

Urban Sustainability

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Diversity as Catalyst: Economic Growth and Urban Resilience in Global Cityscapes

 Springer

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Chapter 6

Urban horizons in China: challenges and opportunities for community intervention in a country marked by the Heihe-Tengchong Line

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Abstract

The research examines the evolution of urbanisation and population density in China between 2000 and 2020, with three key objectives. Firstly, it analyses how state policies have influenced the configuration of the real estate market and urban sprawl in the country. Secondly, it studies the variation of population density through annual census data, focusing on how policies have affected demographic distribution. Thirdly, it investigates the impact of national policies on population density in relation to community policies. The inquiry employs data from over 5,000 urban entities to assess the influence on the spatial distribution of population. Historically, the relationship with Chinese community policies is manifested in the promotion of a balanced

regional development attempt, the reform of the hukou system to facilitate mobility and rural-urban integration, and, more recently, the implementation of strategies for sustainable urbanisation. These policies are designed to enhance the living standards and urban infrastructure in Chinese cities by addressing the challenges of urban concentration while promoting more inclusive and balanced development across the country. However, the outcomes of these policies are yet to be determined.

The chapter comprises the following sections. Section 1 outlines the methodology employed in the research, which culminates in an examination of urban development policies in China and their impact at the national level (Section 2). The research then proceeds to examine the impact of state interventions on urbanisation patterns (Section 3), before summarising the key findings on the challenges China faces in density distribution for the creation of effective community policies (Section 4). The implications of these issues are discussed in Section 5, which leads to a final section that highlights the main lessons learned and provides recommendations for future policies (Section 6).

Keywords: *Urban development; real estate market; urbanisation; growing economy; urban sprawl; density.*

1 Introduction

The research involved three principal tasks. The first of these examines the principal documentary sources and reviews the scientific literature to interpret the urban development policies implemented in recent years in China and the functioning of the Chinese real estate market. The objective is to gain insight into the complex process that has led to the current situation.

The second task ascertains whether the pattern of population density has undergone a transformation over time because of governmental policy. The data employed in this study are primarily derived from the population figures of the National Bureau of Statistics of China, which are derived from the national census conducted every ten years. Additionally, the main data bulletins of the provincial-level administrative units (autonomous regions, municipalities directly under the central government) and the statistical bureaus in China have been utilised. It is also important to note that the two Special Administrative Regions of Hong Kong and Macao, as well as Taiwan, were included in this study. The data on population for Hong Kong and Macau were obtained from the Census and Statistics Department, SAR Hong Kong, and the Direcção dos Serviços de Estatística e Censos, Macau, for the years 2001, 2011 and 2021, respectively. Finally, the data for Taiwan were sourced from the National Statistics, Republic of China. The resident population database, which is linked to the different units of representation (provinces, prefectures and counties), was constructed for this research from the 2,852 spatial units identified for the year 2020. This was achieved by entering the information from the China

National Bureau of Statistics and geolocating it in each of the polygonal units that constituted the cartographic base. Each of these spatial units was adequately georeferenced in the aforementioned database but lacked precise population data from the last three censuses and the resulting density. For this reason, the data had to be processed through geospatial processing tools using Geographic Information Systems (GIS) processing tools, which proved to be an ideal system for the processing of information in this phase of the research, given that it allows the collection, management and analysis of geolocalised data. The process yielded a database that could be utilized to illustrate the evolution of density at the three primary administrative levels. The density considered in this database is defined as the number of permanent residents in each spatial unit at a specific time. The selected time points were the years 2000, 2010 and 2020.

The third task ascertains whether Chinese national policies at the city level have had an impact on the country's development model and whether the relationship between density and the imaginary Aihui-Tengchong Line remains consistent. This an identifying element of the spatial distribution model of the population which separated the Eastern and Western sectors of the country, respectively with a high and low population density. This task is performed on the mapping of the 5,047 main urban entities with more than 25,000 inhabitants identified in the "City population dataset" (Brinkhoff, 2024). A database of geolocated entities was created for this purpose, based on the entity's name, its relationship to the three main administrative levels existing in China ("1. Province", "2. Prefecture", and "3. County"), and the population of each entity according to the most recent census data available from the China National Bureau of Statistics (2021), the Bureaus of Statistics in China (2021), the Census and Statistics Department, SAR Hong Kong (2022), and the Macao's Direcção dos Serviços de Estatística e Censos (Census and Statistics Department, 2022). The verification process of the entities contained in this database was conducted by superimposing them on the OpenStreet Maps cartography, which was loaded directly into the ArcGIS Pro program. In addition, the data for each of the cities included in the City population dataset was transcribed into an Excel spreadsheet format to facilitate the integration of the alphanumeric population data with the respective graphic entities.

To study the density of territories, a heat map is created in which each entity represents a surface area, and its relative density dynamics are analysed. This type of cartographic representation is particularly well-suited to the display of point distributions, particularly when the points in question are near one another. The symbology employed in this representation indicates the relative density of points as a dynamic raster visualization, with a colour scheme employed to indicate density values. This task was performed through the geographic information systems tools to the totality of entities suitably geolocated, represented by a colour representation that varies from cold (sparsely populated) to warm (densely populated). As the user zooms in and out, the density definition and, therefore, the colour values change. The density is calculated using the Kernel Density Method, which determines a magnitude per unit area from point or polyline entities in order to fit a smoothly tapered surface to each point (Jiménez Moreno, 1991).

2. China-led national policies and their impact on the country's development model

The hukou is the census registration system for individuals or households in China and was first introduced in 1958, with a design like the propiska system employed by the Soviet Union at the time. Its continued use in China is essential for understanding the migratory movements of individuals and households from rural to urban areas within China. The hukou system controls internal migration and limits access to public services for rural migrants and it has contributed significantly to the formation of cities in China and the formalization of so-called ghost cities (S. Gu, 2017; L. Zhang & Tao, 2012). This system has prevented many new cities from reaching adequate population density by restricting the ability of rural citizens to settle in urban areas, resulting in vast uninhabited urban areas.

