

**Economic Transition, Development Zones, and Urban Land Expansion
in the Yangtze River Delta, China**

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Abstract

Since the reforms launched in the late 1970s, China has been undergoing rapid economic growth and urbanization. With the pursuit for competitiveness and growth, Chinese cities have recorded massive urban land expansion, accompanied by disappearing rural agricultural land, serious environmental consequences, and intensified social conflicts. This report investigates urban land expansion and structural change in the Yangtze River Delta (YRD), with an emphasis on Nanjing city, by integrating official land use statistics and remote sensing data. We investigate development process and changing contents of government policies and analyze development zones and key projects as privileged, trait making, and even path breaking particles of the development process. We find that Chinese cities have recorded unprecedented urban land expansion, and the magnitude of this expansion is generally consistent with the process of urbanization and economic development. Urban land expansion in the YRD has been driven by rapid industrialization, especially institutionally driven development referred to as “development zone fever.” We highlight the transition and paradox of the Chinese state in urban development process, and the broad institutional contexts underlying urban land expansion in China. We argue that state sponsored development aimed at capitalizing on globalization and promoting economic growth has contributed greatly to urban expansion in large cities of China. The local growth-oriented government has become a predominant agent of urban expansion. Development zone and project fevers, and lagging administrative reforms, however, have made cities heavy with debt and led to wasteful development, corruption and social unrest in China. China must deepen institutional and land reforms to better manage urbanization and make development more equitable and sustainable.

Keywords: Urbanization, urban expansion, development zone, Yangtze River Delta, China

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Introduction

Rapid urban growth and land use change in developing countries, especially in Asia, have generated considerable governmental concerns and scholarly attention (United Nations 2002). These issues are important as they are associated with economic growth, resource allocation, inequality, social unrest, and sustainability (e.g., Kasarda and Parnell 1993; United Nations 1996). Having difficulty in coping with population growth, developing countries have attempted to control urbanization and the growth of large cities, similar to the former socialist countries influenced by socialist ideology (Wei 2005; Chen et al. 2013). While problems associated with urbanization have continued to trouble developing countries, globalization has transformed urban governments from providers of public goods to developmental and entrepreneurial states promoting economic growth and competitiveness (Hall and Hubbard 1998). Cities are increasingly becoming centers for globalization and economic growth. The rapid urban land expansion has become a widespread global phenomenon (Angel 2011), and a new challenge that developing countries have rarely faced before three decades ago. Asia is urbanizing rapidly, and cities in Asia are emerging as engines of growth, posing major development challenges such as poverty, inequality, and sustainability (Dahiya 2012). Rapid growth and urbanization has generated renewed debates over consequences of urbanization and challenges to urban sustainability and policy, especially with heightened concerns over global warming and regional resilience.

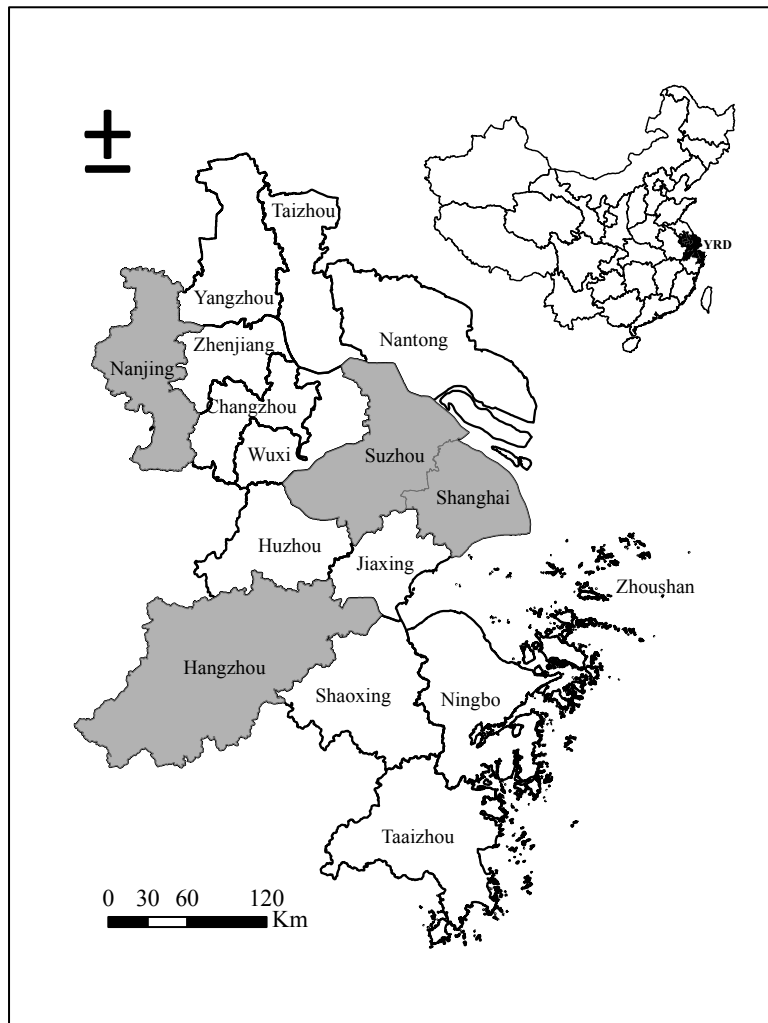
Former socialist countries, under the influence of socialist ideology, had intended to control urbanization and the growth of large cities, as evidenced by the notion of “under-urbanization” and “anti-large-city” policies (Andrusz et al. 1996). During Mao’s era, heavily influenced by socialist ideology, China implemented a policy of controlling migration and urbanization, while promoting industrialization (Wei 1994; Zhao and Zhang 1995). Due to this policy, the Chinese cities had been compact with very limited urban land expansion. However, with economic reforms and globalization, cities have been undergoing unprecedented growth and restructuring, with millions of rural migrants flooding into the cities (e.g., Pieke and Mallee 1999; Fan 2008). By the end of 2011, for the first time in the history, more Chinese people have lived in cities than in the countryside, although many migrants still hold rural household registration. The cities in China, whether large or small, have recorded massive urban land expansion (Xie et al 2007; Wei 2012; Yue et al. 2014), which has even been called urban sprawl, comparable to the United States (Yue et al. 2013). Land loss, unjust development and environmental problems have resulted in massive social protests (Lin and Ho 2005; Tong and Lei 2013).

This report examines the process and effects of development policies and economic transition on urban land expansion in China through a study of major cities in the Yangtze River Delta (YRD) and with a focus on Nanjing (Figure 1). The YRD is defined as the area generally known as Hu (Shanghai) – Ning (Nanjing) – Hang (Hangzhou) region, which officially

encompasses 16 municipalities with similar physical conditions and close economic linkages. A related concept is the Pan-YRD region which includes Shanghai, Jiangsu province and Zhejiang province, and sometimes includes Anhui province. We specifically investigate four cities including Shanghai, Suzhou, Hangzhou and Nanjing due to their economic and political significance.

As one of the largest emerging global city regions of the world, the YRD is experiencing rapid urban expansion in recent years. Shanghai is an emerging global city driven by both foreign investment and state policies. Suzhou showcases the rapidly industrializing cities in the YRD. Hangzhou is a representative of coastal cities undergoing dramatic growth and restructuring. Nanjing illustrates how a city in the fringe of the YRD attempts to cope with the intensifying intercity competition through its urban development strategies. We investigate changing contents and effects of government policies, especially project-oriented, development zone-based policies, and their effects on urban growth and land expansion. This report mainly relies on urban statistics and remote sensing data, along with interviews with various municipal governments and visits to different development zones to understand development policies, processes and mechanisms. We highlight the paradox and transition of the Chinese state in land development, and the broad contexts underlying urban land expansion. We see urban land expansion as a process responding to economic transition and policy change. We hold that the role of the state has to be analyzed within the broad context of globalization and economic restructuring to understand urban development and expansion, not just the local factors of accessibility and feasibility.

Figure 1. Locations of Shanghai, Suzhou, Hangzhou and Nanjing in the Yangtze River Delta



Institutional Reforms, Economic Transition and Urban Expansion

Issues of urbanization and land development in China are complicated since the nation has been undergoing economic transition from state socialism and land has become a key instrument for local governments to promote economic growth, subsidize infrastructure development and compete for external investment. Moreover, the processes of urbanization and land use change are increasingly being influenced by global processes, becoming more globalized, dynamic and complicated (Wei and Ye 2014). Urban land expansion is no longer a local, physical process mainly influenced by accessibility and the physical environment. It has been widely observed that foreign capital has become a major force of industrial relocation and land development (Wei et al. 2013), and often finances “land grabs.” More recent research efforts have promoted the development of land change science and land system science (Turner et al. 2007; Verburg et al. 2013) and the reconceptualization in land use change and urban land expansion. The urban land teleconnections (ULT) framework has the potential to link land use change to global process and to advance conventional

conceptualization of urbanization and land (Gunalp et al., 2013). Given the dynamics of economic restructuring and its significant impact on land use change, scholars have also promoted economic geography to reinvigorate land-use science (Munroe et al. 2014).

China has been undergoing economic reforms with emphasis on the restructuring of the socialist institution since the late 1970s. Chinese cities have been transforming from socialist cities to transitional cities characterized by transitional institutions, hybrid urbanization, and spatial fragmentation (Heikkila 2007; Luo and Shen 2008; Ma 2005; Wei and Ye 2014). While China has become the engine of the global economy, rapid urbanization of population is coupled with equally rapid urban land expansion and structural change. Problems with the land system and development process have intensified concerns over income inequality, land loss, government corruption, and environmental degradation, leading to huge rise in protests and riots in China (Lin and Ho 2005; Tong and Lei 2013).

The work on urban land expansion in China is fragmented and largely modeling based. Most of the research, using GIS and remote sensing analyze the extent, direction and factors of urban land expansion, and focus on accessibility and physical conditions in driving urban growth (e.g., Xie et al. 2007; Li et al. 2014). This line of research is very fruitful and has documented the patterns and factors of urban land expansion in China in great detail. They have also attempted to improve the understanding of the mechanisms and driving forces by improving spatial modeling techniques, expanding socioeconomic variables, and incorporating institutional analysis. Such efforts have improved the modeling and understanding of urban land expansion. Indeed, this is the mainstream in terms of land use change and urban land expansion research globally, with progress being made in developing and applying spatially explicit models in land use change and urban land expansion (e.g., Seto and Kaufmann 2003; Luo and Wei 2009).

Modeling approaches typically follow the neoclassical perspective and emphasize the role of accessibility and the physical environment, as necessary conditions for urban land expansion. However, they are insufficient in interpretation and understanding. The progress towards incorporating socioeconomic variables and institutional analysis has been limited due to the limitation of data at finer geographical scale and difficulty in quantifying institutions. Such studies also tend to be weak in addressing the processes of forces underlying urban land expansion, especially the impact of macro and institutional forces. More efforts are still needed to further incorporate socio-economic and institutional variables, and undertake policy analysis.

Scholars have also adopted institutional and political economy perspectives and analyzed the state-directed process of urban development and expansion, often based on case studies and policy analysis (e.g., Lin and Ho 2005; Wei 2012). The role of the state has been analyzed through the governance paradigm, the notions of development and entrepreneurial states/cities, the growth machine, and the politics of scale (e.g., Hall and Hubbard 1998; Ma 2002). But case studies tend to emphasize a few cities such as Beijing with weak comparative

dimensions. More work is still needed in these lines of research to provide better understanding of urban land expansion in China.

This report analyzes multiple forces including government policies in urban land expansion, influenced particularly by work on institutional economic geography and China's economic transition. We follow Wei's (2000; 2001) triple transition framework, developed in his study of regional development and inequality in China, in the analysis of institutional change and urban expansion in China. This framework conceptualizes the reforms as a triple process of globalization, decentralization and marketization, rather than either globalization or marketization, typically debated academically, as fundamental forces underlying urban and regional development and change in China.

China's reform has reconfigured the relationships between state and market, and between domestic and global forces. Similar to the global process of state decentralization, in response to the over-centralization of state socialism, China's reforms started with decentralization, earmarked by fiscal and administrative reforms, and decentralized fiscal responsibilities and administrative power to local governments. With the decentralization of responsibilities, especially after the 1994 fiscal reforms and pressure from increasing competition, the local states, represented by strong mayoral leadership in cities, have become major agents of urban development and transformation in China. The local state leads the formulation, pursuing, promotion, and implementation of urban development strategies and policies (Ma 2002; Ng and Tang 2004). China's decentralization has empowered local states to mobilize resources, especially state-owned land and state-directed projects, for urban growth, and has become a major process underlying urban land expansion.

The Chinese state acts within the context of globalization, and the China's open door policy has initiated almost simultaneously with decentralization, starting from special economic zones (SEZs) and coastal open cities centered on development zones (DZs). The major purpose of China's open door policy is to use global capital through attracting foreign direct investment (FDI) and selling Chinese products globally through export. To attract FDI, the Chinese state has relaxed its control over foreign capital and provided preferential tax policies for FDI, largely centered on thousands of DZs at various levels, known as development zone fever (Cartier 2001; Wei and Leung 2005). China's open door policies have benefitted from the relocation of production from developed countries to developing countries, often called the globalization of production, accompanied by the globalization of finance, trade, and services and the formation of global production networks (GPN). Consequently, a large amount of FDI has been located in the newly industrializing countries (NICs) in Asia, especially China.

FDI tends to be urban-biased and located in major cities and core regions in developing countries, as these places have advantages in infrastructure, labor force, and access to market and political power, as evidenced by the concentration of FDI in coastal China (Huang & Wei 2011). Scholars have used the concepts of "exo-urbanization" and externally driven urbanization to study the concentration and the impact of FDI in cities in the Pearl River

Delta (Sit and Yang 1997). The opening up of the Pearl River Delta followed by preferential policies granted to Shanghai and the Yangtze delta, have brought a new wave of globalization and the formation of globalizing cities in the region. Globalization has also intensified the development of knowledge economy and the competition for talents and technology. Increasingly, the state competes in the development of high-tech and advanced business service industries by promoting the development of higher education districts, high-tech zones, and central business districts (CBDs) (Wei 2012). Mega-projects and events have long been prodded by local states (Altshuler and Luberoff 2003), and globally oriented mega-projects, including the 2008 Beijing Olympics and the Shanghai 2010 World Expo (Grant 2014), have become another symbol of globalization in China, often known as “project fever” (Cartier 2001; Wei 2015). All these efforts and policies have greatly contributed to urban development and urban land expansion in China.

The marketization process has introduced market forces in urban development, and the state is now situated in the market-oriented network of exchanges and flows. The marketization process in urban development is also driven by the reform in the land and housing markets, which makes land the single most important resource for local states and developers (Qian 2008). Land reclamation and development, especially in the forms of administrative rescaling and development zones, has become the most important instrument of the development state in China (Ma 2005). Development zone and project fevers are intertwined with the process of local administrative rescaling, in which central cities take over suburban land through annexing suburban towns and townships and even whole cities and counties to provide cheap land for development (Ma 2005; Shen 2007). This is also used as a strategy to avoid suburbanization and decline of central city in Western countries such as the United States (Waldner et al. 2013). As a result of the triple transition, state and non-state corporations are being increasingly involved in land and project development process. Megaprojects such as the 2008 Beijing Olympic Games and the 2010 Shanghai World Expo well represent the state projects in the age of globalization and marketization, representing both visible and invisible hands of the Chinese state.

The state in China is not static, and its policies shift with changing institutional contexts and continuously reconfiguring urban spaces. Wei (2005) argues that transitional institutions underlie the constant revision of urban master plans and the chaotic urban construction and management in Chinese cities. This report therefore treats Chinese institutions as transitional in time and space, and situates the role of the state in the transitional process of China’s economic reforms and urban development. The process of urban growth and land expansion varies over space, and responses of local governments to urban problems also differ across China. The open door policy, initiated in the SEZs in south China in the late 1970s, and expanded to open coastal cities in the mid-1980s, focuses on economic and technological development zones (ETDZs). With the drive towards innovation and technological development, high-tech DZs also initiated, followed by the development of higher educational districts in the early 2000s. Globalization has also brought new waves of the development of CBDs, new city centers, and export processing zones.

An emerging body of literature has argued that the role of institutions, including states and informal institutions in economic development, is much more important than geography (Appelbaum and Henderson 1992). Acemoglu et al. (2002) emphasize the role of institutions rather than geographic factors in explaining economic prosperity among countries colonized by the European powers. However, institutions function in geographical contexts, and government policies have to build upon the existing resources, location, and spatial structure. The implementation of government policies is also constrained by geography and also influenced by socialist legacy. Wei (2012) discusses the challenges of secondary cities in the YRD such as Hangzhou when competing with Shanghai, an emerging global city with geographical advantages, in the development of advanced business services. Wei and Gu (2010) illustrates the struggle of Changzhou in attracting FDI and making itself an economic power house of the YRD. We therefore situate the role of state institutions and the process of urban development in their geographical contexts.

Urban Land Expansion and Structural Change in the Yangtze River Delta

The transitional nature of China’s reform process is well reflected in land use policies. Local governments of China issued numerous land use policies, changing the nature of land from a free component of socialism to increasingly a commodity sold in the market (Table 1). We also added some policies specific to the development and urbanization of the YRD, which also show the active role of local governments in land reforms and economic development.

