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BEIJING: CHINA'S HAPHAZARD LUNGE INTO THE FUTURE

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ABSTRACT

Beginning in 1979, China left behind the old socialist model and put into place reforms towards a market-oriented economy. In the following three decades, China has experienced urban and economic growth at an unprecedented rate in the world to become one of the most powerful nations in the 21st century. China's transformation is especially apparent in Beijing, its capital. Residents of the city have seen firsthand dramatic changes to the city appearance and their way of life within the span of a few decades however, due to its emphasis on growth, Beijing has neglected to keep other issues in check. Currently, the city faces growing social and environmental concerns, such as the increasing income disparity, severe ecological deterioration and stagnating development of satellite towns. These conditions pose a serious threat to future development and growth. This paper provides a detailed analysis of the economic growth and urbanization of Beijing, as well as how they have contributed to its current concerns.

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Chapter 1

Introduction

Few cities can compare to Beijing, which has been at the heart of China's political, economic and social development since its establishment as the capital 800 years ago. One of the country's most modernized, prosperous and influential cities, Beijing serves as the nation's political, cultural and education center, home to the Chinese parliament and numerous government institutions, national museums and ancient temples, and the country's most prestigious universities. After Shanghai, it is the largest Chinese city by urban population with a total of 20,693,000 inhabitants in 2012 ("Beijing 2012 Official Economic and Social Development Statistics Bulletin").

The entire municipality covers an area of 6,336.14 mi², divided into 528.31 mi² of urban space and 5,807.83 mi² of rural space ("Beijing Survey"). As seen in the map displayed below, Beijing comprises sixteen subdivisions, which include fourteen urban and suburban districts and two rural counties. Due to their small sizes, the Chongwen district had officially merged with the Dongcheng district and the Xuanwu district with the Xicheng district in 2010. Dongcheng and Xicheng, shown in blue, are located in the center of urban Beijing and represent the historic core of the capital. Chaoyang, Haidian, Shijingshan and Fengtai, shown in green, function as the inner urban districts of Beijing. Tongzhou, Shunyi, Changping, Daxing, Mentougou and Fangshan, shown in yellow, cover the outer suburban area. Yanqing, Huairou, Miyun and Pinggu, shown in red, make up rural Beijing.

Fig. 1-1. Districts of Beijing. Source: www.asiaotaku.com.

Table 1-1. Population statistics of Beijing. Source: Beijing 2010 Census.

District/County	Population	Area (mi²)	Population density (per mi²)
Dongcheng District	961,200	16.15	59517.03
Xicheng District	1,243,300	19.58	63498.47
Chaoyang District	3,545,000	181.78	19501.60
Haidian District	3,281,000	166.32	19727.03
Fengtai District	2,112,000	118.10	17883.15
Shijingshan District	616,083	32.58	18909.85
Tongzhou District	1,184,000	349.91	3383.73
Shunyi District	953,000	398.78	2389.79
Changping District	1,830,000	518.73	3527.85
Daxing District	894,416	400.00	2236.04
Mentougou District	298,000	561.78	530.46

Fangshan District	967,000	779.54	1240.48
Pinggu District	416,000	415.06	1002.26
Huairou District	372,887	819.54	455.00
Miyun County	468,000	860.60	543.81
Yanqing County	317,000	764.48	414.66

The following chapters give a detailed analysis of the economic growth and urbanization of Beijing, as well as how they have contributed to its current concerns.

Chapter 2 describes Beijing's economic history, starting with the founding of the People's Republic of China in 1949 and ending with the end of the century. From 1949-1979, Beijing functioned as a production city under the socialist system, focusing on heavy industries. It was home to major government-run enterprises, and migration into the city was tightly controlled under the household registration system called the Hukou. Following China's rural reforms in 1979, the reorganization of the farming system created a surplus of rural laborers. Urban reforms gave state-owned enterprises autonomy to experiment with the market. Special economic zones were created to encourage foreign investment, and the Hukou system was relaxed, facilitating the mobility of people. In addition, the government commercialized the land market in the 1980s. Real estate became one of the most dynamic sectors of the economy, encouraging urban expansion and restructuring. These reforms served as crucial drivers of the market economy. Beijing's economic growth skyrocketed.