The hukou divides all Chinese citizens into two distinct categories (yin-yang), differentiating between those residing in urban and rural areas. As observed by Qingwu (1988), the hukou system has served to consolidate the country's prevailing socialist system and public interests. However, in the literature, the predominant explanation is that it was initially used to limit and control the movement of the population from the rural to the urban environment, but was later remodelled in 1978 to serve the industrialization of the country and influencing the selection of emigrants through the restriction of social services related to this system and the distortion of the return to qualification through wage discrimination (Chan & Zhang, 1999; J. Zhou & Hui, 2022).

In the early 1980s, China initiated a series of reforms that relaxed restrictions on internal migration. This represented a significant shift in policy, allowing Chinese citizens to move more freely within the country for the first time in decades in search of better job or educational opportunities (Brewer, 2011). While this liberalization did not encompass alterations to the hukou system, impeding individuals from relocating with greater ease, Chinese people were still able to officially alter their place of residence without approval, which still constrained their access to services such as education and medical care in their new places of residence (Y. Song, 2016; Tao et al., 2015; Huafeng Zhang, 2010) (Fig. 1).

Over time, cities began to develop local policies that allowed migrants to settle on a more permanent or semi-permanent basis. The specific policies enacted by different cities varied, but generally included the relaxation of urban hukou requirements and access to certain public services. These policies significantly improved the quality of life for migrants and encouraged a greater flow of population into urban areas. Among the implemented measures was the abolition of the *nongzhuangfei*, a costly and restrictive fee that rural migrants were required to pay in order to convert their rural hukou to urban (Huang et al., 2010; Hui et al., 2014; Q. Song & Smith, 2021; Tao et al., 2014).

In the late 1990s, these local hukou policies were consolidated, facilitating the migration and settlement of a greater number of individuals in urban areas on a more stable basis. This, in turn, facilitated labour mobility and access to better economic opportunities, as well as promoting

more inclusive and equitable economic growth by balancing development between China's rural and urban regions. However, it is evident that the system has continued to determine access to housing, education, and public services for Chinese citizens, despite the implementation of the aforementioned reforms (Huang et al., 2010; Hui et al., 2014; Q. Song & Smith, 2021; Tao et al., 2014).

During this period, the hukou system constituted a pivotal element in China's urbanisation and social development policy, inextricably linked to the objectives delineated in the various Five-Year Plans since its inception in 1953. These plans have served as a guiding force in the evolution of the country's economic and social policy, including the way population mobility and residence are managed. Prior to the 10th Five-Year Plan (2001-2005), the hukou system underwent a transformation from a rigid mobility control mechanism to a more flexible instrument that facilitated Chinese urbanisation and balanced development. This edition represented a significant turning point, with three different novelties in terms of national urbanization and the removal of institutional obstacles. First, it sought to promote the growth of smaller cities and facilitate the transition from rural to urban hukou, with the goal of enhancing the quality of life for migrants and supporting more inclusive and sustainable urban development (L. Zheng et al., 2007). Second, it emphasized the necessity of ensuring that new developments align with Chinese national conditions and prevent uncontrolled urban sprawl. Eventually, the development of small towns and villages was identified as a key approach to promoting urbanization, with priority given to this strategy.

During the 11th Five-Year Plan (2006-2010), the focus was on enhancing the capacity of cities to accommodate the growing migrant population and implementing differentiated policies to manage urbanization (N. Zhou et al., 2012). The Chinese government's approach involved the implementation of differentiated policies to guide urbanisation, which took into account the increase in population in large cities following the displacement of temporary and permanent rural workers (J. Zheng et al., 2022).

The subsequent 12th Five-Year Plan (2011-2015) strengthened these policies for integrating rural workers into the urban system by modifying the hukou system to facilitate their transition to urban residents and improving their living conditions in small and medium-sized cities (B. Wang et al., 2018). This Plan advocated for the synchronous organisation of industrialisation, urbanisation and agricultural modernisation, maintaining that industry should foster agriculture and cities should rely on rural areas to actively and steadily advance the urbanising process undertaken by the country. To achieve this objective, two kinds of measures were proposed. First, the establishment of a strategic pattern of urbanisation through the gradual formation of clusters of cities with a significant radiating effect. Second, changing the hukou status of rural workers to urban residents, while the population size and management in megacities was to be controlled and improved (Casey & Koleski, 2011).

Over the past decade, China's urbanisation has attracted as much attention as its economic growth. While the process of urbanisation has undoubtedly promoted modernisation and wealth

creation, it has also brought with it a number of problems and challenges, including the emergence of so-called 'ghost cities'. Consequently, in 2014, the Chinese government implemented a new urbanisation policy across the country, as evidenced by Chu (2020) and Liu et al. (2024). In fact, the Chapter XV "Optimization of urban spatial structure and management pattern new strategies" of the 2014-2020 National New-Type Urbanisation Plan set out the transformation of central urban areas and the construction of new cities and new districts (Central Committee of the Communist Party of China, 2016). One of the most significant issues is the Section 1 "Renewal to enhance central city functions", which encourages the relocation of specific existing functions in the central urban areas of megacities to satellite cities that support them, while reinforcing high-end services, modern commerce, innovation and other functions in the main urban cores of large and medium-sized cities. This is accompanied by the Section 2 "Strict regulation of the construction of new cities and areas", which sets out rigorous conditions for the creation of these new cities. The aim is to avoid uncontrolled expansion of urban limits. To achieve this, it is necessary to adopt an informed planning approach that takes into account factors such as population density, environmental capacity and available resources. Finally, Section 3, entitled "Improving the environment at the interface between urban and rural areas", addresses the improvement of the environment at the interface between urban and rural areas through the improvement of planning, construction, and management services in these areas. The objective is to promote balanced community development and to improve the living conditions of the rural population.

The current 2021-2035 National New-Type Urbanisation Plan considers urbanisation to be the sole path to modernisation. Its support is essential for the promotion of coordinated regional development (H. Wei et al., 2021). Furthermore, the text acknowledges that while the Beijing-Tianjin-Hebei urban agglomerations have taken the lead in opening and development, the development of the central and western regions is relatively lagging. This implies that the spatial distribution and scale structure of cities and towns are not aligned with the carrying capacity of resources and the environment (Ye et al., 2020).