Table 1. Development and land-use policies in China, 1980–2010

	Date	Policy	Aims
Central Government	1986	Land Administration Law	Define the parameters of land property right among owners and users.
	1989	Land-use Taxation	Improve and rationalize urban land use efficiency and adjust land rents
	1991	State Council Regulations	Define two kinds of land transaction, namely the sale of land-use rights and the transfer of land-use rights
	1994	Tax-sharing reform	Increase the central government revenue
	2000	Housing Commercialization Reform	Promote urbanization and rural–urban migration
	2002/2004	Land Acquisition Act	Increase land supply by the conversion of land ownership
	2008/2010	Regional Integration of the YRD	Promote regional development and competitiveness of the region
Local Governments	2010	Modernization of Sunan	Promote industry upgrading and competitiveness of the region
	2003	Development of Riverside Areas of the YRD in Jiangsu	Reduce spatial inequality and promote the integration of province
	2005	Development of Coastal	Promote the development and

2007	Areas in Zhejiang Industrial Land Auction Methods in Jiangsu	competitiveness of the region Improve industrial land use efficiency and adjust land rents
2009	Embodiment of Economic and Intensive Land	Promote the conservation of urban land

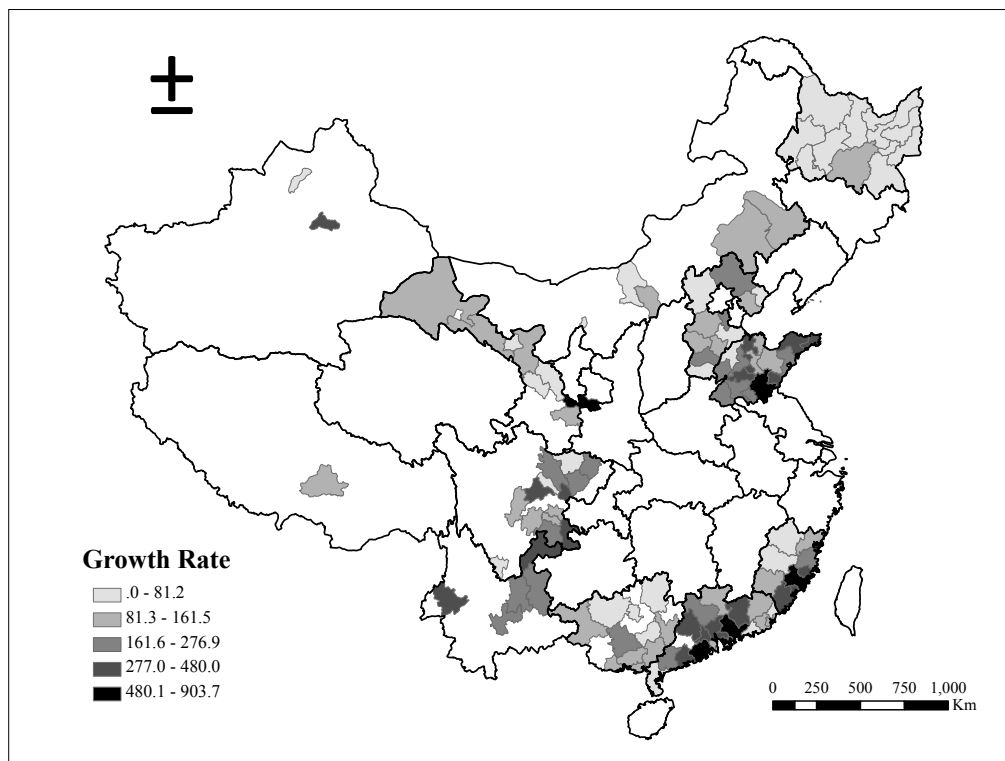
Accompanying land use reforms, the past two decades witnessed a remarkable increase of urban population and urban land in Chinese cities. Urban land expansion in prefectural cities was even more intensive when compared with urban population growth. As shown in Table 2, between 1993 and 2009 the total population living in prefectural cities increased by 73.7%, from 126.57 million to 219.82 million. On the other hand, urban land in the form of built-up area more than doubled in the same period, with increase from 10,549 sq. km in 1993 to 26,100 sq. km in 2009. Urban built-up area increased in all the prefecture-level cities. The largest urban expansion rate could be found in centrally administrated municipalities, provincial capitals, the Bohai Rim Region, the Pearl River Delta and the YRD (Figure 2).

Table 2. Urban population and urban land in Chinese prefectural level cities, 1993 and 2009

Region	No. of prefecture cities	Urban population			Urban land		
		1993 (millions)	2009 (millions)	1993-2009 percentage change	1993 (sq. km)	2009 (sq. km))	1993-2009 percentage change
All cities	192	126.6	219.8	73.7	10,549	26,100	147.4
East China	92	69.3	130.7	88.8	5,531	15,124	173.4
Central China	71	39.8	57.5	44.4	3,577	7,202	101.3
West China	29	17.5	31.6	80.8	1,441	3,774	161.9

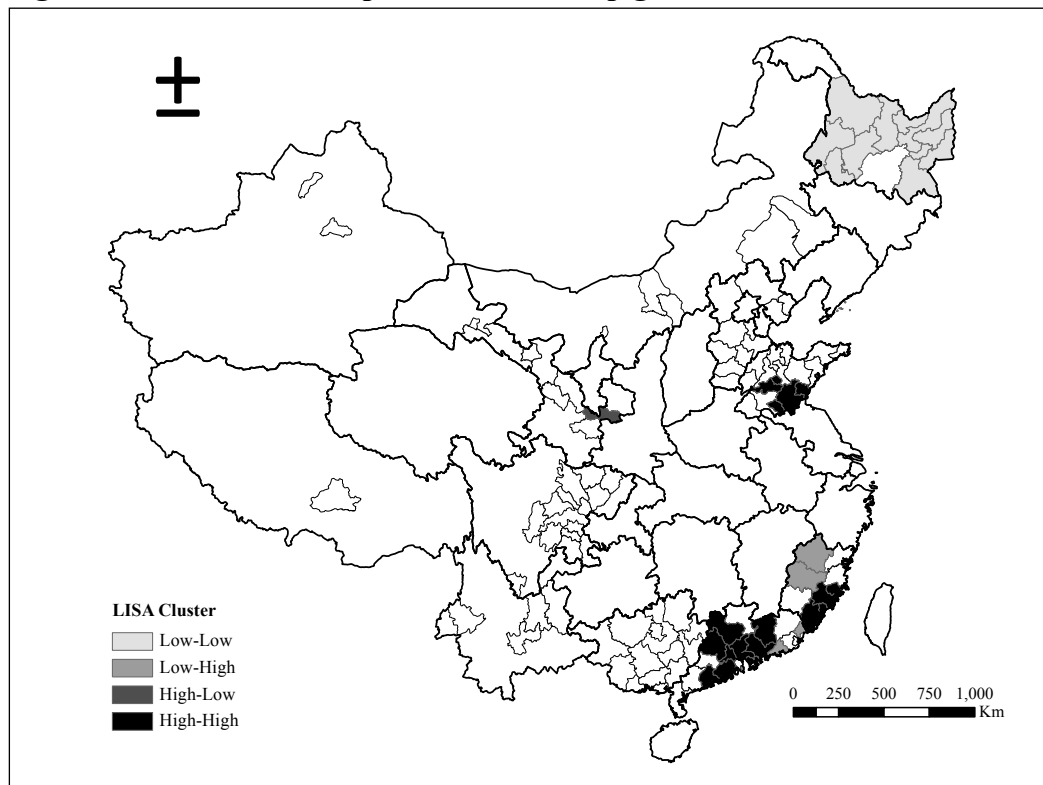
Source: Compiled by authors from NBS, 1994–2011

Figure 2. Urban built-up growth rate (%) in prefectural level cities, 1993–2009



Local Moran's I was further employed to investigate the spatial patterns of urban land expansion. The spatial concentration of urban land expansion in Chinese cities is obvious (Figure 3). Most of the high-high clusters of urban land expansion rate are concentrated in the coastal areas, which is consistent with the coastal-inland divide in the economy of China. Within the coastal areas, the high-high clusters are concentrated in the Pearl River Delta, the Xiamen-Zhangzhou-Quanzhou area in Fujian Province, the YRD, and part of Shandong Province. The majority of the low-low clusters of urban expansion rate were found in Northeast China. The sluggish urban expansion in this region can be largely attributed to its lagging economy in the post-reform era, where inefficient state-owned enterprises (SOEs) agglomerated. A high-low outlier of urban land expansion was found in Chongqing, which was heavily influenced by the upgrade of its administrative status from prefectural level to central level in 1997, when it became the fourth established centrally-administrated municipality in China.

Figure 3. LISA cluster map of urban built-up growth rate, 1993–2009



The YRD is no doubt the most important economic motor in the China’s economy. In 2011 it occupied 6.9 % of the total population and 1.15% of land area in China, while producing 17.3% of the GDP in the nation, and generating 34.1% of the exports (NBS 2012). Urban development in the YRD during the reform period mainly began with “urbanization from below” in the 1980s, represented by the development of township and village enterprises (TVEs) and the rise of small towns (Ma and Fan 1994; Wei 2000). Since the late 1990s, there had been a shift from town-based urbanization to land-based and city-centered urbanization, in which large cities play an important role in the urbanization (Lin 2007). The YRD is a dominant player in initiating national level DZs (Table 3), which are mainly concentrated in large cities in the region.

Table 3. National Development Zones in the Yangtze River Delta

City	Development Zone	Year Initiated	Year Upgraded	Land Area (sq. km)
Nanjing	Nanjing New & Hi-Tech Development Zone	1988	1991	160
	Nanjing Economic & Technological Development Zone	1992	2002	13.37
	Jiangning Economic & Technological Development Zone	1992	1997	38.47
	Nanjing Chemical Industry Park	2001		45
Wuxi	Wuxi Hi-Tech Industrial Development Zone	1992		9.45
	Xishan Economic & Technological	1992	2003	125

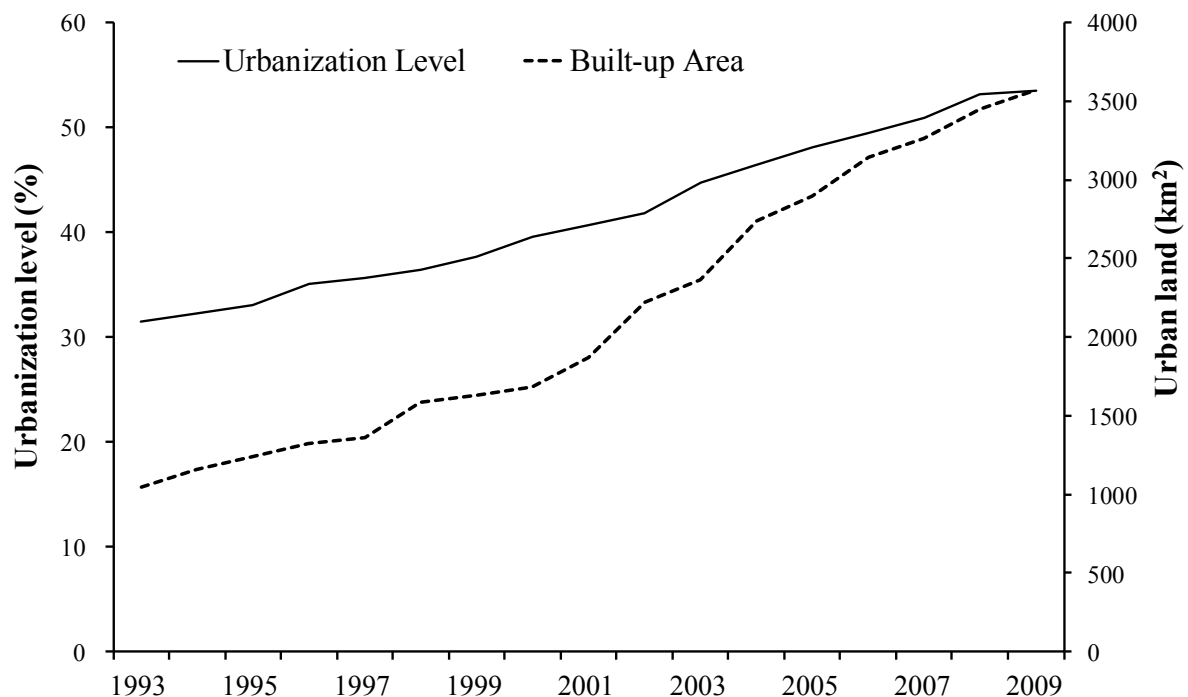
	Development Zone			
	Jiangyin Hi-Tech Industrial Development Zone	1992	2011	6.6
	Yixing Environmental Technology Industrial Park	1992		15
Changzhou	Changzhou National Hi-Tech District	1992		5.63
	Wujin National Hi-Tech Industrial Zone	1996	2012	182
Suzhou	Suzhou Industrial Park	1994		143.32
	Suzhou New & Hi-tech Development Zone	1992		36
	Xushuguan Economic & Technological Development Zone	1992	2013	36.5
	Wuzhong Economic & Technological Development Zone	1993	2012	29.3
	Changshu Economic & Technological Development Zone	1992	2010	59.74
	Zhangjiagang Free Trade Zone	1992		4.1
	Zhangjiagang Economic & Technological Development Zone	1993	2011	57
	Kunshan Economic & Technological Development Zone	1985	1992	
	Kunshan National Hi-tech Industrial Development Zone	1994		
	Wujiang Economic & Technological Development Zone	1992	2010	173
	Taicang Port Economic & Technological Development Zone	1991	2011	
Nantong	Nantong Economic & Technological Development Zone	1984		183.8
	Nantong Hi-Tech Industrial Development Zone	1992	2013	130.7
	Rugao Economic & Technological Development Zone	1992	2013	
	Haimen Economic & Technological Development Zone	1992	2013	114
Yangzhou	Yangzhou Economic & Technological Development Zone	1992	2009	72
Zhenjiang	Zhenjiang Economic & Technological Development Zone	1992	2010	73.8
Taizhou	Taizhou Medical New & Hi-Tech Industrial Development Zone	2009		30
	Jingjiang Economic & Technological Development Zone	1992	2012	168.93
Hangzhou	Hangzhou Economic & Technological Development Zone	1993		104.7
	Hangzhou High-Tech Zone	1990		11.4
	Hangzhou High-Tech Zone (Binjiang)	1996		73
	Xiaoshan Economic & Technological Development Zone	1990	1993	181
	Fuyang Economic & Technological	1992	2012	47

DevelopmentZone				
Ningbo	Ningbo Economic & Technological Development Zone	1984		29.6
	Ningbo National Hi-Tech Industrial Development Zone	1999	2007	10
	Ningbo Petrochemical Economic & Technological Development Zone	1998	2010	56.22
	Ningbo Daxie Development Zone	1993		36
	Ningbo Meishan Bonded Area	2008		7.7
	Cixi Economic & Technological Development Zone	2001	2014	10
Jiaxing	Jiaxing Economic & Technological Development Zone	1992	2010	40
	Pinghu Economic & Technological Development Zone	1996	2013	18.5
Huzhou	Huzhou Economic & Technological Development Zone	1992	2010	135.68
Shaoxing	Shaoxing National Hi-Tech Industrial Development Zone	1992	2010	15.3
	The National Shaoxing Paojiang Economic & Technological Development Area	2000	2010	66
	Hangzhou Bay Shangyu Economic & Technological Development Area	1998	2013	275

Source: Compiled from various development zones' websites by authors.

Urban land expansion accelerated since the mid-1990s in the YRD with deepening economic reform and opening up (Figure 4). Urban population in the 16 municipalities in the YRD increased from 26 million in 1993 to 45 million in 2009, with an increase of urban land area from 1,048 sq. km to 3,568 sq. km over the same period. Similar to the national trend, urban land expansion was more intensive than population growth in the YRD.

Figure 4. Urbanization levels and urban land expansion in the YRD, 1993–2009



The insatiable demand for urban land expansion in many of the Chinese cities had led administrative restructuring to emerge as a common instrument for increasing urban land development in the YRD (Ma 2005). Many cities in the YRD, such as Nanjing and Hangzhou, benefited from the annexation of suburban counties (Tables 4 and 5). For example, the annexation of nearby counties, namely Yuhang and Xiaoshan resulted in the dramatic expansion of the area of Hangzhou city from 683 sq. km in 2000 to 3068 sq. km today. Therefore, local states gained control of more land from suburban counties, effectively making suburbanization a part of the urban development process (Wei 2012).

Table 4. Annexation of suburban counties in the YRD, 2000–2009

Annexing city	Annexed counties	Administrative Area (sq. km)		Time of Annexation
		Before Annexation	After Annexation	
Nanjing		1026	4728	
	Jiangning	1573		December 2000
	Luhe	1383		April 2002
	Jiangpu	746		May 2002
Wuxi		517	1631	
	Xishan	1114		December 2000
Changzhou		280	1864	
	Wujin	1584		April 2002
Suzhou		392	1650	
	Wuxian	1258		February 2001
Nantong		355	1521	
	Tongzhou	1166		June 2009

Yangzhou	148	973	
Hanjiang	825		December 2000
Zhenjiang	273	1083	
Dantu	810		April 2002
Hangzhou	683	3068	
Yuhang	1222		February 2001
Xiaoshan	1163		March 2001
Ningbo	1033	2560	
Yinxian	1527		April 2002

Source: NSB (2000–2009).

Table 5. Changes of the urban land in prefecture-level city districts after annexation

City	Before Annexation (sq. km)			After Annexation (sq. km)		
	Built-up	Industrial	Residential	Built-up	Industrial	Residential
Nanjing	201.4	30 (14.7)	42 (21.1)	438.6	114 (25.9)	126(28.7)
Wuxi	101.5	21 (21.0)	21 (20.6)	176.2	51 (28.7)	46(26.3)
Changzhou	69.0	26 (37.1)	17 (25.1)	90.5	26 (28.5)	20(22.3)
Suzhou	86.5	25 (29.4)	23 (26.5)	129.4	44 (33.9)	37(28.7)
Nantong	131.9	45 (34.0)	42 (31.9)	257.1	51 (19.8)	49(18.9)
Yangzhou	48.7	12 (25.1)	15 (30.4)	53.5	14 (26.2)	17(31.0)
Zhenjiang	60.2	23 (37.4)	15 (24.1)	72.4	25 (34.7)	16(22.1)
Hangzhou	177.2	24 (13.5)	29 (16.2)	255.6	46 (17.8)	56(21.8)
Ningbo	68.5	21 (30.7)	24 (34.7)	102.2	37 (36.1)	27(26.3)

Note: Numbers in parentheses are proportions (%).

Source: CMHURD (2000–2010).

