation, looking at the case of Beijing. The results of the analysis show that sprawling development, characterised by scattered gated communities, low-density luxury villas, informal development and uneven distributions of public services and transport infrastructures in the peri-urban regions, have increased residential segregation between low-income and high-income residents and between local residents and migrants. Planning policies designed to control urban sprawl and encourage a compact city could have a positive role in reducing social segregation. However, the role of spatial planning is limited as there are still other institutional factors influencing social segregation in China's cities, two of the most relevant here being the remaining *hukou* system and dual land system.

Key words: Social segregation, urban sprawl, spatial planning, Beijing

INTRODUCTION

Social segregation in cities has been a central theme of planning and geography studies for some time (Peach 1975; Peach *et al.* 1981; Massey and Denton 1993). Planning research on social segregation has been concerned with at least two questions: How does the pattern of urban growth affect social segregation? Can planning reduce this segregation? (Frieden & Morris 1968; Kaitz & Hyman 1970; Gaffikin & Morrissey 2011; Arthurson 2012). Although there is a large body of research on the impact of urban sprawl on social segregation, conclusions are still mixed. Many studies have argued that urban sprawl may promote social segregation in North American cities (Massey & Denton 1993; Power 2001; Powell 2002), European cities (Kazepov 2005; Maloutas 2007;

Arapoglou 2009) and Australian cities (Murphy & Watson 1994). Consequently, policies designed to control urban sprawl would play a positive role in reducing social segregation. However, some empirical findings suggested that there are only weak links between urban sprawl and social segregation, when controlling for other factors, for example, demographic characteristics (e.g. Brueckner & Largey 2008) and institutional context (Zhao & Howden-Chapman 2010).

Moreover, the existing empirical research is dominated by cases from developed countries, while cases from developing countries are scarce. Since both urban form and social segregation are affected by the social, economic and institutional contexts, there is a strong need to examine the relationships between urban form and social segregation using cases from

different countries. While there are a few empirical studies about the effects of urban sprawl on social segregation in developing countries, for example in Latin America (Caldeira 2000; Coy & Pöhler 2002), Indonesia (Connell 1999) and China (Gu & Kesteloot 2002), more empirical evidence is still required in order to generalise findings reported by these studies.

The purpose of this study is to fill this gap in the current literature by looking at the case of Beijing. China's large cities, including Beijing, have been in a process of rapid urbanisation since the 1980s. Urban population increased by 10 million annually on average during the period from 1985 to 2010. Most of this increase of people in cities was rural migrants. China also has been in a process of transition from a centrally planned to a market system since the 1980s (Lin 2000; Wei 2001; Chow 2007). These two processes are combined with a process of globalisation (Chow 2007). In the past decades although China's cities have gained a proud achievement in economic growth, many social problems have occurred, for example, urban poverty, polarisation, social inequity, etc. In particular, residential segregation has grown in China's cities (Dollar 2007; Wang 2008). For example, in Beijing, social segregation has since appeared in the form of the separation of high-quality gated communities from marginalised communities such as urban villages and migrant enclaves (Gu & Liu 2002).

Since the 1980s, spatial distribution of houses, urban public services and transport infrastructures in China's large cities has been dominated by a form of urban sprawl (Deng & Huang 2004, Jiang *et al.* 2007). It is characterised by scattered gated communities, dispersal low-density luxury villas, informal (illegal) developments in rural villages, low accessibility to basic urban services and rapid development of highways. Urban sprawl has been continuously increasing recently due to the booming property market and roaring housing price. The negative effects of urban sprawl on the loss of farmland and deterioration of the environment have already been widely discussed by previous studies (e.g. Deng & Huang 2004, Jiang *et al.* 2007). However, the social effects of urban sprawl were neglected. In particular, many studies have acknowledged that urban

sprawl could increase social segregation (Gu & Kesteloot 2002; Fan & Taubmann 2002; Chen *et al.* 2006). However, a clear empirical analysis of the impact of urban sprawl on social segregation for China's cities is still lacking.

The contributes fresh evidence regarding the impact of sprawl on social segregation. It does this in several ways. First, the existing literature about the impacts of urban sprawl on social segregation has been dominated by cases from Europe and the US, while cases from China are still scarce. Social segregation in China's cities has different features from those of Europe and the US. For example, social segregation in Europe and the US is mainly characterised by residential segregation between racial groups. However, in China's cities there is no segregation based on race because the population of China's cities is monoracial. Residential segregation is strongly defined between the poor and the rich and between the local and the migrants. Second, the poor often live in the urban core in the US, while the wealthy live in the suburbs (Downs 1999). However, in China's cities most wealthy people prefer to live in the city centre due to a traditional cultural factor. Even though some wealthy people choose to live in the suburbs, they usually live in high-quality gated communities or villas which are separated from other suburban areas. That implies that urban sprawl in the suburbs of China's cities may have a more obvious effect on the low-income people than in Western countries as most low-income population live in the suburbs in China's cities. Third, in practice, the role of spatial planning, which is a major tool of intervening distribution of houses and controlling urban sprawl, is often criticised regarding its implications for the reduction of social segregation. The findings of the study would provide new evidence about how spatial planning can reduce social segregation.

THEORETICAL BACKGROUND: SPRAWL AND SOCIAL SEGREGATION

Urban sprawl is broadly understood as a process of the spreading of the city into rural areas, or a type of development characterised by low density, spatial segregation of land use, and a lack of public services and activity centres

(Gillham 2002). Ewing (1994) defined four characteristics of sprawling urban development: leapfrog development, commercial strip development, low-density development, and single-use development. Apart from environmental effects, urban sprawl also affects social segregation (Massey & Denton 1993; Power 2001; Powell 2002; Kazepov 2005; Maloutas 2007; Arapoglou 2009).