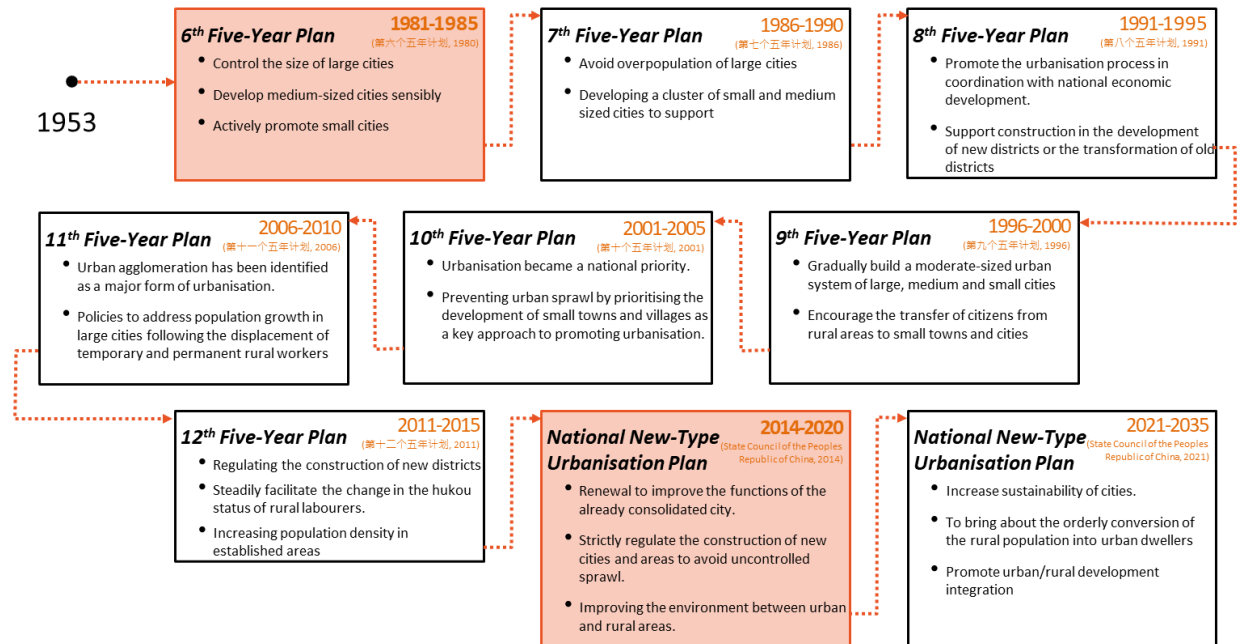


Fig. 1 Urbanisation plans and strategies 1981-2035 (Source: Own elaboration).

3. State-led interventions and the challenges of urbanisation

The relationship between the housing market and community interventions in the country is complex, multifaceted and intimately influenced by a series of public policies, economic demands and social changes that have developed over the last decades. The Chinese real estate market has experienced a massive expansion, characterised by rapid urban development and a remarkable growth in housing construction (Fig. 2). However, this has not been uniform, resulting in the emergence of different territorial challenges. These include housing affordability (Ma & Liu, 2024), regional imbalance (Fan et al., 2011; Z. Zhou & Zhang, 2021), the emergence of ghost cities (Shepard, 2015; Sorace & Hurst, 2016) and concerns about the quality of life in urban and rural communities (D. Wang et al., 2023; P. Wang et al., 2023).



Fig. 2. New urban developments around the centre of Taizhou city-prefecture in Jiangsu province (Source: photo taken by Javier Morán Uriel, 16 April 2023).

One of the most prevalent forms of intervention in urban contexts has been the enhancement of infrastructure and services within cities through the construction of new roads, the improvement of the public transport system, and the provision of essential services such as water and electricity supply. Such interventions not only enhance the quality of life for residents but also elevate the value of real estate in the affected areas (X. Li et al., 2020). In this context, the Chinese government has made a significant investment in upgrading urban infrastructure with the objective of supporting real estate development and encouraging housing demand in areas that previously lacked adequate services. This investment has been of particular significance in second- and third-tier cities, where the absence of infrastructure has constituted a significant impediment to economic growth and the attraction of new residents (Wu et al., 2016).

This phenomenon can be attributed to the fact that rural land is owned by agrarian collectives, while urban land is owned by the state. As China's urbanisation has expanded into rural areas, large tracts of farmland have been reclassified as urban by the local authorities themselves. This has resulted in the expropriation of land rights from the peasants who previously resided there, in exchange for an urban hukou, compensation, or a modern flat (Hong Zhang et al., 2016). The strategy in question is based on municipalities purchasing rural land at a low price, subsequently rezoning it as urban and selling it at a high price to developers, thus generating a profit (Mingye, 2017). This encourages the current Chinese tax system to force local governments to rely on land sales, creating a situation where cities need to keep expanding and encouraging accelerated urbanisation of the territory (Rithmire, 2017).

In parallel, some cities have implemented policies of redevelopment and rehabilitation of older neighbourhoods seeking to renovate blighted areas and transform slums into modern and functional residential areas. This is achieved by improving the living conditions of existing residents and creating new opportunities for real estate development, all of which helped balancing housing supply and demand in cities (Sun et al., 2022; M. Wang et al., 2022).

Another crucial aspect of the state-led interventions has been the implementation of affordable housing policies to address the needs of lower-income segments of the population. The Chinese government has implemented policies to facilitate the construction of low-cost housing and has established subsidy programmes to enable low-income individuals and rural migrants who have relocated to urban areas in search of improved prospects to access housing (Tian et al., 2020; Zenou, 2012). These policies have been instrumental in addressing inequalities in access to housing and in guaranteeing that all citizens can live in decent conditions. Nevertheless, in first-tier cities, the discrepancy between the supply of and demand for housing has been a significant contributing factor to the surge in land prices, which has subsequently led to a dramatic increase in house prices (H. Gu & Jie, 2024; X. Zheng et al., 2021).

A final issue resulting from this type of state intervention has been an attempt to promote environmental sustainability within real estate development by adopting sustainable building practices, improving energy efficiency in buildings and creating green spaces and recreational areas in urban environments. As pointed out by Li & Mell (2023), Li & Yao (2012), Zhang et al. (2020) and Zheng & Barker (2021), these initiatives have been implemented through various projects that not only enhance the quality of life for residents, but also improve the desirability and value of properties in the affected areas in Maanshan and Beijing. The aforementioned projects illustrate the growing recognition of environmental sustainability as a mitigating factor in the context of significant environmental degradation and the loss of agricultural land, which is eroding local resilience (J. Wei et al., 2023; Xu et al., 2024).