Urban land expansion in the cities in the YRD was also similar to economic development patterns. Urban growth in Shanghai was modest compared to other cities in the YRD, given its limited area and strict control of urbanization. The high growth rate of urban land had been focused on those originally less developed areas close to Shanghai, and the capital cities in Zhejiang and Jiangsu. Cities far from Shanghai experienced relatively moderate growth of urban land. It is worth noting that urban expansion in Jiangsu province was more imbalanced than that in Zhejiang province. We found that Suzhou has become the focal point of urban expansion in Jiangsu, while urban growth in Zhejiang province is concentrated in Shaoxing, Hangzhou and Ningbo.

The rapid expansion of urban land was also accompanied by the change of land use structure in the YRD. Cultivated land declined by nearly 13% over the period 1991–2008, while orchard land decreased by 98%, and grass land by 89.3% (Table 6). The loss of cultivated land prompted the central government to explicitly set up the cap of cultivated land that can be converted into urban land use, so as to limit the accelerated urban expansion (Lin and Yi

2011; Wang et al. 2012). However, as evidenced in the YRD, the amount of land used for industrial and urban development had by no means stopped increasing.

Table 6. Changes of land use in the YRD, 1991–2008

Year		Cultivated land	Forest	Urban	Water	Dry land	Orchard	Grass land	Others
1991	sq. km	55645	21671	11169	9216	16746	242	393	655
	%	48.1	18.7	9.7	8.0	14.5	0.2	0.3	0.6
2008	sq. km	48463	19990	27668	7347	11443	34	42	750
	%	41.9	17.3	23.9	6.4	9.9	0.0	0.0	0.7
Change	sq. km	-7182	-1681	16499	-1870	-5303	-208	-351	95
	%	-12.9	-7.8	147.7	-20.3	-31.7	-86.1	-89.3	0.2

Source: Compiled from Wang et al. 2011

Note: The remote sensing data covered both urban and rural areas in the YRD. Therefore, the absolute values are larger than the urban land data based on official statistics.

Table 7 further documents the internal structure of urban land expansion with an increase in all of the nine urban land use types. We found that the residential and industrial land expansions were the major contributors to urban expansion in the YRD, while urban land expansion was structurally focused on the expansion of industrial land. The share of industrial land increased from 25.28% in 1999 to 26.66% in 2009; in contrast, the share of residential land declined by 2.37%.

Table 7. Changes of urban land categories in the YRD cities, 1999–2009

Land use area(sq. km)	1999	2004	Change 1999-2004	1999*	2009*	Change 1999-2009
Residential	512.0	896.5	495.4	268.5	719.2	450.7
share (%)	33.2	30.8	-2.4	27.0	26.4	-0.6
Public Facilities	143.5	302.4	195.1	108.5	325.5	217.0
share (%)	9.3	19.6	10.3	10.9	12.0	1.0
Industrial	390.0	775.7	499.9	251.0	783.2	532.2
share (%)	25.3	26.7	1.4	25.3	28.8	3.5
Storage	63.4	93.0	34.8	40.5	65.7	25.2
share (%)	4.1	3.2	-0.9	4.1	2.4	-1.7
External Transport	127.5	213.0	96.9	64.6	129.0	64.4
share (%)	8.3	7.3	-0.9	6.5	4.7	-1.8
Local Roads and Plazas	108.5	255.8	198.1	85.8	338.8	253.0
share (%)	7.0	8.8	1.8	8.6	12.5	3.8
Municipal Utilities	44.9	77.4	44.0	38.5	87.3	48.8
share (%)	2.9	2.7	-0.3	3.9	3.2	-0.7
Green Space	109.1	236.2	159.0	100.4	272.8	172.4
share (%)	7.1	8.1	1.1	10.1	10.0	-0.1
Special Purposes	43.9	59.3	17.5	35.4	53.6	18.2
share (%)	2.9	2.0	-0.8	3.6	2.0	-1.6
Subtotal	1542.8	2909.2	1366.5	993.2	2721.5	1728.3

Source: CMHURD, 1999–2009.

Note: *Excluded the data of Shanghai as they were unavailable after 2004.

There was a substantial increase in the land used for local roads, plazas and public facilities (Table 7), thereby implying that the local governments in the YRD had actually invested heavily in the infrastructure to support industrial development. In fact, since the late 1990s, YRD cities had mainly undertaken a top-down approach of building up large-scale DZs, so as to compete for foreign investment in the high-tech sector. This is particularly in contrast to the spontaneous and bottom-up development of small-size industrial districts in the PRD of South China, where local governments placed less emphasis on public facilities and urban environment (Yang, 2009).

Some different development characteristics can be found in other land use types (Table 8). Shanghai had a high LQ (2.07) in land development for external transportation. This reflects that urban expansion in Shanghai was driven by the development of transportation facilities that connect Shanghai and the other cities in the YRD and China. It also echoes the role of Shanghai as a gateway city and a business hub, having become the headquarter economy of the YRD (Wang et al., 2011). We also found that the LQs of green space in Hangzhou and Zhoushan (2.09 and 3.33) were higher than that of other cities in the YRD, partly resulting from the emphasis of tourism development. Notably, in comparison with other YRD cities, Hangzhou's development had greatly benefited from its advantageous natural environment (Wei, 2012). The diverse patterns of urban land expansion in YRD cities were investigated in greater detail through the following sections.

Table 8. LQs of different urban land use types in the YRD cities, 2004

	Residential	Public Facilities	Industrial	Warehouse	Inter-city Transportation	Local Roads & Plazas	Utilities	Green Space	Special Purposes
Shanghai	1.32	0.62	0.97	0.99	2.07	0.45	0.48	0.26	0.70
Nanjing	0.91	1.27	1.01	1.22	0.42	1.05	1.02	1.27	1.21
Wuxi	0.98	1.17	1.21	0.61	0.51	1.09	0.93	0.75	0.71
Changzhou	0.72	0.96	1.06	1.05	1.40	1.44	1.39	1.11	0.30
Suzhou	0.88	0.68	1.19	0.49	0.41	1.58	1.06	1.47	0.32
Nantong	0.79	0.91	0.89	2.04	1.38	1.40	1.01	0.90	1.68
Yangzhou	0.98	1.70	1.04	1.06	0.38	0.87	1.06	0.85	0.35
Zhenjiang	0.74	1.16	1.26	2.32	1.35	0.72	1.10	0.42	0.72
Taizhou	1.33	0.63	1.00	1.03	0.39	1.02	0.77	1.01	0.26
Hangzhou	0.82	1.18	0.66	0.60	0.55	1.57	1.81	2.09	1.53
Ningbo	0.67	1.40	1.32	1.69	1.04	0.97	0.39	0.71	0.60
Jiaxing	0.83	1.34	1.06	1.62	0.68	1.42	1.01	0.82	0.19
Huzhou	0.81	1.24	1.17	0.52	0.73	1.24	0.60	1.00	1.58
Shaoxing	0.82	0.89	1.10	0.46	0.32	1.31	0.71	1.30	4.07
Zhoushan	0.92	0.85	0.25	0.67	0.42	0.91	4.67	3.33	1.68
Taaizhou	1.19	1.11	1.21	0.75	0.62	0.80	0.95	0.35	0.17
Std.	0.20	0.30	0.26	0.57	0.51	0.33	0.99	0.75	0.99

Source: CMHURD, 2005.

Urban Land Expansion and Structural Change in Shanghai, Suzhou and Hangzhou

Shanghai

Shanghai's economy turned inward during Mao's era, and its slow participation in the economic reforms of the 1980s eroded its status as China's largest economic center. The decision in the late 1980s to open up its Pudong district to foreign investment and trade provided a new spark for Shanghai to regain its economic power. Since then Shanghai had made tremendous efforts to reposition itself as the dragon's head of the YRD and an emerging global city (Wu 2000; Yusuf and Wu 2002; Wei and Leung 2005).

From 1949 to 1978, Shanghai was the manufacturing center of China, and urban land use was concentrated in the west of the Huangpu River. However, from 1979 to 1990 Shanghai had relatively low economic and urban growth rates because SEZs emerged as the new centers of foreign and domestic investments in south China. Since the early 1990s, the central government granted greater power to Shanghai to attract foreign investment, which resulted in rapid economic development in the city. In 2008, Shanghai had a registered population of nearly 18.4 million and a total area of 6340.5 sq. km.

To measure the magnitude and patterns of urban land use change in Shanghai, we compared the classification results of two remote sensing images. It was found that from 1991 to 2010

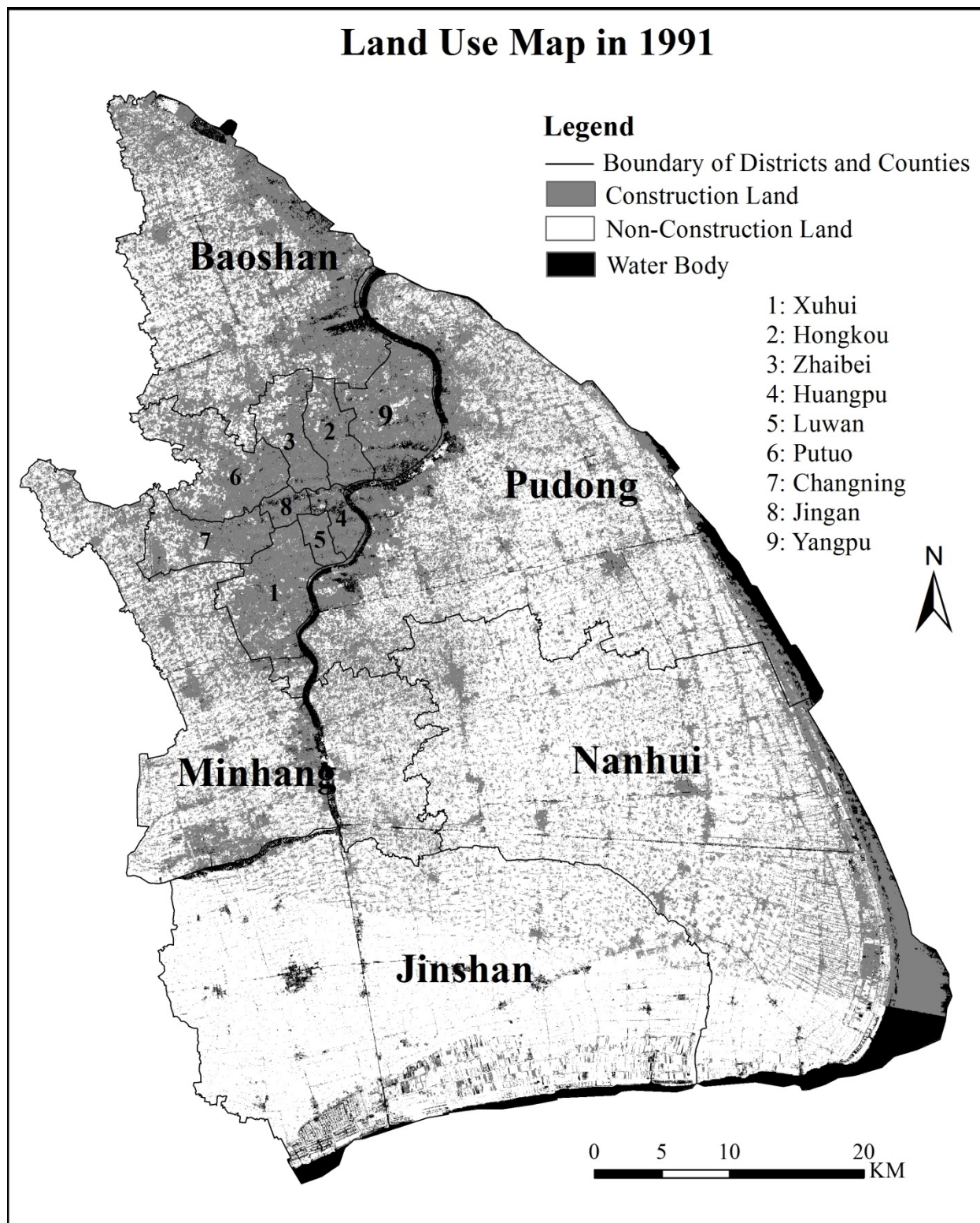
the construction land in eastern Shanghai increased 378.48 sq. km, with an increase rate of 38.45% (Table 9). This scale of urban land expansion in Shanghai is higher than most other cities in China. On the other hand, this whole study area lost nearly 15% of agriculture land and 50% of its water bodies because an extensive sea area was converted from sea to construction land to develop new modern ports and harbors. A similar process can also be found in Pudong. The Pudong New Area had a 41% increment of construction land, and the speed of agriculture land loss was much higher than the average in the study area.

Table 9. Land use change in eastern Shanghai and Pudong

Land Use Type	Eastern Shanghai			
	1991 (sq. km)	2010 (sq. km)	Change (sq. km)	% of Change
Construction	984.45	1,362.93	378.48	38.45
Water Body	174.85	88.86	-85.99	-49.18
Agriculture	1,871.35	1,578.85	-292.49	-15.63
Land Use Type	Pudong			
	1991 (sq. km)	2010 (sq. km)	Change (sq. km)	% of Change
Construction	208.07	293.36	85.283	40.99
Water Body	49.43	32.23	-17.21	-34.79
Agriculture	302.68	234.59	-68.08	-22.49

In 1991, most of the central districts in Shanghai were covered by construction land (Figure 5). By 2010, most urban expansion was concentrated in the neighboring districts of the central area, such as Baoshan, Minhang and Pudong (Figure 6). Because these three districts are much larger than the central districts, the range of land expansion was extraordinary. Urban land expansion in Jinshan and Nanhui was spatially scattered with some concentration in coastal areas. Urban land expansion in Pudong was quite different from other districts. In 1991, urban land in Pudong was concentrated in the east bank of the Huangpu River. In 2010, urban land covered almost the entire district. We also found some significant agglomerations in this process, which can be explained by the rise of DZs facilitated by the state policies and urban planning.