Chapter 3 details the transformation in Beijing's physical appearance and the urbanization of lifestyles. Millions of migrants were attracted to the opening of new job opportunities in the city, resulting in a major population boom. Real estate developers saw endless investment opportunities with Beijing's growing prosperity and incoming population. The 1990s was characterized by hundreds of major construction and infrastructure projects, led

by both government officials and private companies, which led to the rapid urbanization of Beijing's city landscape

Chapter 4 continues the theme of economic growth and urbanization during the 21st century. In 2001, Beijing won its bid to host the 2008 Olympic Games, which accelerated the economy and created another major building boom. Urban infrastructure continued to expand, new commercial and residential neighborhoods were constructed, and heavy investment was poured into developing the surrounding suburban area.

By 2013, China had the world's second largest economy, and Beijing was considered one of the most economically influential cities in the world. After decades of growth, Beijing succeeded in transforming itself into a modern, first-class, international metropolitan; however, the same forces that drove this growth have contributed to many new social, ecological and economic problems that pose a threat to future development for the city and the rest of the country. Chapter 5 provides a detailed analysis of several of these problems.

Due to massive and uncontrolled migration, the number of temporary residents in Beijing currently makes up over one third of the population. The majority of migrants is unable to find stable, secure, and well-paying jobs and is denied access to the benefits and welfare enjoyed by permanent residents. As a result, these migrant workers are a major contributor to urban poverty and further aggravate the income disparity that is evident in Beijing and throughout China.

In addition, an overemphasis on production and consumption, combined with the booming population, had led to serious environmental problems. Beijing is currently one of the most water-scarce cities in the world. Annual consumption has reached 3.6 billion cubic meters, far exceeding the 2.1 billion cubic meters of water available locally. Scientists estimate that at the current rate, China's water supply will run out in less than three decades. Air pollution has also raised massive health concerns. In 2013, the concentration of pollutants in the air has been

recorded to be over 20 times more than the amount considered safe, and the life expectancy for Beijing residents is estimated to be cut by five years.

Finally, the city has accelerated the development of satellite towns in the 1990s and 2000s in an attempt to develop fully functioning, economically independent, city subcenters. These city clusters are located outside Beijing in order to encourage movement outwards, as there are more people competing for work, transportation and social welfare than the policies can sustain. Unfortunately, local governments favored short-sighted profits over healthy, sustained development. Most satellite towns lack adequate commercial, educational and health facilities. They serve primarily as dormitory towns, while residents continue to commute to the urban district for work. Thus, planning for satellite towns has not eased the heavy density of people traveling in the city center.

Chapter 6 concludes that through a detailed analysis of Beijing's economic history, the city has long favored economic growth and urbanization despite the social and ecological costs that it incurred. Current concerns, however, call for an immediate shift in priorities. The final chapter argues that reducing urban poverty, protecting the environment, and balancing the development of new towns may require policies that slow down growth in GDP, but the long-term effects of these policies can lead to a more stable society and economy in the future.

Chapter 2

Towards Economic Growth

Starting in 1979, Beijing, as well as the rest of China, embarked on an ambitious campaign of economic, social and political reform. In a mere thirty years, China experienced a dramatic transformation of its city landscape, standard of living and status in the world. It modernized at an unprecedented rate to emerge as one of the most prosperous and powerful nations in the world. As China's capital, Beijing played an integral role in China's rebuilding, and today it has risen to become one of the world's fastest developing, economically influential and urbanized cities. The main drivers for Beijing's rapid growth and modernization can be understood through a thorough analysis of China's economic history.

Pre-1979 Period

The People's Republic of China was officially proclaimed by its first chairman, Mao Zedong in 1949. Mao envisioned a Soviet-style centrally controlled economy, in which the state, rather than private businesses, owned economic resources, determined prices and incomes, and made all decisions concerning consumption, production, distribution and investment. Within the first few years of his leadership, Mao carried out major reforms in rural land ownership, seizing property from landlords and redistributing it to poor peasants. Private farming became prohibited, and villages were organized into communes, in which land was owned and farmed collectively. By the end of 1957, approximately 88% of all rural households belonged to communes. Rapid industrialization and collectivization took place. The central government assumed control over

industrial enterprises, and by 1956, almost all private enterprises were eliminated to make way for state-owned enterprises (SOEs) (The Economy of China 12).