4. China's density distribution challenges in establishing community policies

In 2020, the People's Republic of China had a population density of 147.16 hab/km². When the populations of Macau, Hong Kong and Taiwan are included, this figure is reduced to 108.35 hab/km². The national surface reaches 9,593,693 km², but its population distribution is not uniform. In its vast and varied territory, two main regions can be distinguished: the eastern half and the western half. The former is watered by the Yangtze or Blue River and the Huang-Ho or Yellow River, has a high population density and different climatic conditions (continental, tropical and subtropical) that have traditionally favoured the settlement of the population. It is the economic base of the country due to its fertile cereal-growing areas of millet, sorghum, soybeans and wheat and its access to the sea. The western half of the country is mountainous and desert-like. The region is characterised by the Gobi and Taklamakan deserts and the Himalayas. The presence of these elements has a significant impact on the climate of this region, which has

resulted in the formation of inhospitable and sparsely populated areas due to the hostile conditions they create.

4.1. The Heihe-Tengchong Line and the territorial inequalities it represents

The significance of these zones and the aforementioned population stability is such that the imaginary Heihe-Tengchong Line is identified as a key element of the spatial distribution pattern of the population. This is characterised by a high population density in the east and a lower population density in the west, which remains evident to this day (C. Liu et al., 2019; Qi et al., 2016; Yan et al., 2023). This pattern, characterised by flat terrain, low altitudes and proximity to coasts and rivers, has persisted over decades in the face of rapid economic and social development. Thus, a line can be drawn between the towns of Heihe in the northeast and Tengchong in the south, which would divide the nation into two distinct halves. This would result in a significant imbalance in terms of land area and population, with 57% of the land area comprising just 6% of the population, while the remaining 43% of the land area would have 94% of the population (Sang et al., 2024).

By considering the Heihe-Tengchong Line, three areas of high concentration of cities can be identified (Fig. 3). The first of these would be in the provinces of Guangdong and Guangxi on the southeast coast, with a privileged geographical position for maritime trade and connections with other Southeast Asian countries. The second zone is situated in the vicinity of Shanghai, which has emerged as the principal national financial and commercial hub, boasting a robust economy and a diverse range of employment opportunities, encompassing the financial and service sectors, as well as the manufacturing industry (Cheng et al., 2019). Finally, the third and final zone is the capital of the People's Republic of China itself. Beijing, the capital of China, has undergone significant investment in infrastructure, including roads, high-speed railways and public transport, which has facilitated the mobility of the population between Beijing and the neighbouring provinces of Hebei and Tianjin. This has led to a concentration of population in these areas.

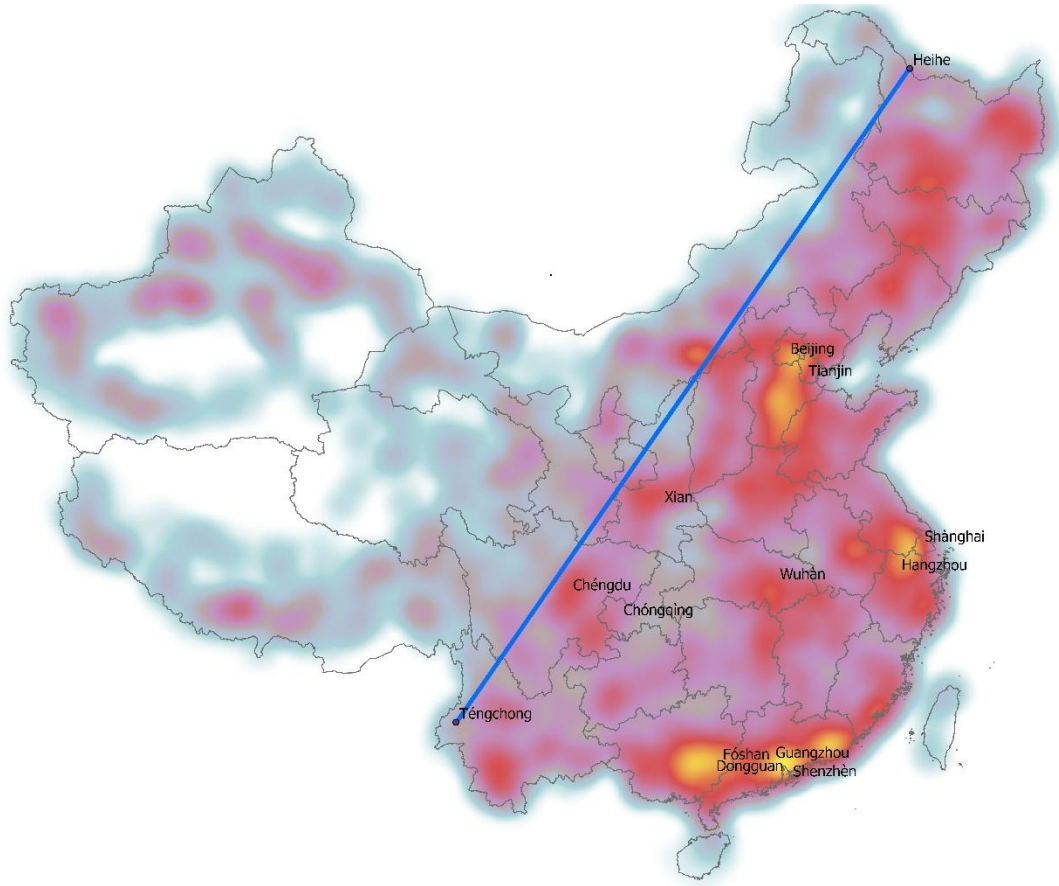


Fig. 3. The distribution of urban populations across the globe was analysed using the Kernel Density Method (Source: Morán Uriel, 2024).

4.2. The evolution of density in three main administrative levels

The uneven distribution of China's population represents a significant challenge for policy intervention (Fig. 4; Table 1). In order to manage the population pressure that is present in densely populated regions, such as urban areas in the east, greater investment in infrastructure and social services is required. In contrast, less densely populated regions in the west have different needs, such as developing basic infrastructure and promoting social inclusion.