Figure 5. Land use map of eastern Shanghai in 1991



Land Use Map in 1991

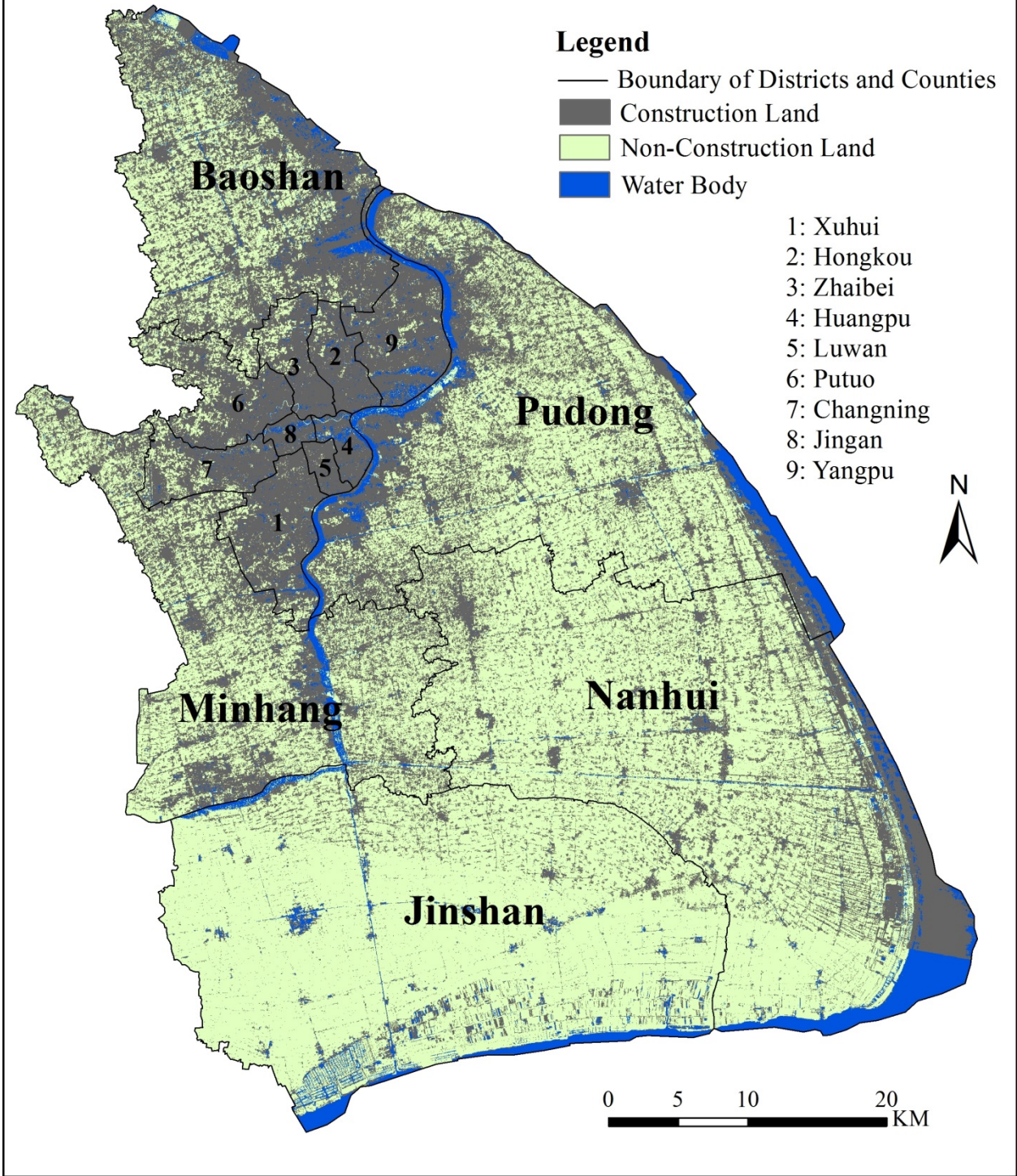
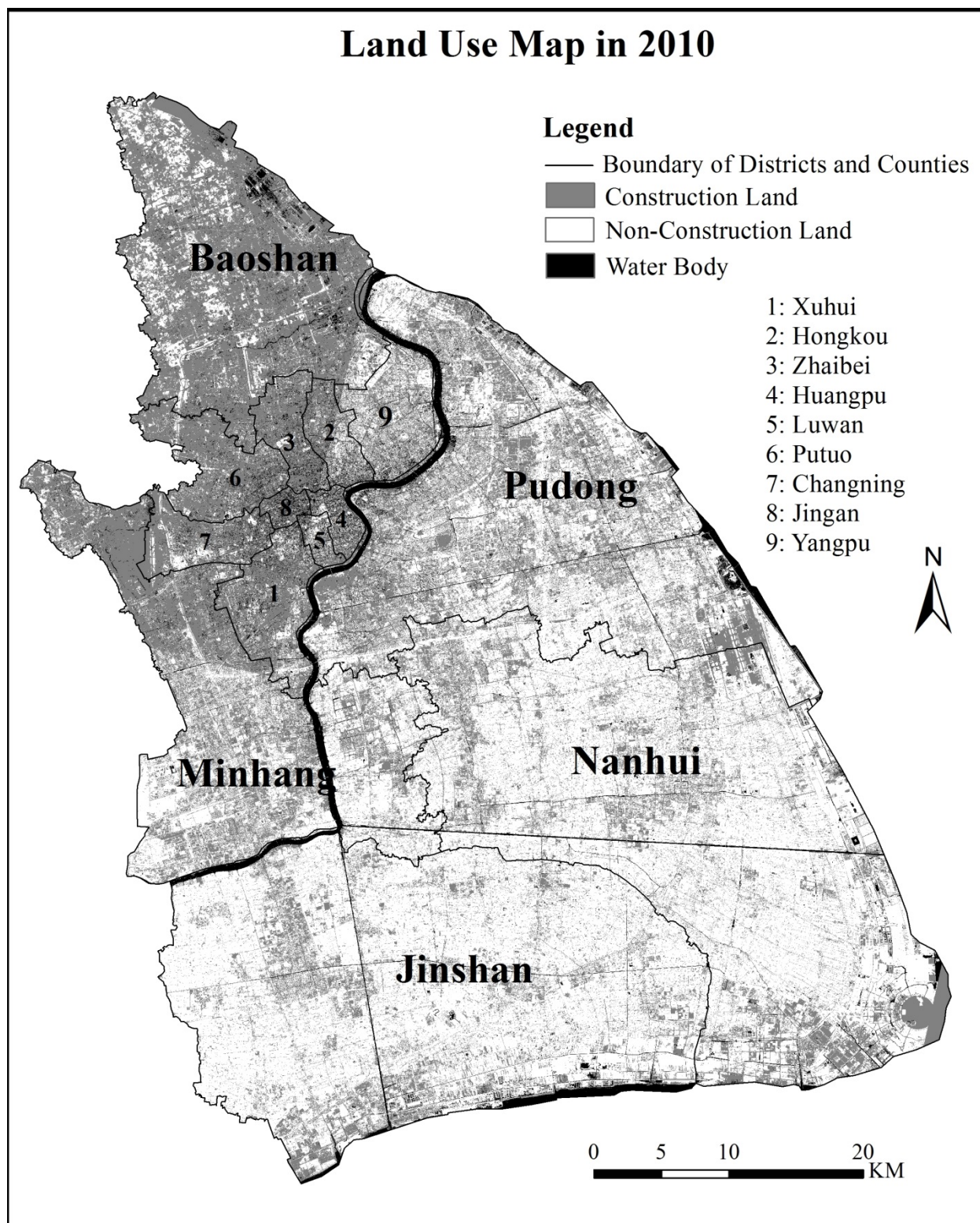
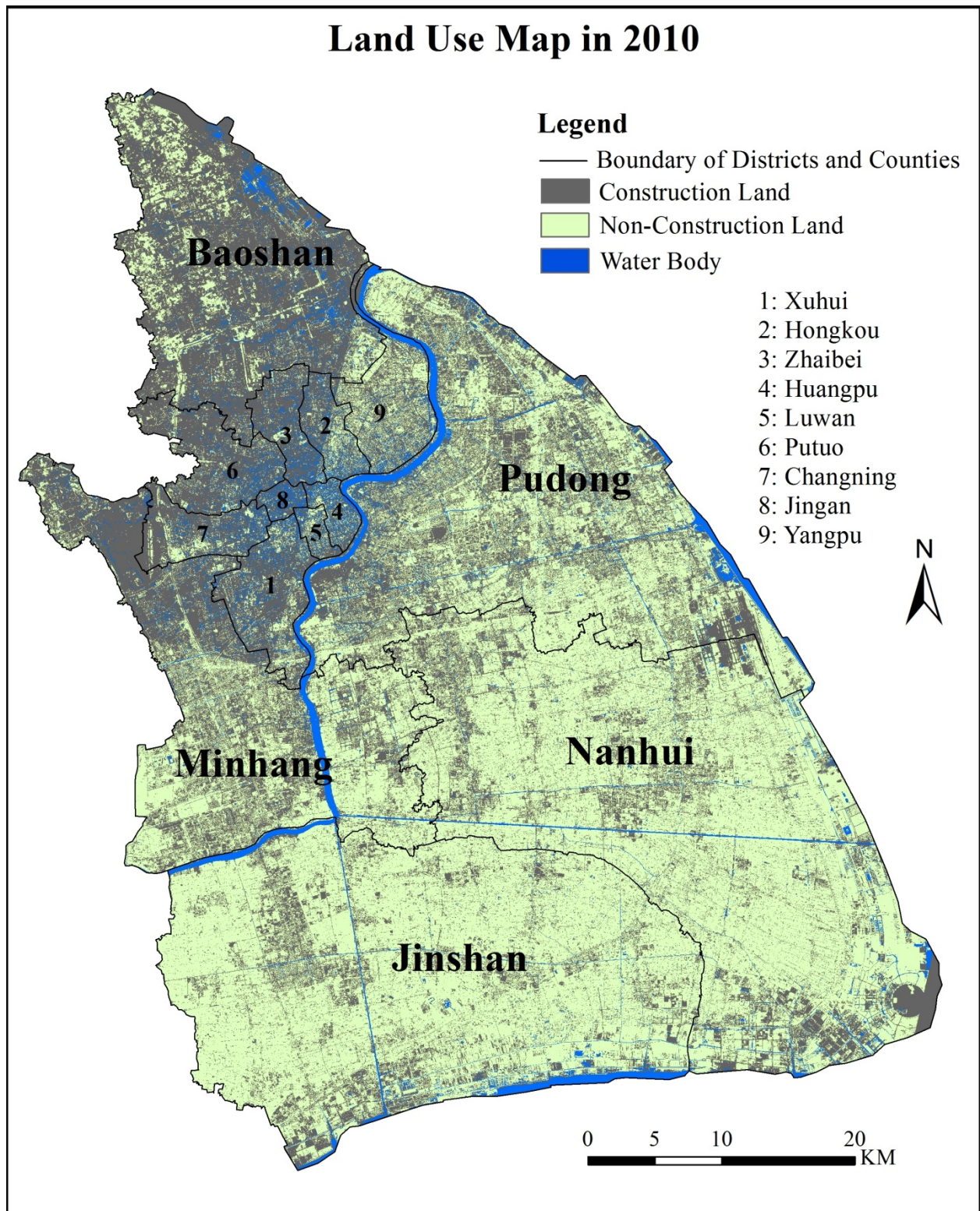


Figure 6. Land use map of eastern Shanghai in 2010





To understand how state policies and municipal government influenced urban land expansion in Shanghai, we evaluated the land use change of the DZs in our study area. In 2006, there were 12 national level DZs and 26 provincial level DZs in Shanghai. The total area of national DZs and provincial DZs were 209.02 sq. km and 431.85 sq. km. In our study area,

there were 180.71 sq. km national DZs and 332.26 sq. km provincial DZs, respectively accounting for 86.45% and 76.94% of DZ areas in this municipality.

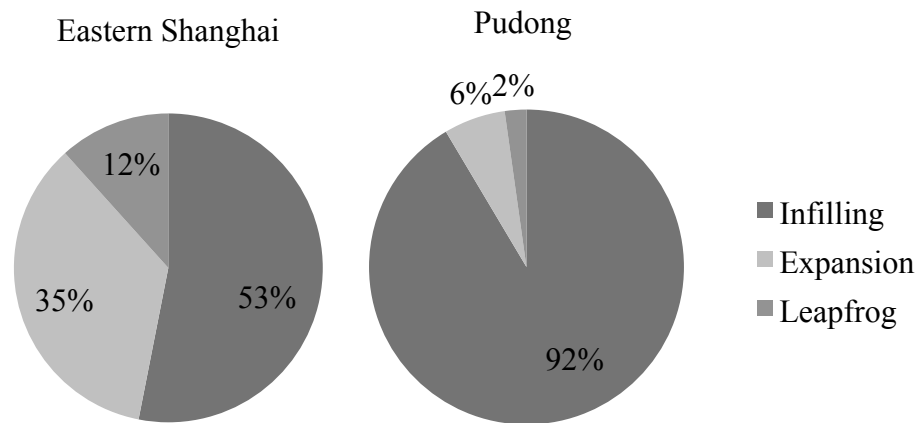
There was a more than 820% increase of construction land use in national level DZs, which was much higher than the average increase rate of this study area (Table 10). In the national level DZs, more than 92% of water bodies were converted to construction land, which can be attributed to the construction of several significant coastal harbors in these DZs. The increase of construction land in provincial level DZs was 102.20%, much lower than that in national level DZs, but still higher than the average. The total increase of construction land in DZs from 1991 to 2010 was 190.06 sq. km, accounting for more than 50% of the increased construction land. We argue that the DZs played the most significant role in urban development in Shanghai, and the national DZs developed much faster than provincial DZs because the hierarchy of state policy still plays a significant role in Shanghai's development.

Table 10. Land use change in development zones in Shanghai

Land Use Type	Area (sq. km)		Percentage of Change (%)		
	1991	2010	1991	2010	1991-2010
National DZs	1991	2010	1991	2010	1991-2010
Construction Land	12.09	111.71	6.69	61.81	823.37
Non-Construction	64.46	61.69	35.67	34.13	-4.31
Water Body	104.15	7.32	57.63	4.05	-92.97
Total	180.71	180.71	100.00	100.00	0
Provincial DZs	1991	2010	1991	2010	1991-2010
Construction Land	88.44	178.89	26.62	53.84	102.27
Non-Construction	234.44	150.66	70.56	45.34	-35.74
Water Body	9.38	2.72	2.82	0.82	-71.05
Total	332.26	332.26	100.00	100.00	0

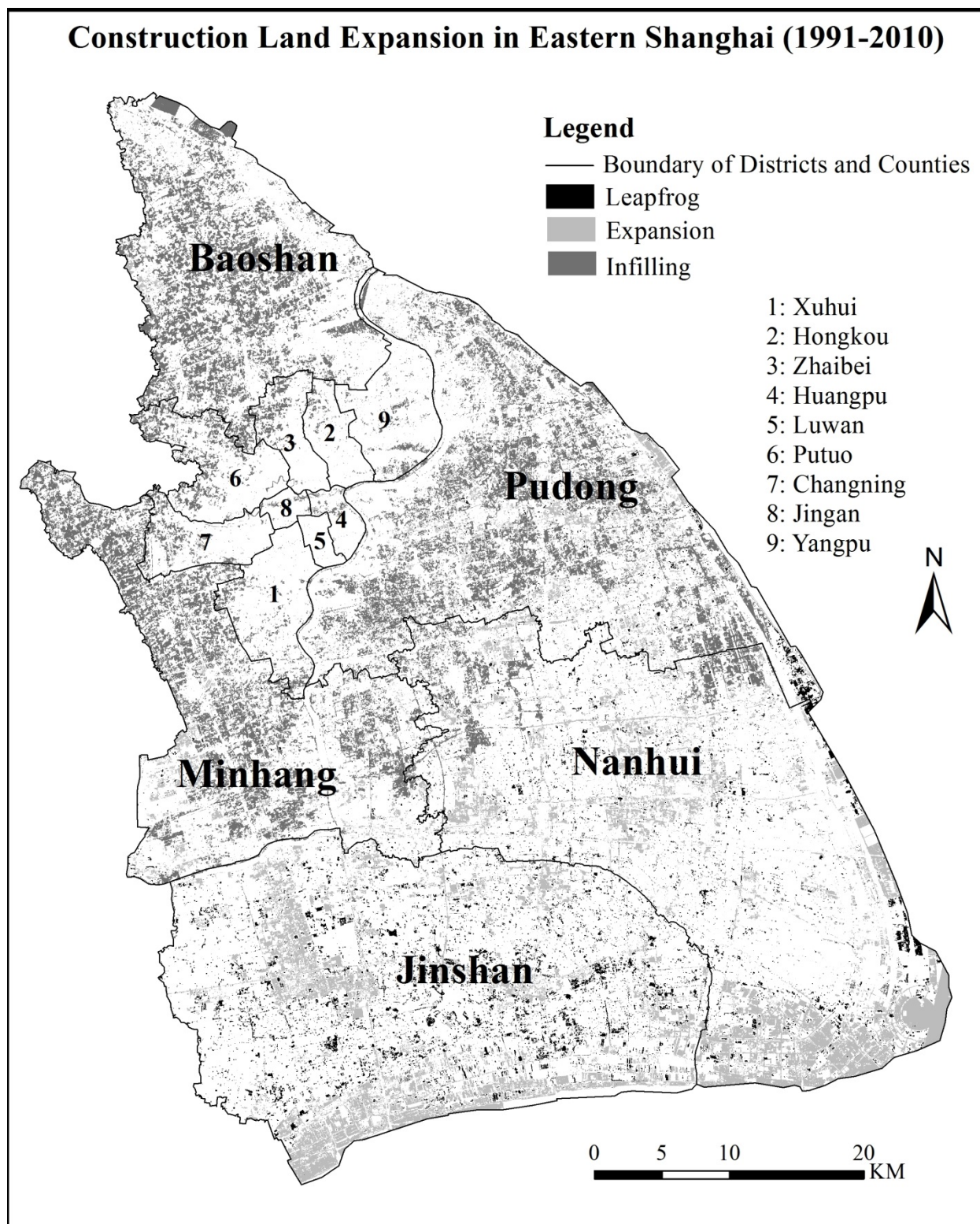
Shanghai had unique spatial pattern in the expansion process. According to the patch analysis, three types of urban growth can be identified: infilling, expansion and leapfrog. Infilling and expansion comprised the majority of urban growth in eastern Shanghai and Pudong, where they together accounted for more than 88% and 98% of the conversion to construction land use in each area respectively (Figure 7). Comparing these statistics with previous studies, we found that the spatial patterns also vary in different cities with diverse economic and geographic conditions. For example, in the polycentric cities such as Nanjing and Hangzhou, leapfrog and expansion were the major patterns, while in the town-based development cities such as Dongguan leapfrog was the leading urban growth pattern.

Figure 7. Types of urban land expansion in Shanghai

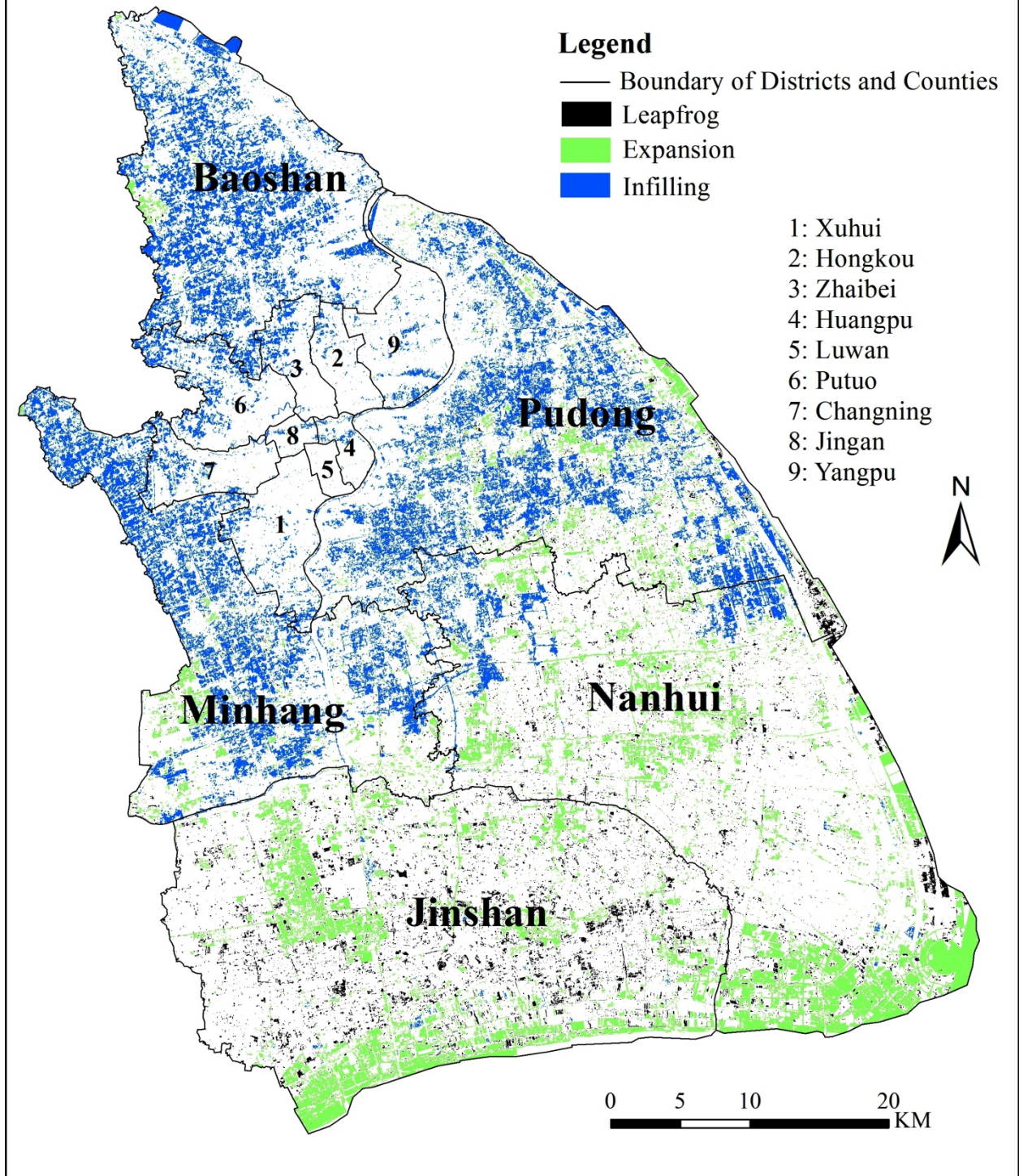


In the neighboring districts of the central area, the pattern was dominated by infilling (Figure 8). However, leapfrog mainly dominated some suburban districts such as Nanhui and Jinshan, and some coastal areas. In 1991, roads and other basic infrastructures were already built in these areas, and development in the following 19 years just filled the construction land in this network of roads and infrastructures. When the central and municipal governments chose sites for the DZs, the maturity of infrastructure was one of the most important criteria. Consequently, the patterns of DZs in Shanghai were expansion and infilling. The leapfrog parcels represent land developments of some sub-districts, which were driven by the local government and non-state-owned enterprises.