Beijing, functioning as the capital of China, received strong support from the central government and developed several supersized SOEs, such as the Shougang Group (Capital Iron and Steel Company) and the Yanshan Petrochemical Company (Gu 254). Many manufacturing plants were established, and by the late 1950s, Beijing had become an important economic center, supported by heavy industries (Yang et al. 493).

Farming communes of 1950s ***Steel factory of Shougang Group***

Fig. 2-1. Communist era China. Source: North Central College.

Similar to the communes in rural China, the residents of Beijing and other cities belonged to the Danwei system, which organized heavy industries, housing and basic residential facilities into localized units. The Hukou system, also known as the Household Registration System (HRS), monitored the population and required official approval for relocation into the city. Migration permissions were granted solely in the case when workers were hired by SOEs. As a result, the urban population was strictly controlled by industrialization and HRS (Gu 257).

Fig. 2-2. Beijing in 1950s. Source: Xinhua News Agency.

The communist system created by Mao proved to be disastrous for China, due to misguided agricultural and industrial policies that caused mass famines and severely limited industrial output. The government devoted the majority of its resources to investment in heavy industry and neglected to provide basic needs for households. Protected from bankruptcy, enterprises favored growth and investment over actual production, resulting in a shortage of supplies and inefficiency in the use of the labor force. In rural China, local authorities assigned quotas to farming communes, but as farmers were paid in proportion to the number of days worked rather than output produced, growth in agricultural output became stagnant. State trading companies struggled to increase the amount of grain procured from rural units for urban consumption (The Economy of China 12).

Mao also embarked on many ambitious campaigns to fulfill his communist ideals, which include the Great Leap Forward (1958-1961), the Anti-Rightist Movement (1957-1959) and the Cultural Revolution (1966-1976). These campaigns were intended to purge the country of capitalist revolutionaries and facilitate the country's transition to a communist society, but in actuality, they caused political and social instability in many regions and severely disrupted China's productivity. Critics of Mao claimed that his campaigns resulted in over 70 million deaths from famines and malnutrition (Chang and Halliday 3).

After his death in 1976, the new government pronounced the Cultural Revolution as "responsible for the most severe setback and the heaviest losses suffered by the Party, the state, and the people since the founding of the People's Republic" ("Resolution on Certain Questions in the History of our Party Since the Founding of the People's Republic of China"). The severity of these results, however, allowed China to begin once again with a clean slate on which future leaders could build a radically different economy.

1980-1990 First Reform Period

The end of Chairman Mao's reign marked a newfound determination for China to rise above its failures and make economic reform and modernization the top priority. The new leader Deng Xiaoping, the leader from 1978 to 1992, pledged to reduce government planning and direct control in order to lead the country towards a market economy. China practiced a policy that introduced reforms gradually. The government first introduced market forces into the rural economy. Once these measures stabilized and proved to be a success, authorities applied reforms to the urban area (Riskin 15).

Market reforms began in rural China with the establishment of Township and Village Enterprises (TVEs) starting in 1978. In comparison to the farming communes, TVEs had more independence and were profit-oriented. This system allowed farmers to retain returns on their produce after meeting quotas and granted them the ability to generate income. As a result, agricultural output began to soar rapidly by the late 1980s. By 1983-1984, the government had abolished most communes, and at its peak, agriculture accounted for as much as one-third of industrial output in China (Riskin 72). On the other hand, improved efficiency in the agriculture industry resulted in a surplus of rural laborers, creating concerns of unemployment.