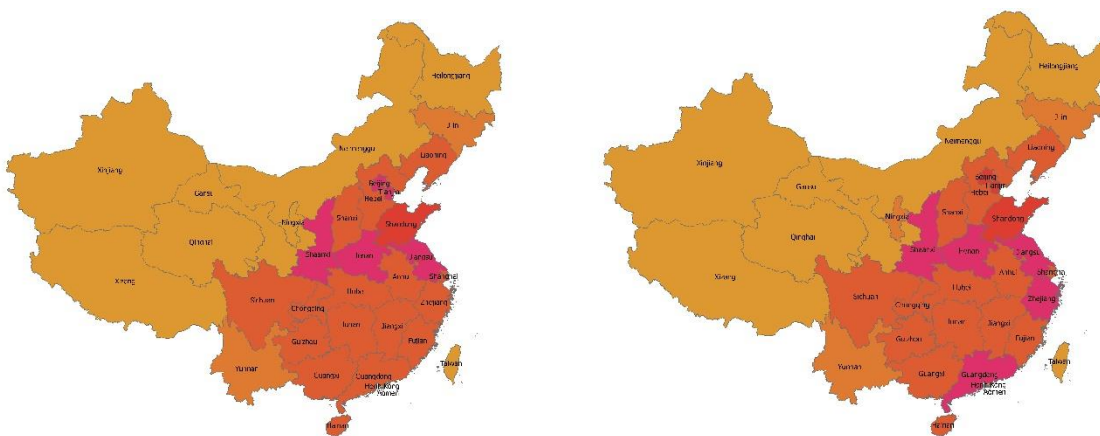


Fig. 4. The evolution of density in “Level 1. Province” between 2000 and 2020 (Source: Own elaboration)

DENOMINATION	STATUS	SURFACE (KM ²)	POPULATION 2020 (HAB)	DENSITY 2020 (HAB/KM ²)
Ānhuī Shěng	Province	139,879	61,027,171	436.29
Běijīng Shì	Municipal Province	16,411	21,893,095	1,334.05
Chóngqìng Shì	Municipal Province	82,403	32,054,159	388.99
Fújiàn Shěng	Province	123,756	41,540,086	335.66
Gānsù Shěng	Province	457,382	25,019,831	54.70
Guǎngdōng Shěng	Province	180,013	126,012,510	700.02
Guǎngxī Zhuàngzú Zìzhìqū	Autonomous Region	237,818	50,126,804	210.78
Guìzhōu Shěng	Province	176,140	38,562,148	218.93
Hǎinán Shěng	Province	34,259	10,081,232	294.27
Héběi Shěng	Province	189,809	74,610,235	393.08
Hēilóngjiāng Shěng	Province	472,766	31,850,088	67.37
Hénán Shěng	Province	165,467	99,365,519	600.52
Húběi Shěng	Province	185,776	57,752,557	310.87
Húnán Shěng	Province	211,842	66,444,864	313.65
Jiāngsū Shěng	Province	99,949	84,748,016	847.91
Jiāngxī Shěng	Province	166,939	45,188,635	270.69
Jílín Shěng	Province	190,282	24,073,453	126.51
Liáoníng Shěng	Province	147,076	42,591,407	289.59
Nèi měnggǔ Zìzhìqū	Autonomous Region	1,199,372	24,049,155	20.05
Níngxià Huízú Zìzhìqū	Autonomous Region	66,400	7,202,654	108.47
Qīnghǎi Shěng	Province	690,355	5,923,957	8.58
Shāndōng Shěng	Province	157,704	101,527,453	643.78
Shànghǎi Shì	Municipal Province	6,341	24,870,895	3,922.24
Shānxī Shěng	Province	156,713	34,915,616	222.80
Shānxī Shěng	Province	205,624	39,528,999	192.24
Sìchuān Shěng	Province	484,056	83,674,866	172.86

DENOMINATION	STATUS	SURFACE (KM ²)	POPULATION 2020 (HAB)	DENSITY 2020 (HAB/KM ²)
Tiānjīn Shì	Municipal Province	11,610	13,866,009	1,194.32
Xīnjiāng Wéiwú'ěr Zìzhìqū	Autonomous Region	1,644,707	25,852,345	15.72
Xīzàng Zìzhìqū	Autonomous Region	1,204,776	3,648,100	3.03
Yúnnán Shěng	Province	383,195	47,209,277	123.20
Zhèjiāng Shěng	Province	104,873	64,567,588	615.67
People's Republic of China	Sovereign state	9,593,693	1,411,778,724	147.16
Macau	Special Administrative Region	3,030	682,070	225.11
Hong Kong	Special Administrative Region	108,260	7,413,070	68.47
Taiwan	Republic of China	3,619,281	23,829,897	6.58
Total		13,324,264	1,443,703,761	108.35

Table 1. Population distribution and density in China according to administrative Level 1 (Source: Own elaboration based on data from China National Bureau of Statistics, Census and Statistics Department, SAR Hong Kong, Direcção dos Serviços de Estatística e Censos and National Statistics of Republic of China).

A comparison of population density by province reveals that the 847.91 hab/km² of Jiangsu Sheng and the 700.02 hab/km² of Guangdong Sheng stand out in comparison to the inland autonomous regions of Nèi Menggu Zìzhìqū with 20.05 hab/km² and Xīzàng Zìzhìqū with only 3.03 hab/km². A different case is that of municipalities under central jurisdiction, such as Shànghǎi Shì and Běijīng Shì (Fig. 5). These municipalities have a population density of 3,922.24 hab/km² and 1,334.05 hab/km², respectively.