Figure 8. Construction land expansion in eastern Shanghai from 1991 to 2010



Construction Land Expansion in Eastern Shanghai (1991-2010)



To investigate if there was mismatch between the real development and planned land use, we compared the pattern map (Figure 8) with the land use planning map in 2000, and found that they matched perfectly. There was not much leapfrogging of industrial land and residential land in Nanhui and Jinshan in the land use map. All the planned construction land use was

defined and ranged by the roads. Based on the result of patch analysis, we argue that the urban development of Shanghai had been under strict control of urban planning.

To conclude, although the control of land use was decentralized to district governments, urban land use in Shanghai was still under strict control of the municipal government. Urban expansion had been driven by local planning and state policy, such as the rapid growth of development zones. We also found that major patterns of urban growth were infilling and expansion. For DZs, the increase of construction land use was influenced by administrative hierarchy. In sum, urban expansion in Shanghai was not only influenced by the penetration of foreign direct investment and multinational corporations, but also driven by local planning and state policy.

Suzhou

Located in the lower YRD, Suzhou is known for its silk industry and historic landscape. It is also the largest economic center and the largest FDI center in Jiangsu province, known for Singapore Industrial Park (Wei et al. 2009). Suzhou city has an administrative area of approximately 1650 sq. km. In the early 1990s, Suzhou was regarded as a representative of the Sunan model, driven by the development of town and village enterprises (TVEs) (Ma and Fan 1994). Since the late 1990s, the city had become a hotspot of global capital. By drawing FDI from Taiwan, Suzhou became a most dynamic city in the global electronics or Information and Communication technology (ICT) industry (Wei et al. 2013). The city experienced dramatic expansion of urban land and population, with a high share of migrants.

As a consequence of the rapid industrialization in Suzhou, urban expansion had spatially and temporally coincided with the pace and locations of foreign invested enterprises (FIEs) in the city. The non-agricultural land in Suzhou had expanded 2.3 times, with increase from 335.7 sq. km in 1991 to 766.9 sq. km in 2006. The 1991–1995 period experienced a moderate expansion and had the smallest expansion rate both relatively and absolutely (Table 11). Although the 2000–2006 period had the biggest annual expansion area and absolute expansion rate, its relative expansion intensity was lower than that of the 1995–2000 period. The 1995–2000 period had a relatively high expansion rate during the 15-year time span, which echoes the inflow of Taiwanese investment in the late 1990s (Yang and Hsia 2007). As the local government became more concerned about the protection of agricultural land in the recent years, urban development in the 2000s was more compact, which is consistent with the findings of Ho and Lin's (2004) research on land use changes in Jiangsu.

Table 11. Urban land expansion in Suzhou city, 1991–2006

Index	1991-1995	1995-2000	2000-2006
Total Expansion Area (sq. km)	20.10	186.52	224.61
Annual Expansion Area (sq. km)	5.03	37.30	37.44
Relative Expansion Intensity (%)	1.50	10.48	6.90
Absolute Expansion Intensity (%)	0.30	2.26	2.27

Notes: the calculation of the relative expansion intensity and absolute expansion intensity is based on the following equations:

$$E_R = \frac{N_b - N_a}{N_a T}, \quad E_A = \frac{N_b - N_a}{S T}$$

where E_R is the relative expansion rate, E_A is the absolute expansion rate, N_a and N_b are the areas of nonagricultural land at the beginning and end of the time period T , and S is the total non-water area.

During the early period of 1991–1995, urban expansion in Suzhou was dispersed, occurring away from the city center in the towns along the major road networks. In the later periods of 1995–2000 and 2000–2006, the expansion was contiguous with the original urban core, gradually combining with those earlier dispersed towns. Concentric analysis of urban expansion revealed a more characteristically suburban pattern in Suzhou when compared with the multi-peak pattern in Hangzhou (Liu et al. 2011) or the monocentric pattern in Nanjing, with urban expansion spreading out to distances of 5–25 km from the old city center (Figure 9).

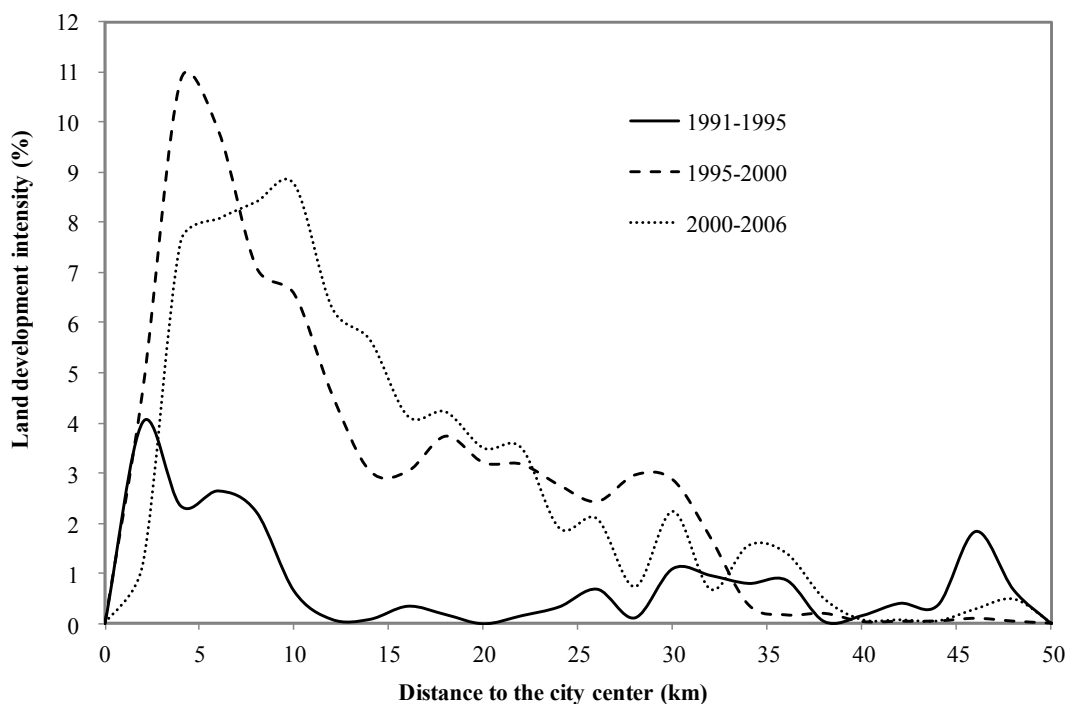
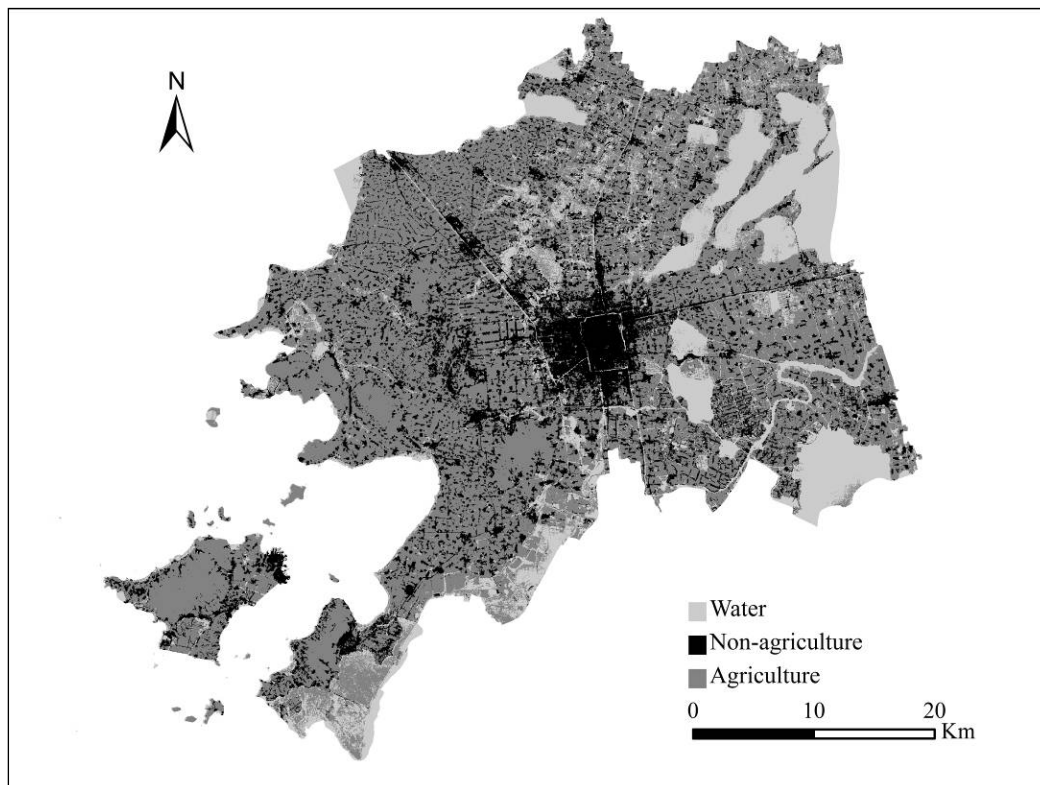
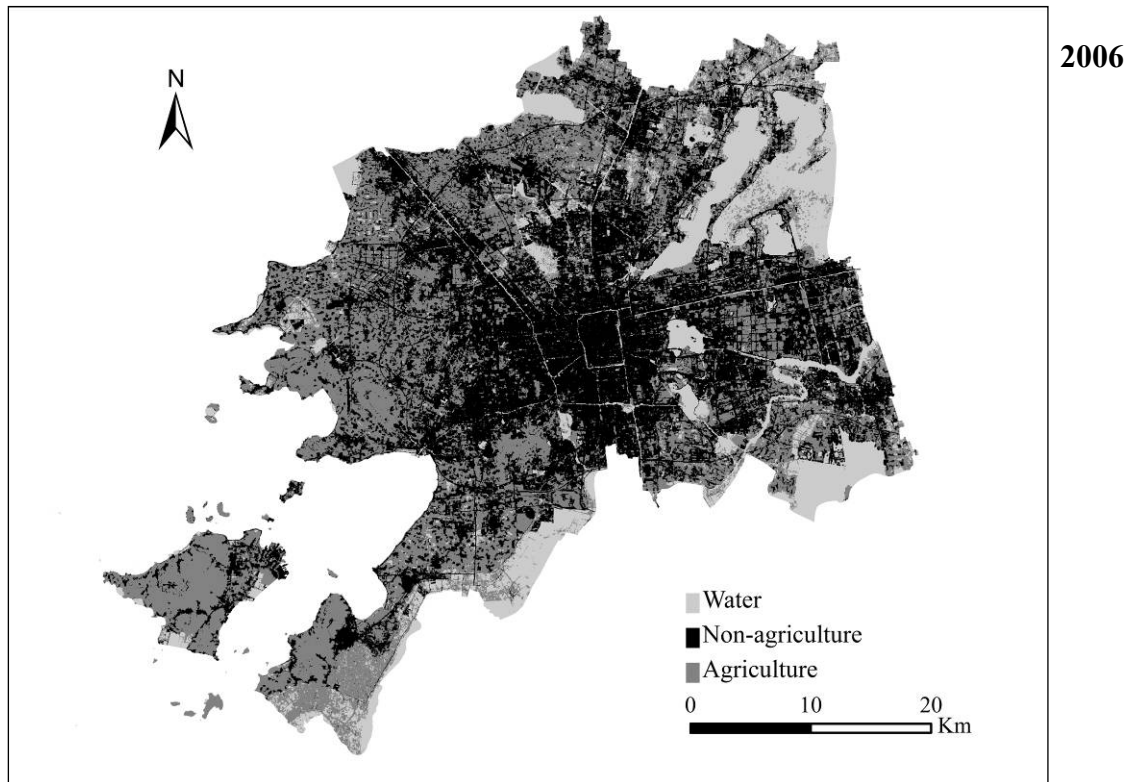
Figure 9. Land development intensity in Suzhou City, 1991–2006

Figure 10 further demonstrates that urban area in Suzhou mainly expanded along the east-west axis. This pattern can be attributed to the physical environment in Suzhou on one hand and the two national level DZs on the other. First, small hills in the west and the Yangcheng Lake in the north had limited expansion in these two directions. Second, the focus of the urban development strategy in the late 1990s in Suzhou was to develop the two national level DZs to attract FDI. The two zones, Suzhou Industrial Park (SIP) in the east and Suzhou New & Hi-Tech DZ in the west, had played a vital role in the urban expansion. They respectively occupied an area of 70 sq. km and 36 sq. km in 2006.

Figure 10. Land use patterns in Suzhou city, 1991 and 2006





In short, Suzhou is a typical case of urban expansion driven by the “going global” strategy and the “development zone fever” in the YRD. It also denotes the transformation of the original Sunan model from the bottom-up urbanization to land-centric urbanization based on the top-down approach favoring DZs. The DZ fever also reshaped the urban landscape in the city and created new centers in the original suburban areas. Furthermore, consistent with recent research on the DZ in Guangzhou (Wuttke 2011), DZs in Suzhou were developed far beyond the initial industrial enclaves. In order to sustain and attract investment in the high-tech sectors, these areas had been increasingly being converted into full-fledged urban areas, with original industrial parks becoming prototypes of metropolitan districts. In other words, the “development zone fever” in Suzhou had shown some signs of becoming the “new town fever.”

Hangzhou

Hangzhou, an ancient capital of China, is representative of coastal metropolises that are undergoing dramatic growth and restructuring (Wei 2012). As the southern center of the YRD, Hangzhou has been searching restlessly for strategies to survive in the competition with Shanghai (Figure 11). The strategies were especially useful in the late 1990s, when a new leadership emerged in Hangzhou and Zhejiang, proposing bolder reforms to stimulate economic growth and transition and position the city to flourish in the age of globalization and information. The leadership attempted to make the city more competitive, creative, and livable. The city entered a stage of most rapid growth and transformation (Table 12).

Table 12. Growth of population and land areas in Hangzhou City, 1950–2009

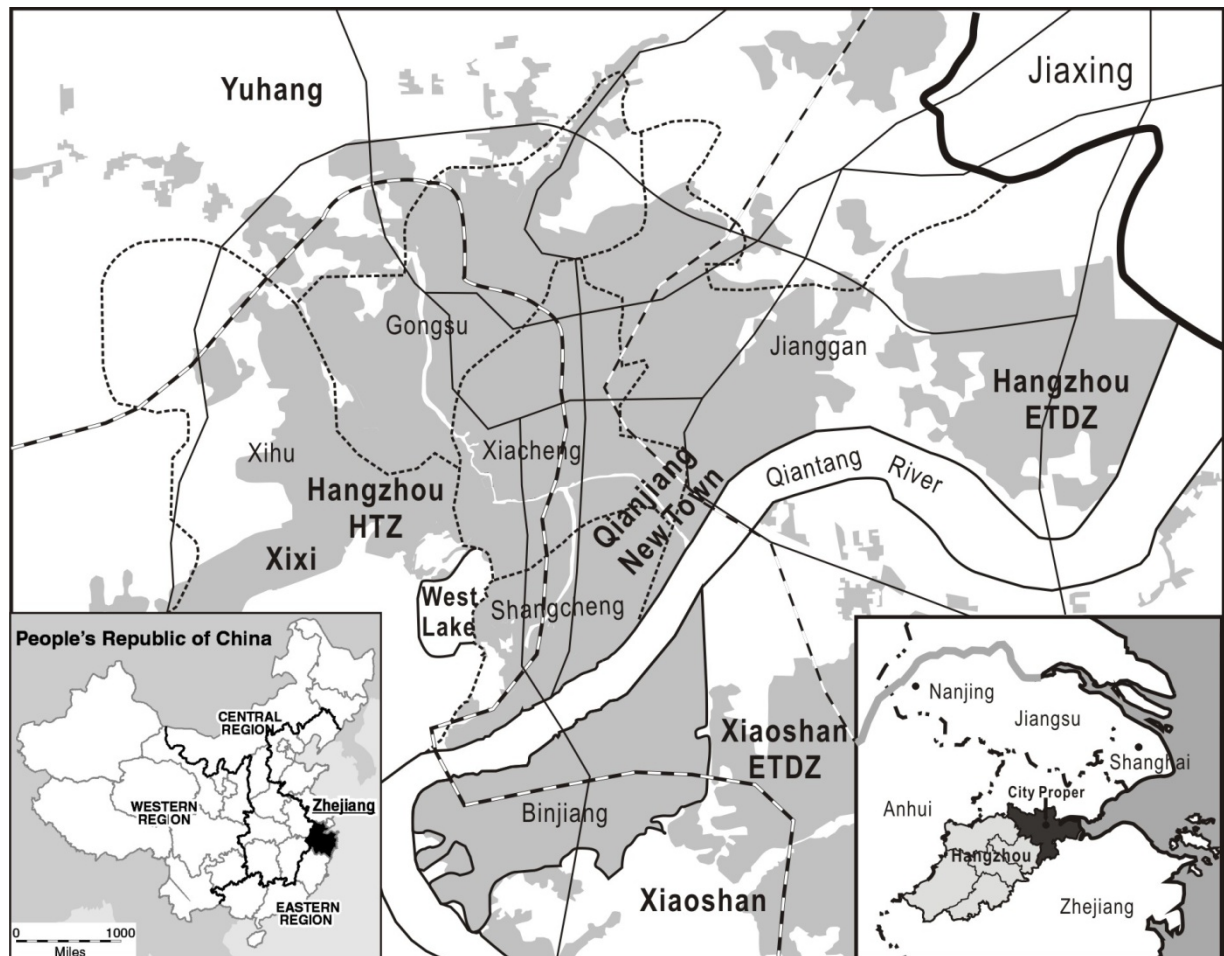
Year	Hangzhou Municipality			Hangzhou City		
	Total Population (1000)	Non-Agricultural Population (1000)	Metropolitan Area (sq. km)	Total Population (1000)	Non-Agricultural Population (1000)	Built-up Area (sq. km)
1950	3121.2	751.8	13	647.5	493.4	-
1960	4037.4	1089.6	122	969.3	802	-
1970	4588.2	1019.4	65	945.5	707.1	-
1980	5155.3	1288.8	430	1130.8	879.3	53
1985	5430.5	1534.6	430	1246.7	1000.1	61
1990	5747.8	1690.0	430	1338.9	1099.7	69
1995	5979.6	1914.3	430	1435.2	1213.8	102
2000	6215.8	2270.0	683	1791.8	1436.9	177
2005	6604.5	2975.4	3068	4095.2	2455.6	315
2009	6833.8	3544.8	3068	4294.4	2978.3	393