Residential segregation is a type of social segregation. Residential segregation refers to the degree to which two or more groups live separately from one another in different parts of the urban environment (Massey & Denton 1988). It has five dimensions: evenness, exposure, concentration, centralisation and clustering. There are many factors influencing residential segregation (Massey & Denton 1988; Wu 2004). These factors can be classified as three categories. One is supply factors, which includes distributions of houses, urban public services, transport infrastructures and design of communities. These factors are largely influenced by spatial planning. Another is demand factors, which includes household's income, desire for house ownership and preferences for residential location. These factors are mainly determined by personal socio-economic features. The other is institutional factors, such as housing allocation and management, population management, land use system and so on. Residential segregation is a result of interactions between these factors.

In the process of urban sprawl, residential segregation is characterised by the concentration of poverty in some areas and the wealthy in other areas (Jargowsky 2001). Residential segregation in the suburbs mainly involves the separation of rich gated communities from marginalised communities (Vesselinov 2012). In particular, the development of gated communities in the suburbs is blamed for the creation of a 'city of walls', and they are seen as a typical extension of residential segregation (Caldeira 2000; Le Goix 2005). Gated communities are often referred to using different terms, reflecting their negative effects on social segregation (Low 2003); for example, 'gated enclaves' (Vesselinov 2012), 'city fortress' (Blakely & Snyder 1997) and 'fortified enclaves' (Marcuse 1997). In the city centre, urban sprawl usually leaves low-income and

minority groups concentrated, while the middle classes retreat to the suburbs. Spatial mismatch is often used to describe the results of residential segregation in the inner city (Kain 1968, 1992).

Sprawling development, which is characterised by low density, the segregation of land use and a lack of public services and spaces, usually results in low accessibility to public services, which are vital to social segregation. Many studies suggest that lower accessibility to public parks, public libraries and community centres due to urban sprawl is associated with more social segregation (e.g. Calthorpe 1993; Duany *et al.* 2000; Leyden 2003). In particular, urban sprawl often causes public services to be unevenly distributed (De Hoog *et al.* 1991). Some neighbourhoods have higher quality public services, for example, schools, shops, clinics, clubs, swimming pools, etc. than the others. Poor public services often cause a neighbourhood to be disadvantaged in attracting the rich to reside, and even low-income people tend to move out of the neighbourhood because of a shortage of public services and facilities.

Urban sprawl favours the development of roads and highways, while decreasing public transit services which segregated groups rely on (Ewing 1994). This happens in two ways. One is that more investments in suburb highways and roads would result in fewer investments in public transit services in the city centre, where many low-income people live, for example, in the US. The other is that in the sprawl process highways and public transport services are usually distributed unevenly. Uneven distributions of transport make some communities hardly accessed by both public transit services and highways. In particular, it is very difficult for local governments to supply and maintain a high quality of public transport services in sprawling suburbs. As a result, these communities may be at a high risk of being segregated. For example, in China, informal houses for urban residents in rural villages are badly serviced by both public transport and road network. A severe shortage of transport services is one of the most important reasons why these communities are social segregated from the rest of cities.

Spatial planning designed to control urban sprawl is believed to reduce social segregation

since urban sprawl is associated with social segregation. In Europe recent interests have been given to compact city (Burton 2000a, b). There are at least three approaches to reducing social segregation: satisfying the needs of the worst off (for example, low-income earners) (Rawls 1972), eliminating poverty and distributing urban resources according to need (Durning 1989; Khan 1995), and redistributing wealth from the rich to the poor (Blowers 1992). Compact city is claimed to reduce social segregation through distributing social costs and benefits: 'greater urban compactness is associated with benefits for the conditions or life chances of the disadvantaged (for example, low-incomes), so reducing the gap between the advantaged and disadvantaged' (Burton 2001).

However, not all studies agree that spatial planning could reduce social segregation. One of major reasons for this is that urban sprawl may be weakly linked with social segregation. For example, using a nationwide survey dataset, Brueckner and Largey (2008) found that higher population density at the census-tract level is related to lower social interaction in the US when the socio-economic features of residents are taken into account. They argued that 'social-interaction effects cannot be credibly included in the panoply of criticisms directed toward urban sprawl' (Brueckner & Largey 2008, p. 33). Some studies have reported that crowding and extreme high density tends to reduce rather than increase social interaction and thus decrease social segregation (e.g. Keane 1991).

Another reason is that, excepting urban sprawl, other factors in relation to households' accessibility to houses and development management of houses also have influences on residential segregation. That means when these factors are taken into account, the effects of urban sprawl on social segregation may not be as significant as what the previous studies found. However, this point has often been ignored by previous literature.

SOCIAL TRANSITION AND SEGREGATION IN BEIJING

Since the 1980s, China's economy has been undergoing a process of marketisation (Lin 2000; Wei 2001; Chow 2007). However, after

several decades of market-oriented reform, social inequity with respect to wealth has grown in China's cities, including Beijing (Dollar 2007; Wang 2008). The socialist welfare-oriented housing system has been transformed into a market-oriented system in which housing must be bought or rented on an open market (Dowall 1993). Individual household residential location choice has begun to be mainly determined by a household's wealth. As a result, residents, and in particular disadvantaged groups, are spatially distributed across the city largely according to their financial ability to afford housing. There are three main disadvantaged groups: local low-income residents, rural migrants and workers laid-off from state-owned enterprises. In the process of urban sprawl, marginalised communities inhabited by disadvantaged groups have now emerged in Beijing. These marginalised communities consist of dilapidated inner-city neighbourhoods, workers' villages and rural migrant enclaves (Wu 2004). The latter two are often called urban villages and are located in the peri-urban regions. As a result, social segregation has since appeared in Beijing in the form of the separation of high-quality gated communities from marginalised communities (Gu & Liu 2002).