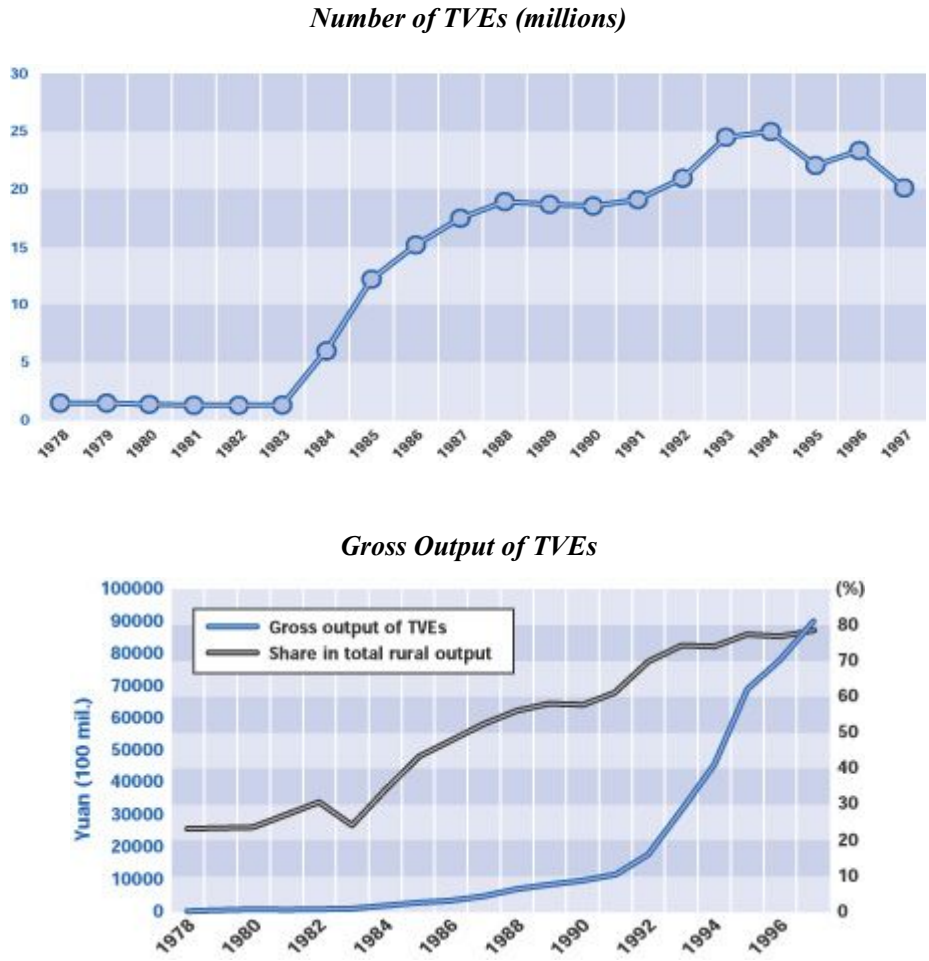


Fig. 2-3. Effects of rural reform. The graphs above show the increase in the number of TVEs and gross output after 1978. Source*:* China Statistical Yearbook, 1997, 1998. The Yearbook of Chinese Township and Village Enterprises, 1995, 1996 1997, 1998. China Economic Yearbook, 1997, 1998.

Following the overall success of TVEs, Deng implemented several institutional reforms in urban areas. They included the Contract Responsibility System in 1985, under which SOEs retained a portion of their profits after paying a fixed amount of income to the state (Naughton 33). During the same year, the government ended the flow of state grants, which SOEs and local governments had used to cover operational costs and investments, and authorized them to borrow directly from banks. In 1991, the government extended this policy to allow borrowing from households and other institutions (Lin, Fang and Zhou 24). Under this system, the central government continued to have ownership of SOEs and local state-owned banks (SOBs) and

authority over local governments, but it allowed these companies to appoint managers and directors, giving them freedom to experiment with the market. The managers made decisions concerning resource allocation, production, pricing, investment and expenditure (Naughton 47). Finally, wage reform gave urban laborers an incentive to improve performance, thus increasing output and productivity ("Wage Reforms in China during the 1990s" 52).

In addition to rural and urban reforms, Deng advocated an 'open door' policy in order to facilitate foreign trade and foreign direct investment (FDI). This policy led to the creation of Special Economic Zones (SEZs), which attracted foreign enterprises with favorable terms and relaxed government policies. Though the first SEZs appeared as early as 1979, these trading areas were not fully developed until the 1990s (Naughton 48).

One of the first SEZs to appear in China

Fig. 2-4. SEZ in Shenzhen, China. Source: www.sina.com.cn.