Notes: a. the data of population in this table are population with residence registration;

b. the numbers of population in Hangzhou Municipality in 1950 and 1960 refer to the numbers in 1952 and 1962 respectively;

Source: HSB, 1996–2010; ZSB, 2010

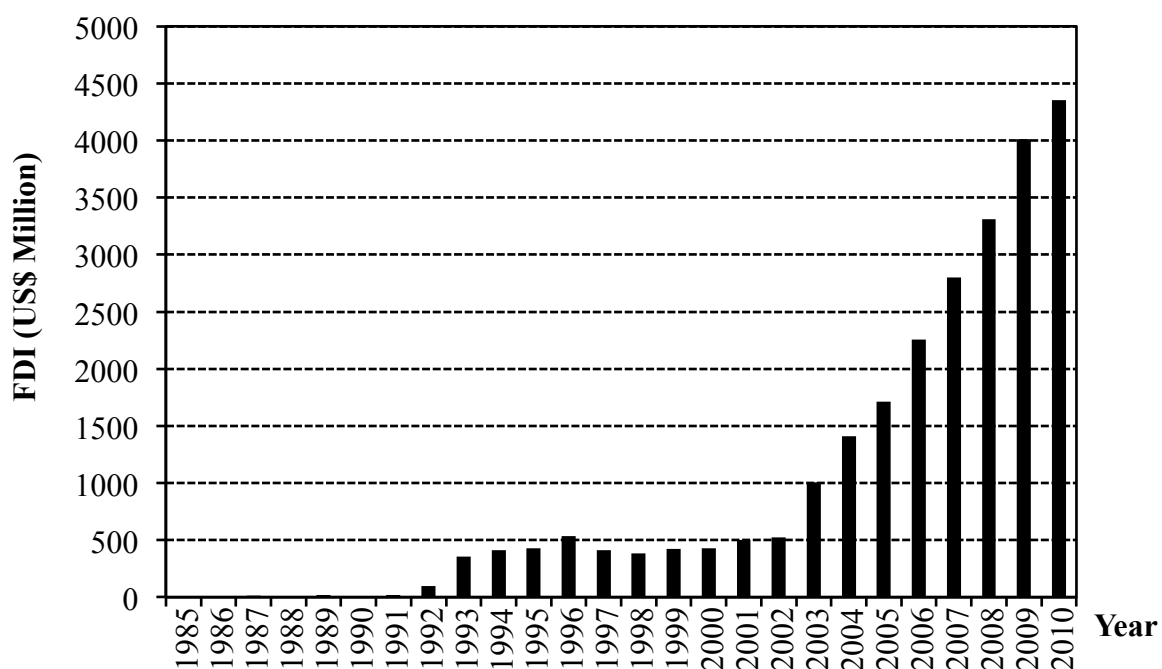
Figure 11. Location and Urban Spatial Structure of Hangzhou



Hangzhou had also been continuously searching for strategies of development and building its own identity. The role of urban landscapes and tourism development had long been a point of debates among policy makers in Hangzhou. The city had been making efforts to improve the tourism sector, especially since the late 1990s, with the emergence of a more active, pro-growth leadership. Indeed, Hangzhou was among the first group of 24 cities approved by the State Council in 1982 as a ‘Well-known Historic and Cultural City’ of China. It became a popular tourism destination for domestic and foreign visitors.

While early urban planning proposed to develop Hangzhou into a tourism city, industrial bureaus were concerned about the limited potential for output generation through tourism. Indeed, manufacturing emerged as a key sector of Hangzhou’s economic growth. To increase industrial production, the city opened a series of DZs to attract domestic and foreign investments and used multiple measures to develop high-tech industries and the higher education sector. With the deepening of the reforms and the opening up of Shanghai’s Pudong, Hangzhou also intensified its reform efforts to globalize its economy. FDI in Hangzhou Municipality increased from US\$9.1 million in 1985 to US\$536.5 million in 1996 and US\$4.36 billion in 2010 (Figure 12).

Figure 12. FDI in Hangzhou Municipality, 1985–2010 (Source: HSB 2010, 2011)



DZs with preferential government policies and professional management became the geographical focus of foreign investors, and the frontiers of globalization. The first economic and technological development zone (ETDZ) in Hangzhou, namely Hangzhou (Xiasha) ETDZ, was established in 1984 (Figure 1). In 1993, the State Council approved the establishment of four national-level DZs in Hangzhou: Hangzhou (Xiasha) ETDZ, Hangzhou

High-Tech Zone (HHTZ), Xiaoshan ETDZ, and Zhijiang Tourism and Vocation Zone. In 2010, the four national ETDZs recorded FDI of US\$ 1.58 billion, accounting for 36.4% of the total FDI in Hangzhou (HSB 2011) (Table 13).

Table 13. Major Developments and Projects in Hangzhou

		Year Initiated	Land Areas (sq. km)
Tourism	Song Dynasty City	1996	0.4
Spots	Hangzhou Future World	1997	0.25
	Hangzhou Paradise	1999	1.3
	Xixi Wetland	2005	11.5
Development Zones	Hangzhou Economic and Technological Development Zone	1993	104.7
	Hangzhou High-Tech Zone	1990	11.44
		1997 (Binjiang)	Binjiang: 73
	Xiaoshan Economic and Technological Development Zone	1990	Shibei: 9.2 Qiaonan: 18.8 Jiangdong: 105
	Zhijiang Tourism and Vocation Zone	1992	9.88
Educational Districts	Xiasha Higher-Educational District	2000	10.91
	Zhejiang University-Zijingang Campus	2001	2.06
	Xiaoheshan Higher-Educational District		4.96
	Binjiang Higher-Educational District		1.82
Infrastructure Construction	Xiaoshan International Airport	2000	0.1
	Hangzhou East Railway Station	2008	0.156
	Shanghai-Hangzhou High Speed Railway	2010	202 km
New Towns Construction	Qianjiang New Town	2001	21
	Linjiang New Town	2003	160.2
	Dajiangdong New Town	2009	500
	Linping New Town	2010	7.5

Source: Compiled from varied developments and projects websites.

Hangzhou also experienced several rounds of administrative rescaling and urban planning, which further accelerated urban expansion and the spatial restructuring of Hangzhou towards a multi-nuclei city. Such a dramatic administrative rescaling and following revisions of master plans were also associated with massive investment in transportation infrastructure and new CBD developments, highlighting the transitional nature of urban planning and local state institutions in China (Wei 2005).

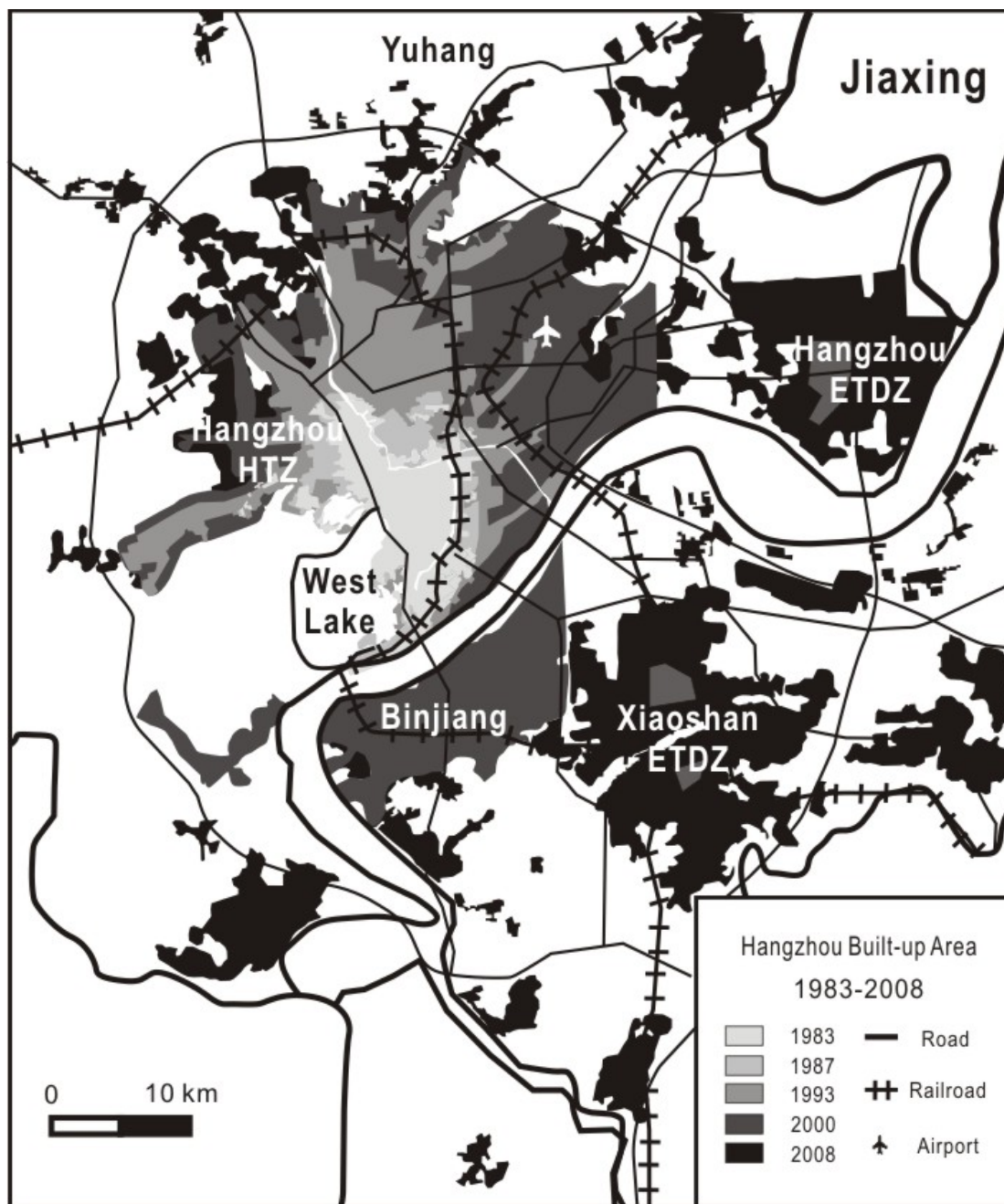
Since the mid-1990s, large cities were more successful in gaining control of land from suburban counties and cities. Rapid growth and the need for more urban spaces forced Hangzhou to seek land from suburban counties by annexation through its administrative power, with the support of provincial and central governments. In 1996, by annexing three

townships from Xiaoshan County and three townships from Yuhang County; the land area of Hangzhou City increased from 430 sq.km in 1995 to 683 sq. km in 2001, witnessing an increase of 58.2%. The annexation allowed Hangzhou to expand the city towards the south and north. However, this annexation did not satisfy the insatiable demand of Hangzhou for cheap land and space for urban development. In February 2001, the State Council approved Hangzhou's request to annex Xiaoshan City and Yuhang City to become districts of Hangzhou. The total population of Hangzhou increased more than two times, and the land area of Hangzhou City increased from 683 sq.km in 2000 to 3,068 sq.km. The annexation provided a substantial land area for urban expansion. Hangzhou had therefore expanded its territory through rescaling to gain control on more land from suburban counties, effectively making suburbanization a part of the urban development process, and, thereby, reducing outflow of industries and population outside of Hangzhou City.

To remain competitive and capitalize from globalization and urban development, Hangzhou proposed a new CBD in the southeast of the city and north of the Qiantang River—Qianjiang New Town. The new CBD was planned to host major government offices, and become the new center of administrative and cultural activities. With a planned total investment of 170 billion yuan, the new CBD will reimagine Hangzhou as a globalizing metropolis and an economic powerhouse of the YRD.

Hangzhou traditionally had a single urban core, with expansion in all directions later (Figure 13). Since the early 1990s, the city expanded dramatically towards the east, the north, and the northwest, and massive construction is underway in the south side of the Qiantang River. Industrial land use was further pushed towards newly developed areas, especially towards the DZs. They had been leading the process of suburban land development, and changing urban spatial structure. It is clear that land development in Hangzhou was institutionally led and institutional land use was the major source of land development and urban expansion. The development of Hangzhou ETDZ stimulated the rapid population growth of Xiasha, which had evolved into a sub-center of Hangzhou. With the incorporation of Xiaoshan, Hangzhou further expanded towards Xiaoshan, making it another sub-center.

Figure 13. Expansion of Urban Built-up Area in Hangzhou, 1983–2008.



In summary, Hangzhou’s development strategies, including tourism, industrial development and urban development, were built on local advantages. The local state had been playing an active role in urban policy and development. While land development became a central component of urban policies, urban planning became a tool to rationalize urban expansion and obtain land development quotas from the central government. Rescaling had been used as a tool to increase urban administrative areas and provide more land resources for urban development.

Institutional Reform and Urban Expansion in Nanjing

Development Process and Government Policies

Nanjing, located on the fringe of the YRD (Figure 1), is an ancient capital of China. Established during the Three Kingdoms (A.D.220–280), Nanjing served as a military base to defend against the invasion from the north. During the Ming Dynasty (1368–1644), Nanjing served as the national capital for the early years (1368–1421) when it was the most prosperous city in China and even the largest city in the world, contributing significantly to making the YRD as the national economic center. Modern industries, such as textile, electricity, and food processing industries, were established in the late 19th and early 20th century in Nanjing. For most of the years between 1912 and 1949, Nanjing was the capital of the Republic of China, and the city’s service industry expanded rapidly. Western ideas of urban planning and management were also introduced to Nanjing, making it one of the earliest cities in China with modern urban planning. The city, however, was destroyed under the anti-Japanese war and the civil war in the 1940s.

Nanjing was an important city under socialist industrialization programs in the 1950s. In 1957–58, with the initiation of the “Great Leap Forward” and influenced from the Soviet model of industrialization, officials proposed to build Nanjing into an industrial city centered on heavy industry. A group of steel, oil refinery, auto, and heavy chemical factories were established (e.g., Nanjing Steel, Nanjing Oil Refinery, Nanjing Auto), largely in the north of the city around the Yangtze River. The construction of these new factories and the recovery of established industries led to the growth of urban population in Nanjing during 1957–60 (Table 14), a phenomenon coined as “spurious urbanization” (Zhou and Ma 2000). Industrial construction also enlarged the urban built-up area. The share of secondary industry in the Nanjing municipality rose from 23.4% in 1952 to 68.4% in 1978 (Table 15). In the 1960s, however, Chinese cities, including Nanjing, faced economic stagnation and unrest, forcing Nanjing to strictly control rural-urban migration, and even send urban residents to the rural areas.

Table 14. Growth of population and land areas in Nanjing, 1949–2012

Year	Nanjing Municipality			Nanjing City		
	Household Population (million)	Total Population (million)	Metropolitan Area (sq. km)	Household Population (million)	Total Population (million)	Built-up Area (sq. km)
1949	2.57			1.07		
1960	3.23			1.65		
1970	3.61			1.52		
1980	4.36		867	2.03		65
1985	4.66		867	2.25		121
1990	5.02	5.17	947	2.47		129
1995	5.22	5.64	976	2.66		151
2000	5.45	6.13	1026	2.90	3.62	201

2005	5.96	6.90	4723	5.13	5.99	513
2010	6.32	8.01	4733	5.48	7.02	619
2011	6.36	8.11	4733	5.50	7.22	637
2012	6.39	8.16	4733	5.53	7.30	653

Note: Total population include local residents with household registration and non-local residents without local household registration.

Source: NSB 1991–2013; National Population Census, 1996, 2000, 2005, 2010.

Table 15. Selected Indicators of Nanjing, 1952–2012

Year	1952	1978	1995	2012	Annual Growth (%)		
					1952-1978	1978-1995	1995-2012
Nanjing City							
GDP (million yuan)	230	269	44,001	647,260	-	-	-
Per Capita GDP (yuan)	205	1538	16,000	100,263	-	-	-
FDI (US\$ million)	-	-	344	3,898	-	-	-
Sectoral Structure of GDP (%)							
Primary	-	2.6	1.4	1.9			
Secondary	-	77.6	52.7	42.6			
Tertiary	-	19.9	45.9	55.5			
Nanjing Municipality							
GDP (million yuan)	393	3442	58,459	720,157	8.1	11.4	13.1
Per Capita GDP (yuan)	155	844	11242	112,980	6.2	8.6	11.8
FDI (US\$ million)	-	-	403	4,130	-	-	14.7
Sectoral Structure of GDP (%)							
Primary	40.6	12.7	7.6	2.6			
Secondary	23.4	68.4	52.1	44.0			
Tertiary	36.0	19.0	40.3	53.4			

Notes: The administrative boundary of Nanjing city changed in 2002, and the data on Nanjing city before and after 2002 are not totally comparable.