Social segregation in Beijing is obvious in the peri-urban regions, where there is a high level of diversity in social features. The urban fringe is composed of residents who have relocated from the central urban area, migrants from outside Beijing and local rural people. The people relocated from the central urban area can be divided into two groups. The first is those residents who were forced to move out of the central area due to urban redevelopment. The second is those who moved in pursuit of improved living conditions, including larger housing spaces as well as a better environment in the suburban community. The second group residents are middle class, and tend to live in high-quality housing, dominated by villas and low-density townhouses with higher housing prices, more space and better services.

In contrast, the migrants from outside Beijing are usually concentrated in urban villages (*cheng zhong cun*) in the peri-urban region (Ma & Xiang 1998). Urban villages developed from rural villages. The landscapes

of urban villages are dominated by informal village housing, illegal construction, insufficient urban facilities and a poor quality of life (Zheng *et al.* 2009). House rents in these urban villages are much lower than in other urban communities. The residents are generally farmers who have become landlords, while the remainder are poor unemployed people or low-income migrant workers. Urban villages account for a large part of the urban poor in the suburbs and are centres of crime (Yang 1996). Compared with other communities in the peri-urban region, urban villages can be considered 'China's slums' (Ma 2007).

Since 2000 some new trends in social segregation in China's cities have arisen. The number of young (around 25 years old), highly educated migrants has increased quickly in villages in the peri-urban region. These new migrants are called 'yi zu' ('the ant group') as they often live in groups, sharing small living spaces. They have low incomes despite the fact that most are university educated. Most are not covered by health insurance and rely on casual jobs such as salesmen, waiters or receptionists. According to China's Human Resource Blue Book 2010, there were more than three million *yi zu* migrants in China's cities in 2010 (Pan 2010). In Beijing, there were 150,000 *yi zu* migrants. They belong to the migrants from outside Beijing. Members of 'the ant group' often choose to concentrate in urban villages, where housing rents are low but the quality of life is poor. As a result, a new type of urban 'slum' has emerged.

Most of local rural people are low-income people compared to local urban people. In China, a strict urban-rural dichotomy system was built in the 1950s. According to the system, cities were given priorities to using resources and pursuing economic development, while rural areas were unfairly treated as areas which only supply foods to cities (Walder 1996). As a result, rural development is largely behind development in urban areas. In Beijing, living quality is poor, and basic facilities and public services are scarce in the rural villages. The annual income of rural people was only one fifth of the annual income of urban people in 2009 (BSB, various years). In the rapid process of urban sprawl, most of municipal investments and policy attentions have been given to gated urban communities. However, only a small

portion of municipal investments was left to the rural villages. The rural villages have much worse facilities, services and housing quality than the gated communities.

URBAN SPRAWL ON THE URBAN FRINGE OF BEIJING

The city of Beijing has a land area of 16,410 square kilometres and had a population of 16.95 million in 2008. The Beijing Urban Master Plan (2004–2020) shows that the entire city is divided into four zones: a central urban area, an inter-suburban area, an outer suburban area and an ecological conservation area (Figure 1). The outer suburban area includes some rural areas associated with Beijing. Most of these rural areas are located in the ecological conservation area. The analysis in this paper focuses on the inter-suburban and outer suburban areas because they are the major regions in which urban sprawl has occurred in Beijing. In this paper, the urban fringe refers to the transition zones between the inter-suburban and outer suburban areas.

In Beijing, urban sprawl has become one of the main forms of suburban land development since the 1980s (Deng & Huang 2004; Jiang *et al.* 2007). According to Ewing (1997), there are two kinds of urban sprawl: density-based sprawl and spatial-structure-based sprawl. Urban sprawl in Beijing is also characterised by these two forms. Density-based sprawl is clearly evidenced by decreases in density. Between 1990 and 2005, during which there was radical urban expansion, residential net density decreased from about 261 persons per hectare in 1990 to 130 persons per hectare in 2005 (see Table 1). In particular, many low-density gated communities and villas were developed on the urban fringe. The total floor area of low-density housing, including villas, reached more than 5 million square metres in 2001, which was equivalent to 36 per cent of the total housing developed in the suburban areas of Beijing (Wan Fang Co. 2001).

Urban sprawl is also characterised by the segregation of land use, in particular, the segregation of residential land from land for public facilities such as schools, post offices, clinics, community centres, etc. This is typically seen in the large number of single-use land

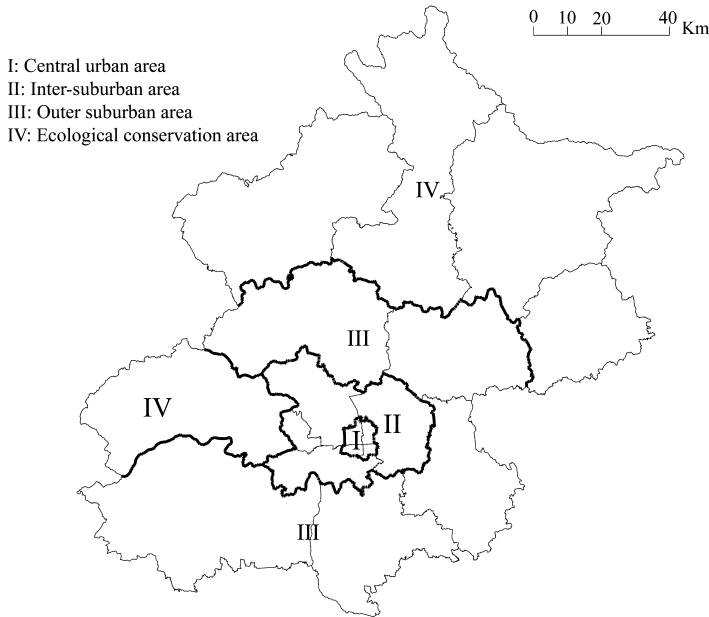


Figure 1. Administrative range of Beijing.