From the years 1976 to 1992, China experienced an economic revival and saw increases consumer spending, life expectancy, literacy rates, and total grain output. Real GDP increased an average of 9% per year during the 1980s. On the other hand, concerns associated with most modern nations, such as wealth disparity, environmental pollution, and unemployment due to the new economic system, were slowly emerging, a foreshadowing of China's current problems thirty years later.

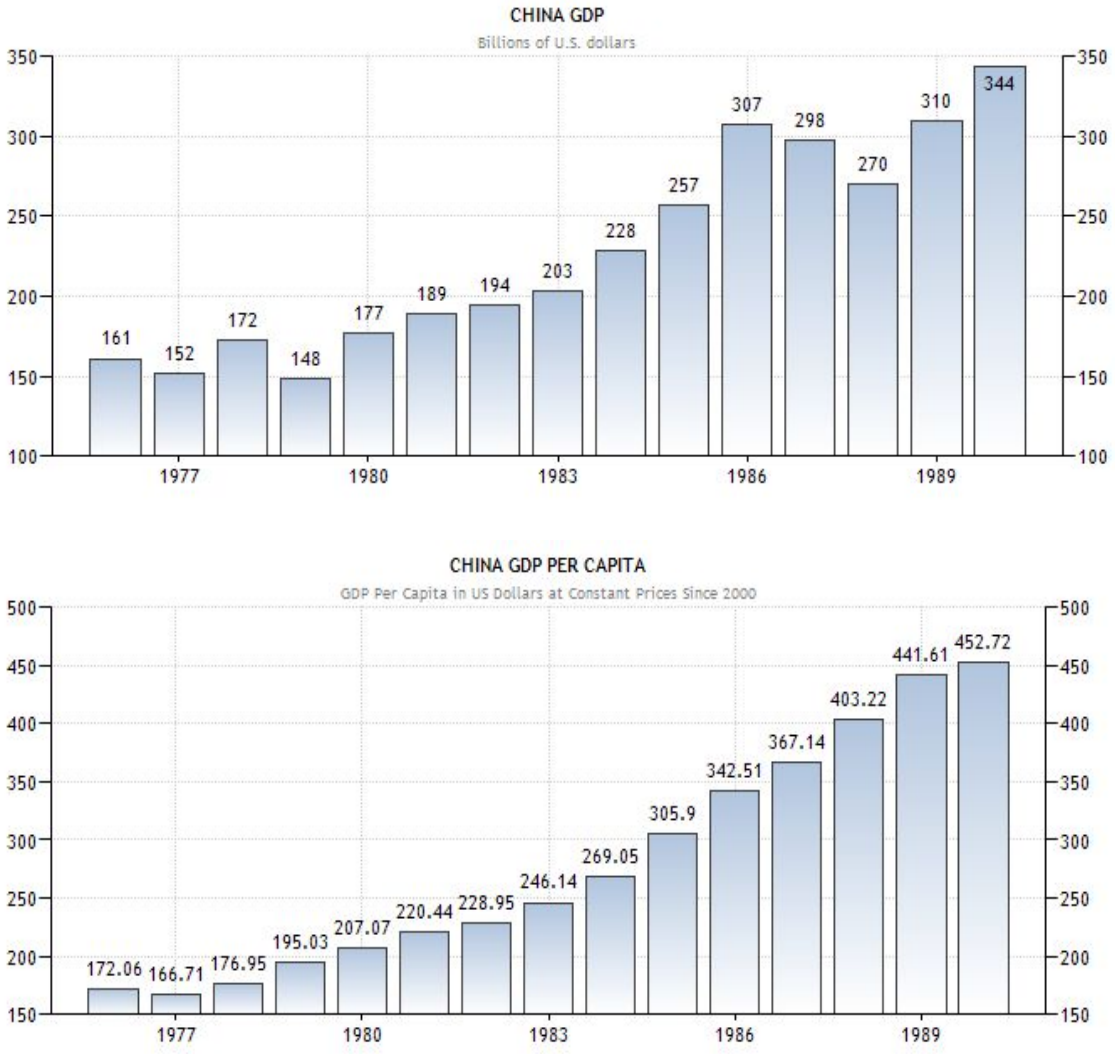


Fig. 2-5. Growth in GDP during the 1980s. Both the GDP and GDP per capita increased by 200% or more during the decade. Source*:* www.tradingeconomics.com.