Source: NSB 1991–2013; JSB 2010.

With the fading of the “Cultural Revolution” and the normalization of U.S.-China relations in the early 1970s, some new factories were established to update the industrial infrastructure, such as Yangtze Petrochemical and Panda Electronics. The number of migrants in Nanjing also increased in the late 1970s when many urban youth who were previously sent to the countryside returned to cities. Non-agricultural population increased from 1.46 million in 1975 to 1.83 million in 1980 (NSB 2010). Such a growth placed a heavy burden on China’s cities, which led to formalization of the national urbanization policy as “strictly controlling the size of large cities, rationally developing medium-sized cities, and vigorously developing small cities” (Wei 1994; Zhao and Zhang 1995).

During the late 1970s and 1980s, under the influence of the national urban policy, Nanjing stressed the control of urban populations and built-up areas. The 1980 Master Plan of Nanjing, approved by the State Council in 1983, set up control objectives of a 1.36 million

population and a built-up area of 122 km² in 2000 for the city district. To control population growth, several measures were taken, such as the restriction on industrial allocation, the organization of functional districts, the development of satellite towns, and the strict migration control. Consequently, Nanjing's growth in population and land use was limited in the 1980s (Table 14). However, with the rapid growth of the China's economy, the planned areas and population control objectives had to be raised constantly (Table 16).

Table 16. Nanjing Master Plans, 1950–2012

Year of approval or completion	Name of Plan	Planned Area (sq. km)	Target Population (million)	Target Land Use (sq. km)	Planned Functions
1954	Zoning Plan (draft)	160	1.327	130	Land use planning, focusing on residential and industrial land use, and cultural, education and military facilities.
1957	Nanjing Master Plan (draft)	160	1.3	139	Develop Nanjing into one of the most important industrial cities in China and a cultural, military and political center. Pillar industries include shipbuilding, electronic equipment, food production and textile.
1960	Nanjing Master Plan	4,535	1.2	-	Develop eleven satellite towns, five industrial zones and three mines. The metropolitan region contains a city center, commuting centers and satellite towns.
1961	Nanjing Master Plan (revision)	-	1.0	-	Control the growth of urban population and land area, and support agricultural development.
1975	Nanjing Master Plan	-	1.1-1.2	-	Renew the old city center, emphasize the development of sub-centers, and control the development of suburban areas.
1983	Nanjing Master Plan 1981-2000	4,717	1.36	122	An ancient capital and the political, economic and cultural center of Jiangsu Province.
1991	Nanjing Master Plan, 1991-2010	6,516	6.0	243	Promote economic development, build up a beautiful environment, and develop a "Yangtze River" city, with a combination of ancient style and modern civilization.
2001	Nanjing Master Plan Revision of the 1991-2010 plan	-	6.8	-	Develop into an economically vibrant city, one of the modern urban centers in the Yangtze River Delta, and an international city with unique cultural and historical characteristics, a high-quality living environment, and a harmonious nature-society interaction.

2009	Nanjing Master Plan 2007-2030	6,582	9.5	-	Become a national historical and cultural city, a transport hub, an important national innovation base, modern regional service center, advanced manufacturing base in the Yangtze River Delta, and a livable city along the Yangtze River.
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Source: Various Nanjing urban planning documents.

Deepening Reforms: Urban Development and Land Expansion

The economic reform stimulated economic growth and urban land expansion. Reforms changed the planning policies of the government towards urban growth and control in Nanjing. The government of Nanjing—especially the mayor, development and reform commission, and financial bureaus—emphasized economic growth and local spending, with the inflow of capital and labor. Reforms also reduced the instruments Nanjing can use to limit industrial allocation and urban growth. The development of market economies paved the way for rural migrants to work and to live in cities. Rural-urban migration became a major source of the population growth of China’s cities. Consequently, many China’s cities surpassed their year 2010 or even 2020 population control objectives set up by their master plans and so did Nanjing. The city had a total population of 7 million and a household population of 5.4 million in 2010 (Table 14). Those figures substantially surpassed the population control objectives for the year set up by the 1991 Master Plan of Nanjing, even adjusted for the change of administrative boundaries. In 2010, the urban built-up area of Nanjing reached 619 km², which was substantially larger than the control objective set up for that year by the Master Plan of Nanjing.

Nanjing was lagging behind other coastal cities in reforms and globalization in the 1980s and 1990s. Nanjing was not among the fourteen coastal cities opened in 1984, and the first national DZ—Nanjing New and High-Tech Development Zone (NNHTDZ) was established in 1988 but its earlier development was slow (Table 17). Consequently, urban land expansion was relatively mild (Figures 14 and 15). The city was relatively compact in terms of urban expansion (Luo and Wei 2009). As shown in Table 18, the development intensity in Nanjing was around 1.41% in the late 1980s, which was relatively small compared with Suzhou, a city much closer to Shanghai.

Table 17. Major development zones in Nanjing

Development Zone	Year of Establishment	Planned Area(sq. km)
National Level		
Nanjing New & Hi-Tech Development Zone	1988	16.5
Nanjing Economic and Technological Development Zone	1992	11.37
Jiangning Economic and Technological Development Zone	1992	38.47
Nanjing Export Processing Zone	2003	2.7
Nanjing Chemical Industry Park	2001	45

Provincial Level

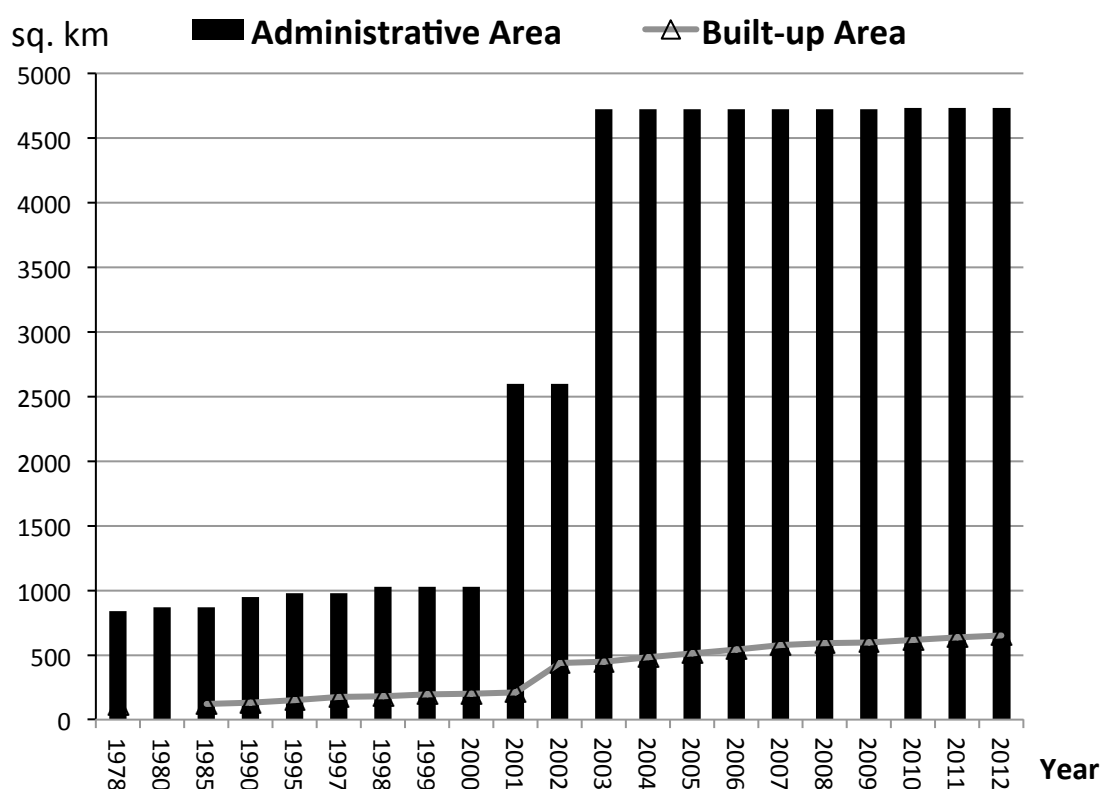
Nanjing Lishui Economic Development Zone	1992	60
Nanjing Qixia Economic Development Zone	1992	13.37
Nanjing Pukou Economic Development Zone	1992	12.65
Nanjing Chemical Industry Park	1993	12
Nanjing Liuhe Economic Development Zone	1993	10
Jiangsu Gaochun Economic Development Zone	1995	6.73
Nanjing Yuhua Economic Development Zone	2000	4.68
Nanjing Baixia High-tech Industrial Park	2001	1.14
Nanjing Binjiang Economic Development Zone	2003	5.53

Table 18. Urban land expansion in Nanjing, 1985–2007

Index	1985-1995	1995-2001	2001-2007
Total Expansion Area (ha)	11,094	26,342	39,021
Annual Expansion Area (ha)	1,109	4,390	6,503
Relative Expansion Intensity	1.41%	4.90%	5.61%
Absolute Expansion Intensity	0.19%	0.74%	1.08%

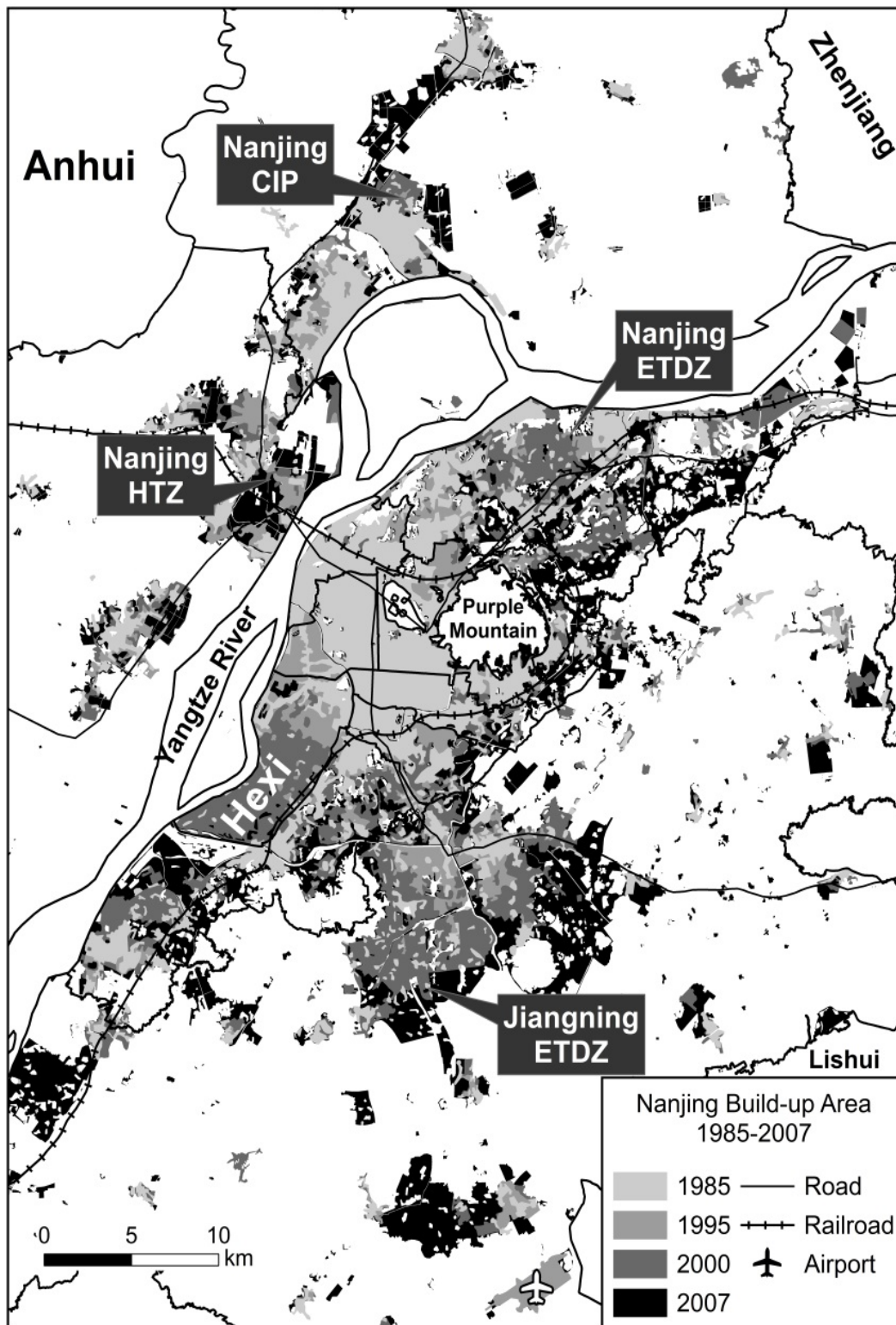
Source: Wei et al. 2014.

Figure 14. Changing Administrative and Built-up areas in Nanjing, 1978–2012



Data source: NSB 1979–2013; JSB 2013.

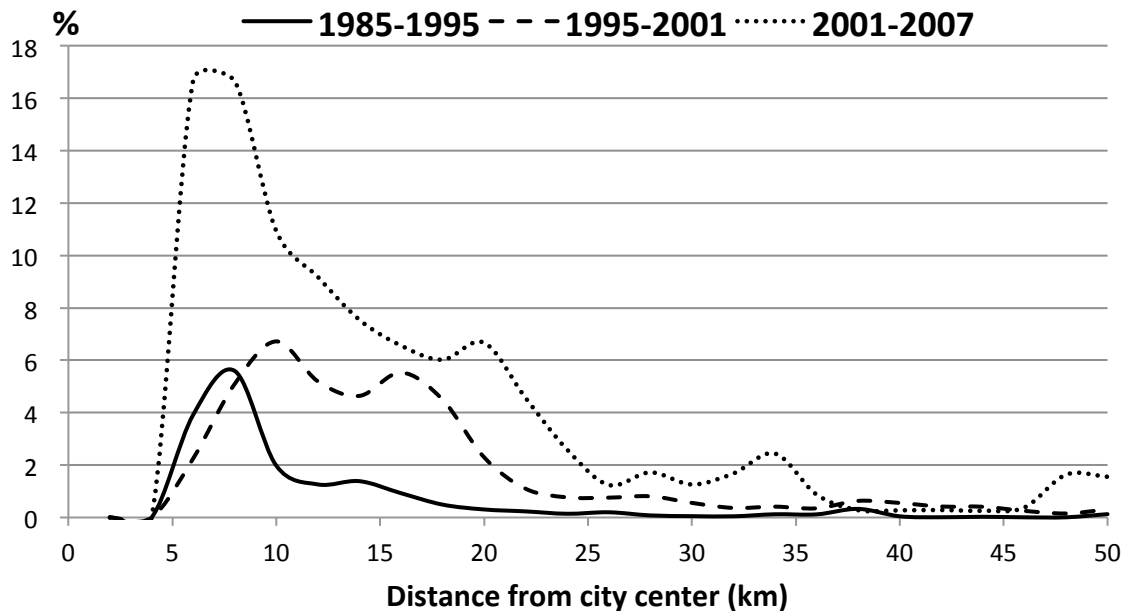
Figure 15. Urban Land Expansion in Nanjing City, 1985–2007



The national push for deeper reforms in the early 1990s prompted Nanjing to launch a series of new policies to promote economic reforms and growth, as reflected in the 1991 Nanjing Master Plan (Table 16). The city established a number of national and province level DZs

(Table 17). Consequently, urban land expanded more rapidly to areas further away from the city center, which led to a concentration in areas located at a distance of 5–15 km from the city center, where the DZs were mainly located (Figure 16). This led to the rise of expansion intensity in the following years, especially in the 2001–2007 period.

Figure 16. Land development intensity in Nanjing, 1985–2007



China’s joining into the World Trade Organization (WTO) in 2001 initiated another round of reforms and globalization in Nanjing. Once again, Nanjing master plan was revised to reflect the new institutional environment including the addition of an international city as a goal for the development of Nanjing (Table 16). Jiangning County was incorporated into Nanjing city to provide more land for development, eventually leading to increase of the administrative area of Nanjing city by more than two times. This was followed by the incorporation of Luhe and Jiangpu counties in 2003, an ever bigger jump in the administrative area (Figure 14), accompanied by the development of university towns and sports projects.

Nanjing’s urban land expansion accelerated in the 2000s, at a pace faster than expansion in the 1990s and 1980s. The annual expansion area increased from 43.90 km² per year to 65.03 km² per year. We found that Nanjing experienced extensive urban expansion in the 2000s, which is consistent with reform policies and development strategies. The urban built-up area increased from 201 km² in 2000 to 619 km² in 2010. The fast growth of urban development was accompanied by the huge loss of agricultural land. The agricultural land in Nanjing recorded a remarkable drop from 3,010 km² in 2000 to 2,399 km² in 2010. The recent global financial crisis promoted another wave of planning (a new master plan) and development, focusing on infrastructure, as a part of the national policy response.

Nanjing’s urban land expanded towards the east, north, and the northwest, with massive construction underway in the south of the Yangtze River Delta (Figure 4). The direction of

urban expansion in Nanjing is also sensitive to the physical environment, which tends to favor the north-south corridor, resulting from constraints of the city boundary and the Yangtze River flowing from the north to the south of the city. Nanjing's development is somewhat different from Hangzhou, where a polycentric pattern is emerging (Wei 2012). Nevertheless, the spatial expansion of urban growth was not identical to the master plans. For example, the 2001 Nanjing master plan limits the development of areas in the east and south for protecting suburban agricultural land, and the environment. Those developments in the southern and northeastern of the city were largely beyond the consideration of the Master Plan of Nanjing, documenting the disparity between planning and urban growth widely taking place in Chinese cities (Wei 2005; Qian 2012).