Table 1. Changes in social segregation and urban sprawl in Beijing, 1990–2005.

	1990	2000	2005	Growth (1990–2005) (%)
Social segregation index				
The index of dissimilarity	0.1693	0.2065	0.2371	40.04
The index of residential exposure	0.3258	0.2991	0.2544	-21.92
Urban sprawl index				
Average residents net density (persons per km ²)	26,105	22,492	13,008	-50.97
Mixed use of land	0.6613	0.6182	0.4157	-37.14
Number of urban villages (units)	–	193	364	88.60*
Primary schools (units per 10,000 residents)	3.33	1.59	0.91	-72.67
Development of highways (km per km ²)	71.61	104.22	185.49	159.03

Sources: the author, edited from population data from the Beijing fourth and fifth censuses, and BSB (2005); land use data from BLHB (various years); 3) *data from Mei and Bao (2006).

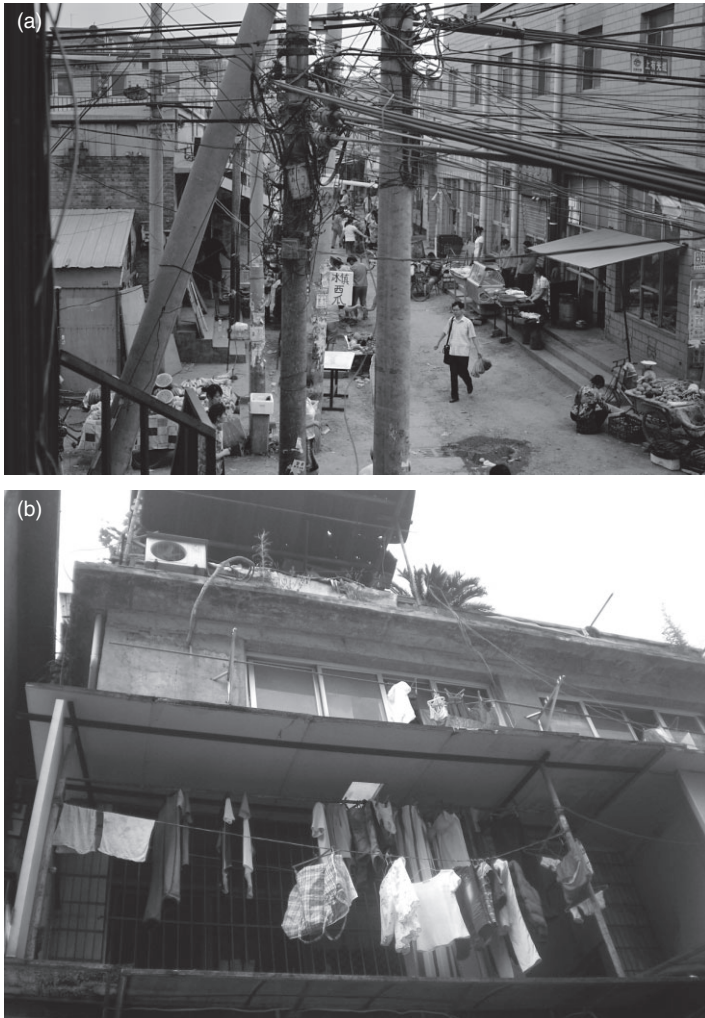
developments on the urban fringe. Accessibility to public facilities in areas of sprawling development is low. This low accessibility to public urban services is one of the major characteristics of segregated communities in Beijing.

The growth of informal development in the peri-urban regions is another major feature of urban sprawl in Beijing (see Figure 2). The number of urban villages increased rapidly after 2000 due to uncontained urban sprawl

and reached 364 in 2005. These urban villages occupied a land area of 19,000 hectares and had a floor area of 74.9 million square metres in 2005 (Mei & Bao 2006).

THE IMPACT OF SPRAWL ON SOCIAL SEGREGATION IN BEIJING

Method and data – This section examines the potential impact of urban sprawl on social



Note: (a) shows a street with houses along it; (b) shows the illegal village houses built by local villagers.

Figure 2. Village house and street in Tujing, Beijing.

segregation in Beijing. Two indexes are employed to measure social segregation. The first is an index of dissimilarity (for measures of social segregation see Stearns & Logan 1986; Massey & Denton 1988). The second is an index of residential exposure. The formula for the index of dissimilarity (ID) is:

$$ID = \frac{1}{2} \left(\sum_i \left| \frac{g_i}{G} - \frac{h_i}{H} \right| \right)$$

where (comparing a low-income and middle- and high-income population, for example): g_i is the size of the low-income population of the i th area; G is the total low-income population in an entire region; h_i is the size of the middle- and high-income population of the i th area; H is the total middle- and high-income population in the entire region. The value of the ID is between 1 and 0, where 1 indicates there is a complete separation between the two populations and 0 indicates there is no

segregation between the two populations. The index of dissimilarity measures the evenness with which two groups are distributed across the component geographic areas.