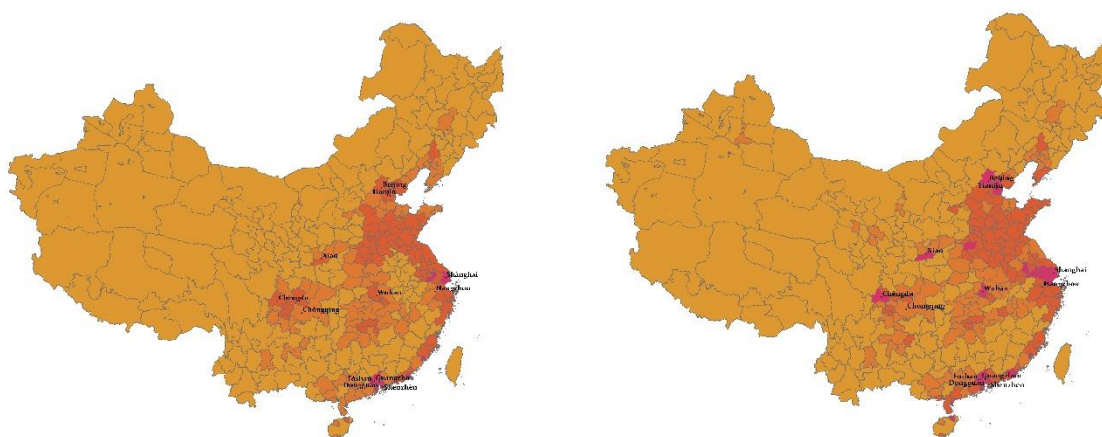


Fig. 5. The evolution of density in “Level 2. Prefecture” between 2000 and 2020 (Source: Own elaboration)

The territorial discrepancies are maintained at the “Level 2. Prefecture”. In this case, the differences between prefectures are once again strikingly evident. The city-level prefectures of Sānshā Shì, Ālāshàn Méng and Ālǐ Dìqū, which have lower population densities, are located in the western part of the region. There is only 0.01 hab/km² in the western part, and there has been practically no population variation in the period 2000-2020. The situation is entirely distinct from that of the city-level prefectures of Dōngguān Shì and Shànghǎi Shì, which have a population density of 4,272.09 hab/km² and 3,922.24 hab/km², respectively. Similarly, the situation differs from that of Shēnzhèn Shì, a sub-provincial city, which reached a population density of 8,980.70 hab/km² in 2020. Moreover, the data indicates a significant variation in population density between 2000 and 2020. In particular, the city of Shenzhen has experienced an annual increase of 269.14 hab/km², while the other two cities have demonstrated a much more modest growth rate, with less than 100 hab/km² annually.

The population variations also demonstrate a clear tendency towards population concentration in the eastern part of the region, with the greatest density losses observed in Nèijiang Shì and Ziyáng Shì Prefectures. In these areas, a decrease of approximately 10 hab/km² per year has been recorded, with values of -9.47 hab/km² and -8.50 hab/km², respectively. Conversely, Xiàmén Shí exhibits a variation of 97.89 hab/km², while Dongguan Shí displays 82.06 hab/km².

The total number of entities included in the “Level 3. Counties” is 2,852, which comprises counties, county-cities, districts, and flags, both autonomous and not (Fig. 6). The variety of entities and the surface areas covered by each of them result in a significant difference between the maximum and minimum density values. Three density poles can be identified at this administrative scale, namely Beijing-Tianjin, Shanghai and Guangzhou-Dongguan, which are home to cities with a population of over nine million.

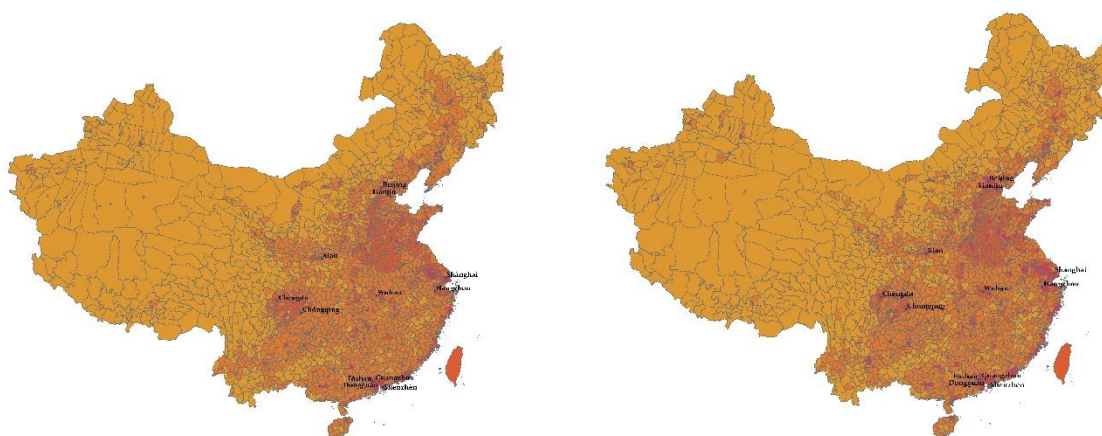


Fig. 6. The evolution of density in “Level 3. Counties” between 2000 and 2020 (Source: Own elaboration)

A first density pole includes the districts of Dongcheng, Fengtai, Haidian, Shijingshan, Xicheng, Chaoyang, Hebei, Hexi, Hongqiao, Jinnan, Nankai, Xiqing, Hedong, Heping and Tong Zhou districts collectively form a large conglomerate with densities all above 2,000 hab/km². Other districts, including Changping, Daxing, Beichen, Dongli and Shunyi, also exhibit high densities, exceeding 1,000 hab/km². A similar phenomenon can be observed in the second density pole, Shanghai, where a total of 10 districts collectively represents one of the most densely populated areas on the planet. In addition to the districts of Hongkou, Huangpu, Jiading, Jingan, Minhang, Songjiang, Yangpu, Changning, Putuo and Pudongxin, which have a population density of over 2,000 hab/km², there are the districts of Fengxian, Jinshan and Qingpu, which have a lower population density. The third density pole comprises 24 entities covering 12,115.20 km². The 24 entities, which collectively cover 12,115.20 km², include Baiyun, Baoan, Dongguan, Futian, Guangming, Haizhu, Hong Kong, Huangpu, Jianghai, Liwan, Longgang, Longhua, Luohu, Nanhai, Nanshan, Panyu, Pengjiang, Pingshan, Shunde, Tianhe, Xiangzhou, Yantian, Yuexiu and Zhongshan. The combined population of these districts is 64,253,955, with a population density of 5,303 hab/km² (Fig. 7).