Nanjing: “Development Zone Fever,” “Project Fever”

Capitalizing from Globalization: “Development Zone Fever”

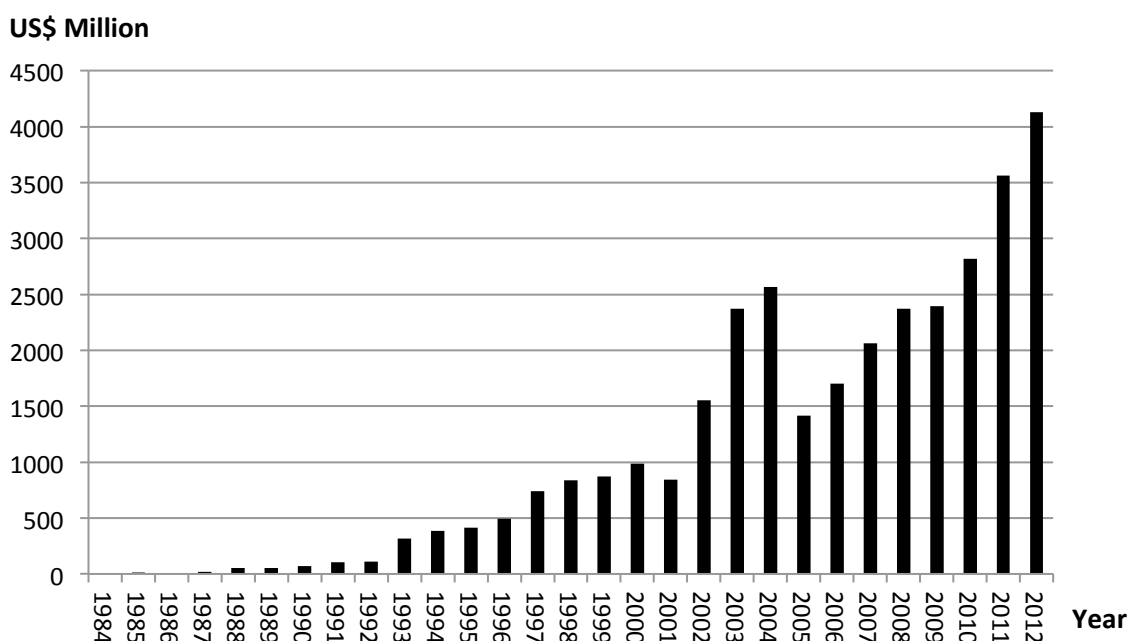
Land had been used extensively in China's process of reforms, globalization and growth. China's open door policy, however, is spatially uneven, with a strong focus on the coastal cities and centered on development zones. Asian economies such as Taiwan and South Korea were among the earliest in establishing export processing zones (EPZs). Their success inspired China to establish special economic zones (SEZs) in south China in 1980, and economic and technological development zones (ETDZs) in 1984 in 14 open coastal cities, as part of China's open door policy. The early 1990s witnessed the establishment of numerous national and local DZs and high-tech zones, as part of China's push towards deeper economic reforms, which in turn triggered the DZ fever in China (Yang 2009; Yang and Wang 2008). China's DZs are efficiency oriented to capitalize from globalization and therefore tend to locate in more developed, more globalized and higher ranked administrative centers such as centrally administrated municipalities and provincial capitals. More than two thirds of the national DZs are located in coastal China, and FDI and export-oriented DZs are heavily concentrated in coastal cities.

DZs enjoy lower taxes for foreign investment, higher foreign exchange retention rates, lower tariffs on imports, tax breaks for exports, and more decision powers and transparency in management, and therefore become focus of FDI in China (Wei and Leung 2005). Their official land use areas can be large, and the real land used can even be substantially larger. Punishment for exceeding land use quotas in national level DZs is rare. The two major types of DZs in China include ETDZs, and high and new technology DZs (or high-tech districts). China continued to introduce new types of DZs, such as EPZ and higher education districts, as new engines of growth and as new ways to attract external capital and obtain preferential policies. Besides the favorable open-door policy of the central government, Chinese cities also initiated numerous local policies to attract foreign investment, especially by further simplifying approval procedures, subsidizing through local revenue, and providing infrastructure support. Provincial and local level DZs also heavily engage in the cut-throat competition for FDI. Nanjing is no exception. The similar policies implemented by local

governments in China, called ‘local policy isomorphism’ (Chien 2008), had been clearly guided by the reform policies of the central government.

Nanjing was opened up in the mid-1980s. However, due to its interior location and the burden of the socialist legacy as a political capital in the province, Nanjing was less attractive to FDI compared with Suzhou. The situation greatly changed in the 1990s and especially in the early 2000s after China’s accession into the WTO (Table 5). The total number of national and provincial DZs in Nanjing increased from one in 1990 to nine in 2000 and to 13 in 2010. The 2000s also witnessed an unprecedented increase of FDI in Nanjing (Figure 17), which rose from US\$ 987 million in 2000 to US\$ 4.13 billion in 2012. Most importantly, hundreds of global 500 enterprises such as Siemens, Philips, Sharp, LG, SAP, had invested in Nanjing.

Figure 17. FDI in Nanjing Municipality, 1984–2012



Most of the newly developed urban lands were located on the fringe of Nanjing (Figure 15). Four broad hotspots of urban expansion can be identified, including northwest of the river, the southwest, the northwest and the southeast. These developments were centered on the construction of DZs and the new CBD, which includes the Jiangning ETDZ (JNETDZ) in the southeast, Nanjing ETDZ in the northeast, Nanjing New and High-Tech DZ (NHNHTDZ) in the northwest of the Yangtze River and the Hexi new town, southwest of the city center. NHNHTDZ, with a planned area of 16.5 km², was among the first groups of DZs in China designated for foreign investment. In 2010, there were 320 foreign enterprises in NHNHTDZ with a total output of 25 billion yuan. JNETDZ is another national-level DZ which was more specifically designed to attract large-size or global 500 transnational corporations (TNCs). By 2010, the zone attracted 91 foreign enterprises and their average output value was 400 million yuan, as compared to the average output of the foreign firms in NHNHTDZ, which was 80 million yuan. The provincial level DZs also experienced dramatic growth from zero in 1990 to nine in the early 2000s, with the establishment of more specialized DZs. The local

governments of China had been continuously inventing new types of DZs. The most recent development focuses on zones or districts for innovation and advanced business services.

The Insatiable Demand for Land: “Project Fever”

China has had a socialist legacy of industrial allocation and project development. China’s economic development during Mao’s era, like other socialist countries, was centered on industrial allocation, and socialist construction based urban planning. During the First Five-Year Plan (1953–57), China attracted 153 key projects from Soviet Union, and the allocation of these projects laid the foundation for the framework of industrial development. The need for industrial renovation prompted the allocation of large scale modern industrial facilities imported from the West in the early 1970s, mostly located in coastal cities including Nanjing. During the reform period, despite decentralization and marketization, project allocation remained a key function of the Chinese government. The largest and most significant ones were administrated as key projects and included in state planning. The biggest ones can be called megaprojects, with tremendous resource commitment from both central and provincial governments.

Flyvbjerg (2014) uses technological, political, economic and aesthetic sublimates to explain the drivers of the global megaproject boom. China’s key projects are large-scale constructions and can contribute significantly to the growth of GDP and the landscape of DZs. These projects are largely top down approved and more likely financed by the central government; they are also expected to have trickle-down effects through their production linkages, technological spillover, service development, and especially the dramatic transformation of urban landscapes. Key projects are also the best instruments for getting more land use quotas from the central government. They, therefore, become political achievement projects (*zhengji gongcheng*), and the best instruments to achieve economic growth and urban development, and consequently, political capital. Such projects tend to locate in provincial capitals, since they are the decision centers and arguably to serve the whole provinces. The direct linkages of provincial governments to the central government also makes it easier for provincial capitals to initiate and receive key projects. Megaprojects, such as the 2008 Olympics in Beijing and the 2010 World Expo in Shanghai, and gigaprojects, such as the China’s high-speed rail project, have national significance and therefore can draw heavy investment from the central government. The project allocation system is still overwhelmingly a state-directed and even state-financed projects; it is therefore a key component of state planning, and tied towards power centers. The more powerful the city is, the more privileged it can be in the system. Key projects, especially megaprojects, are therefore privileged particles of the development process (Hirschman 1995), trait making, and even path breaking.

Key projects in China are typically heavy industry and infrastructure development projects influenced by socialist ideology promoting socialist industrialization and construction. The size of key projects also became larger over time, and more importantly, their scope had been expanded dramatically to include administration, information technology, education, finance, sports and new modes of transportation such as high-speed rail. Key projects, within the

aforementioned areas, can be found in most large cities of China, as signs of project fever, a global phenomenon. Infrastructure development is the most effective way to improve urban landscapes, to show political achievements, and to satisfy urban residents' demand for better working and living conditions. The project fever had been further intensified since the Global Financial Crisis and became a focus of policy initiatives to revitalize the Chinese economy.

Nanjing is by no means exceptional in the new wave of “project fever” in the 2000s (Table 19). National level DZs themselves are the largest political achievement projects and are comprehensive megaprojects where manufacturing activities are geographically concentrated. Industrial projects are largely located in DZs. Besides the DZ projects, university towns, Hexi new town and infrastructure development became the frontiers of urban growth in path towards attracting advanced service investment or development of high-tech and headquarter economies in Nanjing.

Table 19. Major Development Projects in Nanjing

Category	Project	Year initiated	Year completed	Planned Area/Length
New City New Urban Districts	Hexi New City	2004	2014	94 sq. km
	Pukou Urban District	1995	-	93 sq. km
	Xianlin Urban District	1995	-	80 sq. km
	Dongshan Urban District	1995	-	107 sq. km
University Towns	Pukou University Town	1987	-	4 sq. km
	Xianlin University Town	2002	-	47 sq. km
	Jiangning University Town	2002	-	27 sq. km
Infrastructure	Lukou International Airport	1995	1997	9.88 sq. km
	Nanjing Metro	2000	2030	617 km
	Nanjing Olympic Sports	2002	2005	0.896 sq. km
	Nanjing South Railway	2008	2011	0.458 sq. km
	Shanghai-Nanjing High	2008	2010	300 km
	The Tenth National Games	2001	2005	-
	Asian Youth Games	2010	2013	-
	Youth Olympic Games	2010	2014	-
Tangshan International Hot	2008	2010	60 sq. km	

First, China had attempted to transform itself from “Made in China” towards “Innovated in China” through promoting indigenous innovation to move up the global value chain (Liefner and Wei 2014). The main channels of R&D and technological development are Chinese research institutions and knowledge transfers from TNCs. Besides high-tech districts, development of university towns became another major project of local governments. This shows Nanjing’s ambition towards knowledge based economy or innovation hub. University towns were built to attract overseas returnees and to compete with key provincial capitals in coastal China such as Hangzhou. University towns, however, are not purely for universities; they had also been used for the development of high-tech industries and residential spaces.

There are three university towns located respectively in Jiangning, Pukou and Qixia districts. Xianlin University Town is the largest university town in Nanjing. It was planned to develop into a comprehensive district, with a planned area of 47 km². Pukou had largely become a new city district, with a planned area of 93 km² (Table 6).

Second, given the demand for services, the construction of new CBDs or sub-centers became another way to stimulate economic growth and obtain land use quotas. Almost all, large Chinese cities had been developing new CBDs. The largest in scale is Shanghai's Pudong District where Lujiazui is being built as the global financial center. Hangzhou's Qianjiang New City had been under construction for more than a decade, and from the very beginning it was planned as the new CBD of the city (Wei 2005; Qian 2008). Hexi New Town of Nanjing was built in the south of the city center, with a planned land area of 94 sq. km (Table 6). It is also a cultural and sports project, since its anchor is the Olympic Sports Complex, although hosting the Olympics was left to Beijing. The word Olympics is certainly a buzz word for marketing and gaining policy support.

Third, infrastructure project had long been a favorite type of key projects, including airport, railway stations, highway stations, and streets, which became a focus of project fever since the recent Global Financial Crisis. The Nanjing Metro is an ambitious metro system to serve the city, and its construction will last for thirty years beginning from 2000 to 2030. Nanjing South Railway Station was built as a transportation hub to stimulate economic growth in south Nanjing.

Last, many other projects were also built in Nanjing. Residential projects accompany most of the project development, since rising real estate prices made residential projects the most profitable development in China. Urban comprehensive projects including shopping, residential and projects relating to cultural activities that emerged across the city. Golf courses are another major development found in cities, often accompanied by the construction of high-end houses and apartments.

Strategic or image projects such as university town and new city district basically reflect the spatial outcomes of the marketization, decentralization and globalization in Chinese cities where land had been the centric platform or interest of conflict in urban development in Nanjing. The ongoing projects had also resulted in the dramatic increase of construction investment and urban expansion in Nanjing. The project fever had also put huge fiscal uncertainty for the municipality government and development corporations in Nanjing, making the city heavily in debt, since most of the infrastructure, administrative and even cultural projects are unprofitable. As observed globally, while in demand, megaprojects are often poorly managed and economically inefficient, leading to the wasteful "breaking-fix-mode" of project development (Flyvbjerg 2014), which forces the city to sell more land and borrow more from state-controlled banks. On the other hand, the spillover effects of these projects, especially to small, private enterprises in Nanjing remain limited.

Conclusion

This report examined the process of urban land expansion in the YRD with an emphasis on Nanjing. We demonstrated that the pattern of urban growth in the YRD is influenced by the process of economic development and is particularly driven by rapid industrialization and infrastructure development centered on development zones (DZs) of various levels and types. Urban land expansion is also an institutionally driven process and tends to be proactive in the process of urbanization. Urban development is still more evident in the largest Chinese cities in the coastal areas, where urban development is driven by the broad processes of decentralization, globalization and marketization.

Decentralization created a growth-oriented environment for local governments and exerted a profound impact on central-local relationships. Decentralization also provided more decision-making power to the local officials, while the central government retained the majority of value-added taxes from enterprises after the 1994 tax reform. Deprived of ongoing tax revenues, local governments turned to land as the most valuable resource available to fund local development objectives. As found in the YRD, local states carried out aggressive urban development strategies, including administrative annexations of land from suburban counties, resulting in significant urban sprawl. At the regional level in the YRD cities, decentralization also weakened the coordination of land use plans between cities and contributed to the waste of land. Marketization had changed the relationship between state and market in the process of urban land development. The governments are now a singular stakeholder in urban growth; local states had evolved themselves as entrepreneurial/developmental states that follow the “rule of game” under the land market reforms in China. Under marketization, land conversion from agricultural uses to urban land found to be more profitable and land conveyance fee is undoubtedly an important source of public finance for local governments in the YRD today. Decentralization and marketization collectively provide substantial incentives for local governments to promote land development for both political and fiscal reasons. Cities in the YRD are also globalizing cities and local state actions respond to globalization and China’s open door policy (Wei 2012). The inflow of FDI accelerated the marketization process and stimulated cut-throat inter-city competition for foreign capital. Specifically, development zones at various levels, granted with more preferential policies in taxation, exports and land fees, are the hotspots of TNCs and play a key role in urban expansion in the YRD.

The urban growth in Nanjing can be seen as a typical scenario of how local Chinese governments promote economic growth through land development and spatial expansion. This process is collectively driven by local development policies and the triple-process of economic transformation—globalization, decentralization and marketization—in China. The temporal change of urban land use and expansion is heavily influenced by the reform policies initiated by the central government, while special locations for development are certainly influenced by local contexts and development conditions. Consequently, the assessment of urban development strategies and policies, as is demonstrated by the case of Nanjing, provides another important approach to understanding urban growth and expansion in China.

We found that although the spatial pattern of urban expansion in Nanjing was modest and relatively compact in the 1990s, the pace of urban growth had been quickly catching up with other major coastal cities such as Suzhou and Hangzhou since the early 2000s. Nanjing shares some common characteristics of urban development with other Chinese cities in developing large DZs and high-tech districts and promoting Hexi as a new city center. As Nanjing is the provincial capital of Jiangsu and located more interior in the Yangtze River Delta, urban development in Nanjing is more domestically driven than Suzhou, which is largely driven by external forces through the development of Singapore Industrial Park (SIP) and Suzhou New District. The case of Nanjing highlights the broad forces of globalization and economic transition in China while analyzing the diversity of urban growth pattern and mechanism in Chinese cities.

This paper had shown the rapid growth and changes taking place in Nanjing, which constantly shaped and reshaped the development and planning activities. China's urbanization policy which controlled the population growth of large cities was a defensive policy responding to the rapid growth of cities and the problems of shortage. It had considerable impact on the planning of Chinese cities in the early 1980s. However, as economic reforms deepen—especially decentralization and the dismantling of orthodox socialist institutions—the ability and willingness of the Chinese central government in controlling large city growth declined substantially. The implementation of controlling policy became less effective. On the other hand, reforms and globalization created a growth-oriented environment, and empowered localities and global investors in pursuit of growth. Local governments of China became less committed to controlling urban land expansion, and more actively promoting urban growth through numerous DZs and projects. Consequently, Chinese cities recorded dramatic population growth and land expansion.

Such rapid growth, however, created new problems for Chinese cities. Megaprojects are often poorly managed and unprofitable, making the city heavily in debt and forcing it to sell more land and initiating new projects, leading to the widely observed breaking-fix-mode of project development. The top down DZ and project fevers in Nanjing further centralized public resources for development. Nanjing lagged behind many cities in the Yangtze River Delta in developing private economies and small enterprises. Facing skyrocketing housing prices, wide spread traffic jams, complains over corruption and inequality, and social unrest, many large cities voiced the need for population control, and the limit of migrant workers. The rapid expansion of urban land use also raised concerns for land available for future development and sustainability challenges. Like other Chinese cities, urban planners and managers in China were largely forced to respond to reforms and globalization from above and outside, and plans, such as those for Nanjing, had to be revised constantly. Problems of coordination exists among different ministries, departments, bureaus, and their branches and between city level governments and district/township level governments. Urban managers are often poorly trained and less educated. Nanjing is at the cross road of institutional reforms to make the development process more equitable and sustainable.

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