The index of residential exposure indicates how the different groups are 'exposed' to each other. It can also be interpreted as the probability that one population group shares an area with another group. The formula for the index of residential exposure (RE) is:

$$RE = \sum_{i=1}^N \left(\frac{x_i}{P} \times \frac{y_i}{p_i} \right)$$

where (the extent to which the low-income population is exposed to the middle- and high-income population, for example): x_i is the size of the low-income population of the i th area; y_i is the size of the middle- and high-income population of the i th area; p_i is the total population of the i th area; and P is the total low-income population in the entire region.

This study uses census data (1990, 2000) to measure the indexes of social segregation before 2000 and in 2000. The latest census data in Beijing was gathered for the Sixth Census Survey, which commenced in November 2010. However, the details of this data have not yet been released. Therefore, the paper uses the most recent population survey instead of census data to measure the indexes of social segregation after 2000. The population survey comes from a population survey conducted in 2005. In the survey, the probability proportionate to size (PPS) sampling method was applied. The sampling size was 1.89 per cent of the total city population, namely, 290,000 respondents. Generally, the data has a high reliability.

According to the Beijing Statistical Yearbook (Beijing Statistic Bureau (BSB), various years), those who make up the low-income population had an annual income of less than RMB 1,636 in 1990, less than RMB 7,916 in 2000, and less than RMB 12,485 in 2005. Members of the middle- and high-income population earned an annual income above these figures, respectively.

In the analysis, the urban sprawl of Beijing will be quantitatively indicated by measures of the net density of residents, the land use mix, the number of urban villages and the number

of schools and development of highways. The net density of residents was measured in terms of the density of residents in the sub-district, omitting non-built-up areas such as public green space and farmland. Mixed land use for different housing types is indicated by an entropy value. Housing types include low-density villa or townhouse, low-density apartment or flat, high-density tower and village house or flat. The higher the entropy, the higher degree of mixed use of land. The number of schools per 10,000 residents is used to indicate the level of public services at local. In Beijing, primary school is usually seen as one of the most important elements of public services supplied by the municipal government. Development of highways is measured by the length of highways per km² of the built-up area. The local spatial unit of analysis for the degree of sprawl and residential segregation is the sub-district, which includes the *Jiedao* (street area) and the *Xiangzhen* (township). The sub-districts are not only the basic census units, but also the primary administrative units in Beijing.

Analysis – Table 1 presents changes in the values of the social segregation indexes and the urban sprawl indexes for Beijing during the period from 1990 to 2005. The value of the index of dissimilarity has continuously increased, from 0.1693 in 1990 to 0.2371 in 2005, which means the degree of social segregation between the low-income population and the middle- and high-income population grew. The growth rate of the dissimilarity index shows that there was 40 per cent growth in social segregation during a twenty-six-year period (1990–2005). During the same period, the index of residential exposure decreased from 0.3258 to 0.2544, which indicates that the degree to which the low-income population is exposed to the middle- and high-income population has decreased. This means that the low-income population was more segregated from the middle- and high-income population in 2005 than in 1990.

There are many factors influencing residential segregation, for example, growing differences in household income, changes in the labour market, the growth of the middle class, etc. However, urban sprawl would be a primary factor influencing residential segregation.

Table 2. *Social segregation and urban sprawl in Beijing, 2005.*

	The city central areas	The urban fringe areas
Social segregation indexes		
The index of dissimilarity	0.1318	0.2278
The index of residential exposure	0.3557	0.2724
Urban sprawl indexes		
Average residents net density (persons/km ²)	27369	5347
Mixed use of land	0.7751	0.6504
Number of urban villages (units)*	33	331
Primary schools (units per 10,000 residents)	1.52	0.34
Development of highways (km per km ²)	96.41	274.26

Source: the author, edited from BSB (2006); *data from Mei and Bao (2006).

Table 1 provides evidence for this, with the urban sprawl indexes reflecting similar changes to the social segregation indexes. The average residential net density decreased by nearly 60 per cent from 1990 to 2005. One of the major reasons for this is the rapid growth of low-density gated communities and villas on the urban fringe. The mixed use of land decreased by 37 per cent during the same period. It is attributed to the appearance of a large amount of communities with a single house type for land use on the urban fringe. The number of schools per 10,000 residents decreased by over 70 per cent from 1990 to 2005. However, the length of highway per the built-up area reached 185 km per km² in 2005 which was 1.5 times in 1990. In the meantime, the number of urban villages increased by 88.6 per cent. This reflects an obvious increase in informal development in the suburbs of Beijing.

The following provides an in-depth analysis to answer the question of how urban sprawl affects residential segregation, focusing on 2005. Table 2 shows that in 2005 the value of the index of dissimilarity was 0.1318 in the central city areas and 0.2278 in the urban fringe areas. The figures reveal that there is social segregation between the low-income population and the middle- and high-income population in Beijing in both the central city areas and the urban fringe areas. However, social segregation on the urban fringe areas is higher than in the central city areas. This means that communities on the urban fringe have a higher degree of residential segregation. Among other potential factors, urban

sprawl would be of significance with respect to residential segregation. Table 2 shows that the urban fringe areas were of lower density and had a lower level of mixed land use than the central city areas. Low-density and dispersal developments would physically increase the degree of segregation between communities. A lower level of mixed land use for houses means communities are dominated by one single type of house rather than by a combination of several house types. However, a community with a variety of house types would attract more different groups in terms of income than a community with only one single house type in Beijing (Zhao & Howden-Chapman 2010). The number of primary schools on the urban fringe is much smaller than in the city central areas. Actually, low accessibility to public services in some communities has become a main reason why these communities are disadvantaged and unattractive to the high-income people.