1990-2000 Second Reform Period

China's economy continued to grow steadily in the 1990s under the guidance of new leaders, Jiang Zemin and then Zhu Rongji, who pushed for bolder reforms towards a market economy. Starting in 1993, more than 2,000 SEZs were introduced, which resulted in an influx of foreign capital and fueled China's economic expansion. These SEZs included Free Trade Zones and High Technology Development Zones, specially designed to obtain foreign investment for

technology as well as research and development. The number of projects that involved FDI increased quickly, from 12,978 in 1991 to 83,437 in 1993 (Y. Xu).

Through SEZs, China also strengthened its trade relations with foreign countries. From 1990-2000, Chinese manufactured exports experienced a growth of 16.9% per year (Lall and Albaladejo 1447). China began the decade with an export-to-GDP ratio of 15% but reached 30% by the year 2000. In addition, a large-scale privatization campaign took place. State enterprises, with the exception of several monopolies, were sold to private investors. The resulting reforms pushed the GDP to grow by an average of over 9.0% per year from 1992 to 2000 ("China GDP Annual Growth Rate").

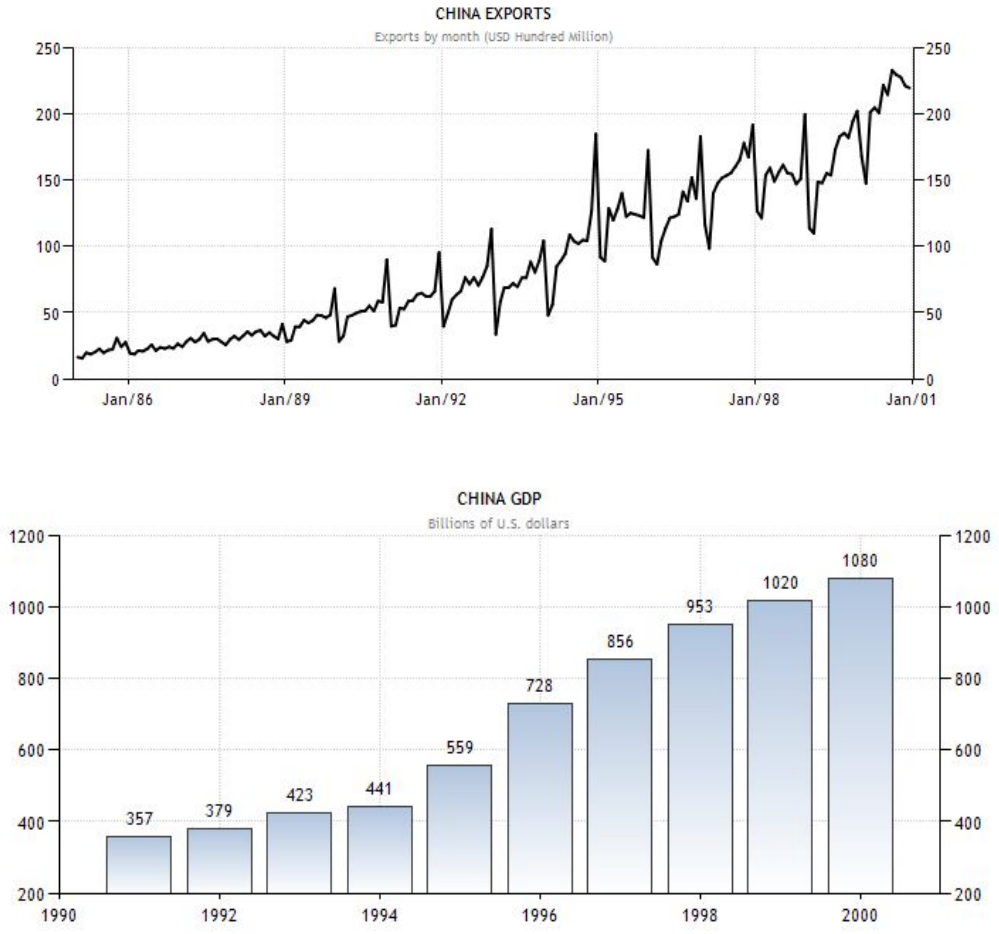


Fig. 2-6. Indicators of economic growth during 1990s. Both the amount of exports and the GDP increased during the decade. Source*:* www.tradingeconomics.com.