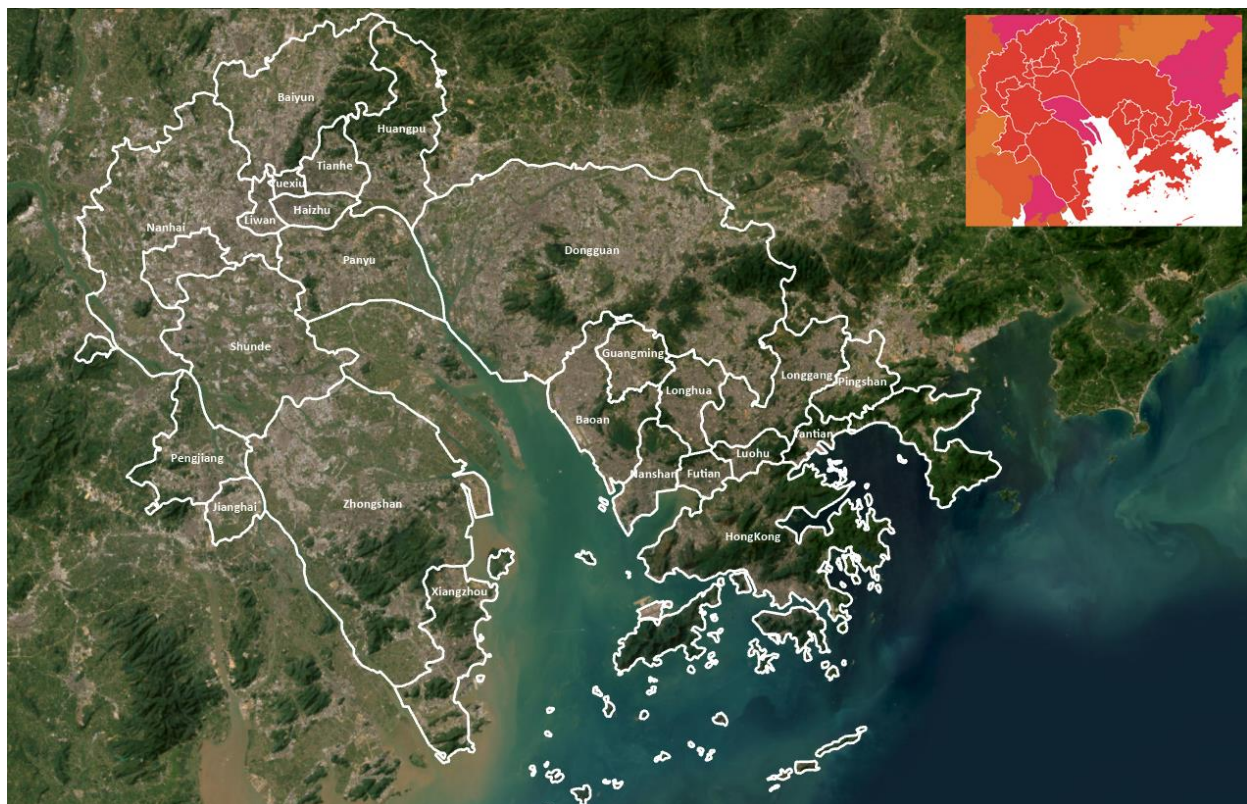


Fig. 7. Guangzhou - Dongguan third density pole. (Source: Morán Uriel, 2024)

At the “Level 3. Counties”, particularly dense entities can be identified. For instance, the Xinjiang Uyghur Autonomous Region, a western autonomous region, has densities close to and above 2,000 hab/km² in the districts of Shayibake, Shuimogou, Tianshan and Xinxi. In the latter district,

the density reaches 3,875.25 hab/km². In addition, the population density in Ruòqiāng Xiàn and Qiěmò Xiàn counties is 0.22 hab/km² and 0.50 hab/km², respectively.

East-west division is reflected in the location of the 10 most densely populated areas. All of them have a population density above or very close to 25,000 hab/km² and are identified in the smallest of the administrative entities at this level, the districts. This density can be placed in context by noting that it is comparable to that of some cities with high population densities, such as Karachi (Pakistan) and Dhaka (Bangladesh). The former has a population density of approximately 46,657 hab/km², while the latter has a population density of approximately 30,900 hab/km², according to data from the latest report by Demographia (2023). Cities that not only experience congestion due to the high population numbers but also face significant challenges in terms of high demand for housing, which can result in the creation of substandard or prohibitively expensive housing, transport or public services, as well as a lack of availability of green space and recreational facilities (Kamble et al., 2022; Meng et al., 2020; Yu et al., 2023). In the Chinese case, the most dense districts (Table 2) are distributed across the provinces of Chóngqìng Shì, Guǎngdōng Shěng, Jiāngsū Shěng, Shǎnxī Shěng, Tiānjīn Shì and Zhèjiāng Shěng. Furthermore, three of these districts are situated in Shanghai, one of the largest and most densely populated cities in the world. The high population density figures in this municipality directly under the central government are related to its importance as a national and international economic, financial, commercial and maritime centre. Furthermore, the city of Shanghai is part of the fundamental framework of a scientific and technological innovation centre with a significant global influence. This is largely due to its close relationship with the Yangtze River Delta floodplain and its physical connection to Hangzhou Bay, which has made the port of Shanghai a major international maritime hub. This enables the city to connect the country to global markets and to handle the highest annual cargo volume compared to other major ports.

DENOMINATION	PROVINCE	SUPERFACE (KM ²)	POPULATION 2020 (HAB)	DENSITY 2020 (HAB/KM ²)
Héping Qū	Tiānjīn Shì	10.01	355,000	35,455.37
Huángpǔ Qū	Shànghǎi Shì	20.35	662,030	32,528.89
Hóngkǒu Qū	Shànghǎi Shì	23.45	757,498	32,308.89
Bēilín Qū	Shǎnxī Shěng	22.99	756,840	32,922.66
Yuèxiù Qū	Guǎngdōng Shěng	33.67	1,038,643	30,845.82
Qiántáng Qū	Zhèjiāng Shěng	27.00	769,150	28,487.04
Liánhú Qū	Shǎnxī Shěng	38.40	1,019,102	26,536.07
Jìng'ān Qū	Shànghǎi Shì	37.00	975,707	26,370.46
Gūsū Qū	Jiāngsū Shěng	80.57	2,058,010	25,542.01
Yúzhōng Qū	Chóngqìng Shì	23.86	588,717	24,672.12

Table 2. Top 10 densest entities in China by administrative Level 3 (Source: Own elaboration based on data from China National Bureau of Statistics, Census and Statistics Department, SAR Hong Kong, Direcção dos Serviços de Estatística e Censos and National Statistics of Republic of China).