Table 2 shows that urban villages were mainly concentrated on the urban fringe. The sprawling development of urban villages has seriously increased residential segregation in Beijing. These villages have developed from pre-existing farming villages, with a large number of illegal constructions. Facilities and urban services in these urban villages are also inadequate. Recently, the number of residents who live in the urban villages has increased because soaring housing prices in the central urban areas have forced low-income groups, which mainly include migrants, to move to the urban fringe (Yang 2004).

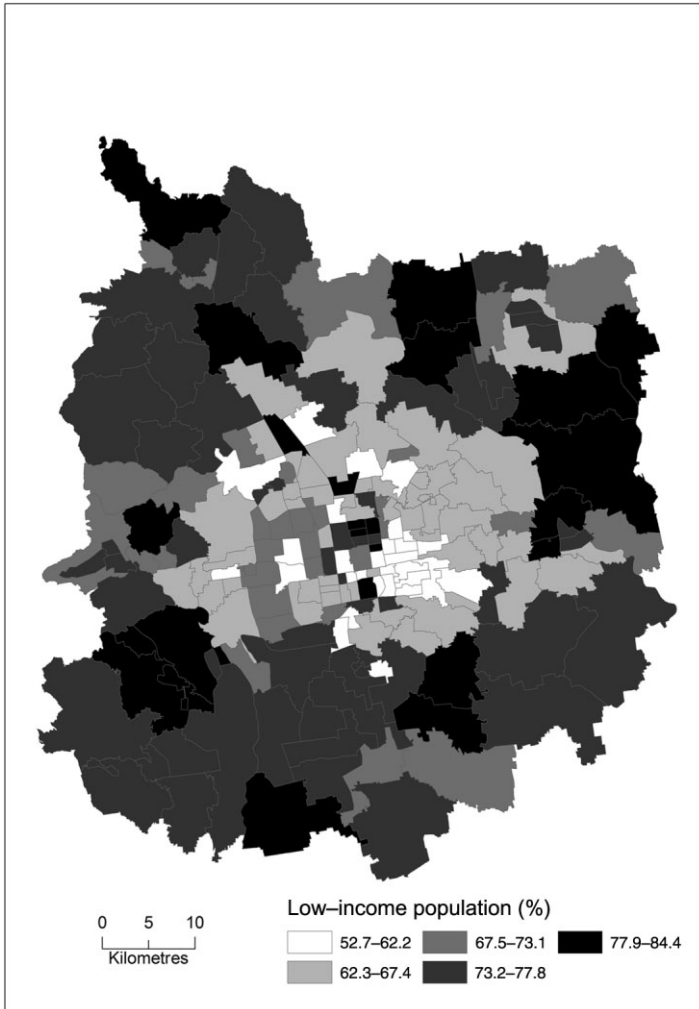


Figure 3. *Proportion of low-income population in a local unit (%), Beijing 2005.*

Table 2 also shows that the value of the index of residential exposure in the central city areas is 0.3557, which is higher than that of 0.2724 in the urban fringe areas. This means that the low-income population in the central city areas is more exposed to the middle- and high-income population than in the urban fringe areas. This is consistent with Figures 3 and 4 which show that the low-income population is more widely distributed across the urban fringes, while the middle- and high-income population tends to be concentrated in the central city areas. The results reveal the effects of urban sprawl on the gentrification of the city

centre. Since the 1980s, there has been rapid urban redevelopment in the city centre, with the existing industry and residents being relocated to the suburbs. In the process of urban development, most of the original residents could not afford the new housing being built in their original neighbourhoods, with their old houses replaced by high-priced commodity housing destined for the open market (Huang & Xu 2005). As a result, most had to move to suburban areas where housing prices were relatively low, while middle- and high-income earners took the opportunity to move into the city centre.

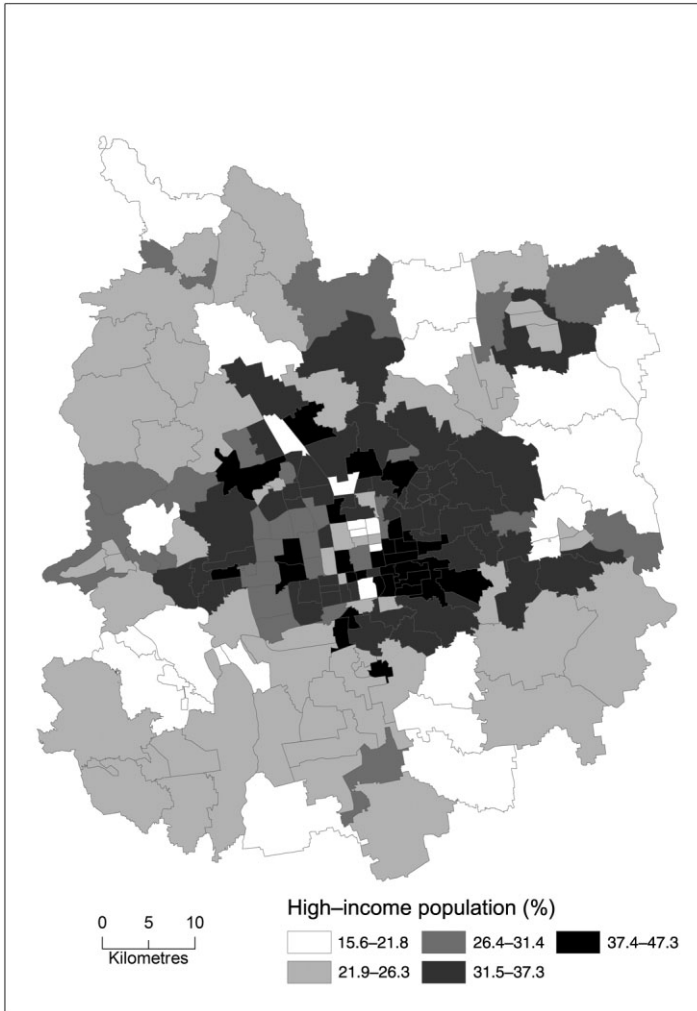


Figure 4. *Proportion of middle- and high-income population in a local unit (%), Beijing 2005.*

Figures 3 and 4 also show that the proportion of the middle- and high-income population has also obviously increased on the urban fringe. This is mainly due to a large number of high-quality gated communities being developed in these areas. In particular, many low-density gated communities (less than 80 households per hectare), including villas, have been developed (Wan Fang Co. 2001). These communities often have large-sized houses and are gated and separated from surrounding communities. A recent report by VillasChina Co. Ltd. (2006) claims that 176 villa projects with a total area of 19 million square metres delivered 40,000 villas to the luxury residential market in Beijing in

2005. These single-family and detached villas had an average living space of 300–500 square metres, ten times the average living space of rental housing in these areas. The luxury villas were bought by high-income earners such as managers of foreign firms, leaders of state-owned enterprises and owners of large private businesses. These villas are gated and walled, separating them from other houses in the peri-urban region. They are often surrounded by a large green space, which plays a further buffering role (Figure 5).

Figure 4 shows that there is a higher degree of spatial concentration of middle- and high-income population along several highway



Note : (a) shows a gated luxury villa from outside; (b) shows the gate of the villa and the extent of the security.

Figure 5. Gated luxury villas in the peri-urban regions of Beijing.

corridors than in other areas in the suburbs. These highway corridors include Jing-Jin Highway corridor, Jin-Mi Highway corridor, Jing-Shun Highway corridor and Jing-Cheng Highway corridor. One of major reasons for this is that middle- and high-income population have cars and prefer to live in the areas which have a better access to highways. Communities in these corridors have high living quality. Housing prices are also generally higher in these corridors than in other areas of the suburbs.

It needs to be acknowledged that excepting urban sprawl, there are other factors influenc-

ing residential segregation in Beijing. For example, the *hukou* system has increased the effects of sprawl on urban villages. The *hukou* system is a resident registration system which is unique to China. According to *hukou* policy, the population of the whole nation was classified into two categories: people with urban *hukou* and people with rural *hukou*. In the pre-reform era, rural residents with rural *hukou* were not allowed to migrate freely to the city. Under the *hukou* system, the rural population were often denied many of the basic privileges enjoyed by urban residents with urban *hukou*. Furthermore, a household's *hukou* has always served as

the basis for the allocation of many goods and services, such as basic foodstuffs, housing and jobs, as those with urban *hukou* consumed more goods and services than those with rural *hukou*. Since the 1980s, many reforms have been implemented in relation *hukou* system, for example, relaxing the control of movement of rural population to city. However, rural migrants in cities are still denied to access many public services, such as social housing, public schools, etc. (Yang 1993). As a result, thousands of low-income rural migrants without local urban *hukou* have to reside in urban villages where housing rent is low, even though quality of living is also low. More than 450,000 people lived in the urban villages of Beijing in 2005 (Mei & Bao 2006).

DISCUSSION AND IMPLICATIONS FOR SPATIAL PLANNING

Recently planning studies have focused on the impact of urban sprawl on social segregation, as sprawl has become a dominant form of urban development (e.g. Arthurson 2012; Gaffikin & Morrissey 2011). Although great efforts have been made by previous studies, conclusions are still mixed. For example, some researchers argue that spatial planning cannot be used to reduce social segregation, as sprawling development has weak links with social segregation (e.g. Brueckner & Largey 2008). The results of this study would add fresh evidence to generalise our existing knowledge of the effects of sprawl on social segregation by looking at Beijing as a case.

The results of analysis in this study suggest that urban sprawl has influences on social segregation. Gated communities have increased the degree of residential segregation in Beijing. In particular, gated low-density communities and villa areas have led to the fortification of suburbia in Beijing. This is consistent with findings by some previous studies (Caldeira 2000; Le Goix 2005). In Western countries, particularly in the US, the sprawling development of gated communities in the suburbs is seen as one of the major reasons for the increase in social segregation (Blakely & Snyder 1997; Marcuse 1997). High-income households tend to retreat from the city centre into suburban gated communities in the

pursuit of security from crime and social diversity, higher property values and a better sense of community (Arthurson 2012). The growth of gated communities has resulted in an increase in social segregation between groups with respect to their background, incomes, etc. Some rich people are in effect 'imprisoned' by walls built to keep 'the others' out (Low 2003). As a result, paralleling with the growth of gated communities, many immigrant enclaves and ethnically distinct communities have appeared in cities (Logan *et al.* 2002). The results of the above analysis suggest that in the urban sprawl process gated communities emerged in Beijing, and have increased residential segregation. The effects of gated communities on social segregation in Beijing seem to be more serious than in Western countries because the speed and scale of urban sprawl in Beijing goes far beyond that which occurred in Western cities.