5. Discussion and implications

China's vast land area and the remarkable disparity in population distribution present unique challenges in a country that is unlike any other. In densely populated areas such as the cities in the east, it is evident that greater investment in infrastructure and social services is required to effectively manage population pressure. Conversely, less densely populated regions in the west require policies that are geared towards basic development and the promotion of social inclusion. The unequal distribution of the population across China's vast territory implies that community intervention policies should be highly adaptable and tailored to the specific context of each region.

To date, the implemented policies have not resulted in a reversal of the Heihe-Tengchong Line, with only minor alterations in population density observed at the three scales analysed. Consequently, the existing inequalities in population distribution, which were intended to be balanced, have been maintained.

In addition, the variability in population density necessitates that community interventions be tailored to the specific characteristics of the local area. In urban areas, where high population density creates problems of congestion and demand for public services, policies should focus on improving the quality of life by creating green spaces and optimising public transport. In rural and less densely populated areas, however, interventions can be focused on sustainable development and improving access to essential services, promoting social cohesion and local economic development. This differentiated approach is of the utmost importance to guarantee that the policies implemented are both effective and aligned with the specific needs of each community.

One of the most significant challenges in densely populated regions is the scarcity of affordable housing and rising prices, which underscores the necessity for community-based initiatives that prioritize appropriate urban planning. The emergence of 'ghost cities' in China prompts reflection on the desirability of specific times and densities in cities. This is particularly relevant in the context of cities with a population density below 5,000 hab/km². It can be posited that community interventions must be based on accurate data and a thorough understanding of local needs to avoid creating unnecessary infrastructure in a context of energy and material crisis such as the current one.

Furthermore, the necessity for equitable development in China emphasises the significance of community intervention policies that facilitate equity in access to resources and opportunities, irrespective of population density. It is imperative that policies ensure that both densely populated, and less populated areas can benefit from economic and social development, thereby ensuring a fair distribution of resources and promoting sustainable development throughout the

country. Meticulous planning and flexible implementation of community intervention policies are crucial to address regional disparities and promote balanced development in China.

The exponential growth of the global population over the past century, coupled with the rural exodus that has been occurring in recent decades, suggests that at some point the past will become too small to be inhabited and shared by people. In this context, a series of rapidly conceived and dehumanised cities or city peripheries have emerged. A phenomenon that originated in the so-called North American suburbs (Brenner, 2016) and is currently at its greatest expression in the cities of Asia. This style of urbanism has resulted in the homogenisation of the peripheral areas of cities, transforming them into entirely monotonous and bland places (Pearson, 1996).

Considering these considerations, it is striking to assess the viability of maintaining identity in a country like China, which has a history spanning thousands of years, in an era of relentless construction and demolition, in a context where the urban population is expanding while the rural population is shrinking, as is currently observed. One of the notable consequences of the urbanisation process that has been encouraged by the state-led policies, in conjunction with the significant expansion of the construction industry, is the lack of identity, history and roots that is prevalent in most of the new urban areas. This has resulted in a vacuum of feeling and relationship between the inhabitants and their city. This situation is in part attributable to the persistence of outdated or inadequate building systems. Furthermore, a lack of sensitivity on the part of developers and local governments contributes to this problem. In many instances, the prioritisation of time efficiency over architectural quality has led to the utilisation of standardised designs with minimal complexity and variety. Consequently, the phenomenon of so-called 'superblocks' has become prevalent in the Chinese skyline, with these structures exhibiting a lack of meaningful connection to their socio-cultural environment. This results in a glaring disconnection with the surrounding urban landscape.

6. Concluding remarks

Despite the evident advantages of community-based initiatives, several obstacles must be overcome to ensure that they have the greatest possible impact on China's real estate market. One of the principal challenges is regional inequality, as a significant proportion of investments and improvements are concentrated in large first- and second-tier cities, while smaller cities and rural areas continue to face a lack of resources and opportunities. This unequal approach has resulted in an imbalanced distribution of development, with densely populated urban areas in the east undergoing a period of rapid urbanisation and economic growth, while the more rural and less densely populated western regions lag. The absence of investment in fundamental infrastructure and public services in these rural areas constrains the potential for development and perpetuates the country's economic and social disparity.

Furthermore, coordination between different levels of government and local communities is crucial to ensure that interventions are effective and aligned with the real needs of residents. The Chinese administrative structure, comprising multiple levels of government from central to local, presents a challenge to the implementation of coherent and effective policies. A lack of effective communication and collaboration between these levels can result in the duplication of efforts, a lack of resources in critical areas and the implementation of policies that do not reflect local realities. It is therefore of the utmost importance to reinforce community participation and ensure that the citizens' perspective is an integral component of the planning and implementation of development policies. Such measures not only enhance the efficacy and longevity of interventions, but also facilitate transparency and accountability in public management.

In the future, it is essential that property development policies and community interventions focus on the promotion of more balanced and sustainable growth across the country. Among these issues, the phenomenon of ghost cities stands out as a clear example of how initially unbalanced urban planning can, over time, achieve efficiency. It is therefore crucial that future policies are based on a thorough understanding of local dynamics and focus on the integrated development of urban and rural areas.

The creation of economic opportunities and the improvement of public services in these areas are of paramount importance if the country is to attract and retain residents and foster more equitable and sustainable development across the country. By concentrating policies on reducing the disparity between more and less developed regions, it is possible to achieve more inclusive growth that benefits a larger proportion of the population. This entails not only enhancing infrastructure and services in less developed regions, but also fostering local innovation and entrepreneurship, thereby creating an environment that enables communities to flourish in a sustainable and equitable manner.

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CRedit authorship contribution statement

Roles played by contributors Javier Morán Uriel (JM), Federico Camerin (FC) and Rafael Córdoba Hernández (RC) to research outputs: Conceptualisation: RC; Data curation: JM&RC; Formal Analysis: JM&RC; Funding acquisition: FC; Investigation: JM; Methodology: JM&RC; Project administration: FC; Resources: FC; Software: JM; Supervision: RC; Validation: FC; Visualisation: JM&RC; Writing – original draft: JM, FC & RC; Writing – review & editing: JM, FC & RC.

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