The results of analysis suggest that uneven distribution of urban public services, for example, primary schools, in the process of urban sprawl are a major factor influencing residential segregation. Communities with good public services are mainly occupied by the rich people and middle class. However, the other communities are short of urban public services. They become unattractive not only to the rich but also to the low-income people.

Unbalanced investment between highways and public transport in the suburbs is another factor increasing residential segregation in the process of urban sprawl. The results of above analysis suggest that high-income residents tend to specially reside in highway corridors which are very well serviced by highway and road network in Beijing. One of main reasons for this is that high-income workers have cars, and a good service of highways helps them to easily access to jobs and public services. However, low-income residents mainly rely on public transport. Their residential location is largely determined by housing price and supply public transport services. In recent decades, in Beijing, investments in public transport in the suburbs lagged behind highway and roads. For example, investments in highway and roads were 2.7 times the investments in public transport during the period from 2001 to 2005 in Beijing (BSB, various

years). The unbalanced investment between highways and public transport in the suburbs has become a major factor worsening residential segregation.

The above discussions imply that spatial planning can be used to reduce residential segregation. Spatial planning may reduce residential segregation through controlling urban sprawl, in particular, dispersal and scattered developments in the suburbs; encouraging highly mixed land use for residential buildings; promoting urban services to be distributed evenly; and favouring compact city to make physical distances between different residential areas shorter. Spatial planning also would help to reduce residential segregation by encouraging a balance investment in transport infrastructure between highways and public transport. In particular, in Beijing, spatial planning would play an important role in reducing social segregation if it pays more attention to enhance living quality in disadvantaged communities, for example, dilapidated inner-city neighbourhoods, workers' villages and rural migrant enclaves.

In addition, it seems that spatial planning may have a higher potential contribution to the reduction of social segregation in China than in Western countries. In China, the supply of various types of housing and residential land use is still more centrally planned and tightly regulated in the present reform era than in Western countries (Zhao *et al.* 2009). For example, the central government has issued a new national planning regulation to increase the delivery of social housing in China's cities. According to the new planning regulation, any development of commodity housing must designate five per cent of its total floor area to the development of social housing for low-income people. One of the most important benefits of this new policy is that it would increase residential mix in such communities and reduce residential segregation.

However, it needs to be recognised that the role of spatial planning in reducing residential segregation may be limited because there are many other factors influencing residential segregation in Beijing. For example, gated communities in the suburbs may not be the first choice for many high-income households in

China's cities including Beijing. In the US, the poor often live in the urban core, while the wealthy live in the suburbs (Downs 1999). However, in China, most high-income households prefer to live in the central areas of the city, even though some wealthy people choose to live in the suburbs. One reason is that the city centre has better access to high-salary jobs and public urban services. Another important reason is a traditional cultural factor. Living in the city centre, where the 'privilegentsia' traditionally lived, usually indicates higher social status in China (Gaubatz 1999). Another example is that the remnants of the *hukou* system has an influence on residential segregation. The analysis here shows that migrant residents without local *hukou* often have no choice except to live in the marginalised communities, in particular in rural villages on the urban fringe. Recently, this trend tends to increase due to increasing housing prices in the central areas.

Another example is the dual land system in China, which is an important factor influencing residential segregation. China has a dual land system, with an urban land system and a rural land system coexisting on the urban fringe (Deng & Huang 2004). Two land systems meet each other on the urban fringe of China's metropolises. Urban land is usually strictly managed through municipal planning and regulations, while land development management in rural villages is much less controlled (Deng & Huang 2004). In the process of urban expansion, villagers' farmlands are expropriated as urban land. However, they maintain ownership of their housing plots according to the rural land system. Thus, after losing their farmland, most villagers in these new 'urban villages' choose to rent housing to maintain their lifestyles. Stimulated by the potential for rental income, villagers build a large number of illegal houses on their housing plots (Wang 2000). The quality of these houses is very low and these rural communities lack access to public services, facilities and infrastructure (Zhang *et al.* 2003). However, the rent of this illegal and informal housing is much lower than that in urban communities, attracting low-income migrants to live there. As a result, new slums are appearing in these urban villages.

CONCLUSION

Spatial planning is seen as one of primary tools through which resources and opportunities are distributed to social groups in terms of their income. A central topic in the field of both planning theory has been how to reduce the effects of urban growth on social segregation. This study found that in Beijing since the 1990s there has been an increase in residential segregation between the low-income population and the middle- and high-income population and between local residents and migrants. Sprawling development, characterised by scattered gated communities, low-density luxury villas, informal development, or single-use land development in the peri-urban regions, tend to increase the residential segregation. In particular, urban sprawl has increased the number of urban villages, created new urban slums and promoted gentrification of the city centre. Residential segregation has also been increased by unevenly distributed public services and unbalanced investments between highways and public transport in the suburbs in the process of urban sprawl.

Spatial planning designed to control urban sprawl would assist in reducing residential segregation in several ways, for example, controlling dispersal developments in the suburbs, encouraging a compact city, promoting mixed land use and different types of houses in a community, distributing urban services evenly in terms of population, encouraging a balance investment between highways and public transport across the suburbs, or enhancing living quality in disadvantaged communities. In particular, in China's cities, spatial planning would be an efficient tool of reducing residential segregation because land use in China is still more centrally planned and tightly regulated in the current transition process.

However, it must be realised that the role of spatial planning is limited. Rather than being primarily affected by urban sprawl, social segregation in China's cities is also greatly affected by institutional factors related to the remnants of the centrally planned system, for example the *hukou* system (residential registration system) and dual land systems. The positive role of planning in promoting social integration may be limited unless more deep reforms are imple-

mented to change the existing social welfare system in relation to *hukou* and land management system.

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