In order to adapt to the market economy, the Beijing government relaxed the housing registration system during the 1980s to allow migrating college graduates, technicians and the surplus of rural laborers into the city (Yang et al. 493). The population expanded rapidly, creating the need for constant construction of new housing space and other relevant infrastructures (Ma et al. 87).

Table 2-1. Population growth of Beijing (1980-2000). Beijing had an increase of approximately 4 million new residents by 2000, and the percentage of urban residents rose to 77.54%. Source: Beijing Municipal Public Security Bureau.

Year	Beijing Population	Urban Residents Percentage (%)	Rural Residents Percentage (%)
1980	9,043,000	57.61	42.39
1985	9,810,000	59.73	40.27
1990	10,860,000	73.48	26.52
1995	12,511,000	75.63	24.37
1996	12,594,000	75.45	24.55
1997	12,400,000	76.48	23.52
1998	12,456,000	76.89	23.11
1999	12,572,000	77.30	22.70
2000	13,636,000	77.54	22.46

Previously, the Beijing government controlled all land in its jurisdiction, but beginning in the 1980s, it began to commercialize the land market (Yang et al. 493). The land was redistributed among local governments, who generated revenue by selling much of the land to private investors and contractors. By the mid-1990s, real estate became one of the most the vibrant sectors of the economy. In addition, the influx of foreign capital and technology during the 1990s created an economic boom concentrated in Beijing, allowing it to grow at faster speeds than other cities ("Beijing Economy"). The GDP for Beijing surged from US$15.5 billion in 1993 to US$34.45 billion in 2001 (State Statistics Bureau). The annual per capita disposable

income for urban residents rose from US$407.70 in 1993 to US$1330.80 in 2001 (Huang and Shi).

Table 2-2. Beijing GDP statistics (1980-2000). Source: Beijing Municipal Statistics Bureau

Year	Beijing GDP (US$ billion)	Beijing GDP Per Capita (US$)	Annual Disposable Income for Urban Residents (US$)
1986	8.25	821	122.70
1990	10.47	969	205.41
1995	18.05	1,520	716.67
1996	21.52	1,714	842.76
1997	25.04	2,003	898.06
1998	28.70	2,309	973.79
1999	32.35	2,585	1055.49
2000	38.18	2,914	1189.62

The city's increasing population, rising incomes, inflow of FDI, and the establishment of the property market were the main drivers for its unprecedented urbanization and development during the 1990s. Beijing, which served as the center of education, culture, research, commerce and government, provided stakeholders with endless investment opportunities and construction proposals. With its newfound economic prosperity, the Beijing government poured billions of dollars on its own development projects, which provided the increasing number of residents with an improving standard of living and demonstrated to the world its status as a strong and modern megacity (Ma et al. 2). Thus, starting in the 1990s, the city fundamentally changed its physical structure and for its residents, their way of life.

Chapter 3

Beginnings of Urbanization in Beijing

The rapid urbanization of Beijing began in the late 1980s and took off in the 1990s. Residents of Beijing claimed, "You may hardly recognize the changing city if you stay home for several weeks" ("Beijing Speeding up Urbanization"). In fact, a total of US$3.65 billion was invested into over 70 major construction projects during this period, as the city saw the emergence of new skyscrapers, towns, highways and commercial districts.

Development and Expansion of the Spatial Structure of Beijing

The urban district of Beijing has a circular structure, with the oldest parts of the city located in the center core. Although Beijing entered into a state of constant renovation and rebuilding, the government kept the same city center and expanded the surrounding area concentrically to develop new urban and suburban districts (FlorCruz). In fact, in ten years the urban area expanded by 20% covering 152.66 mi^2 in 1990 to 189.23 mi^2 in 2000.

At the heart of Beijing is its historic core, covering 23.94 mi^2. It has served the capital city for over 800 years and includes ancient structures such as the Forbidden City and Imperial City. After the market reforms were set in place in the 1980s, the immediate surrounding area of 115.83 mi^2 developed rapidly to include modern business and commercial districts, as well as new residential neighborhoods (Huang).

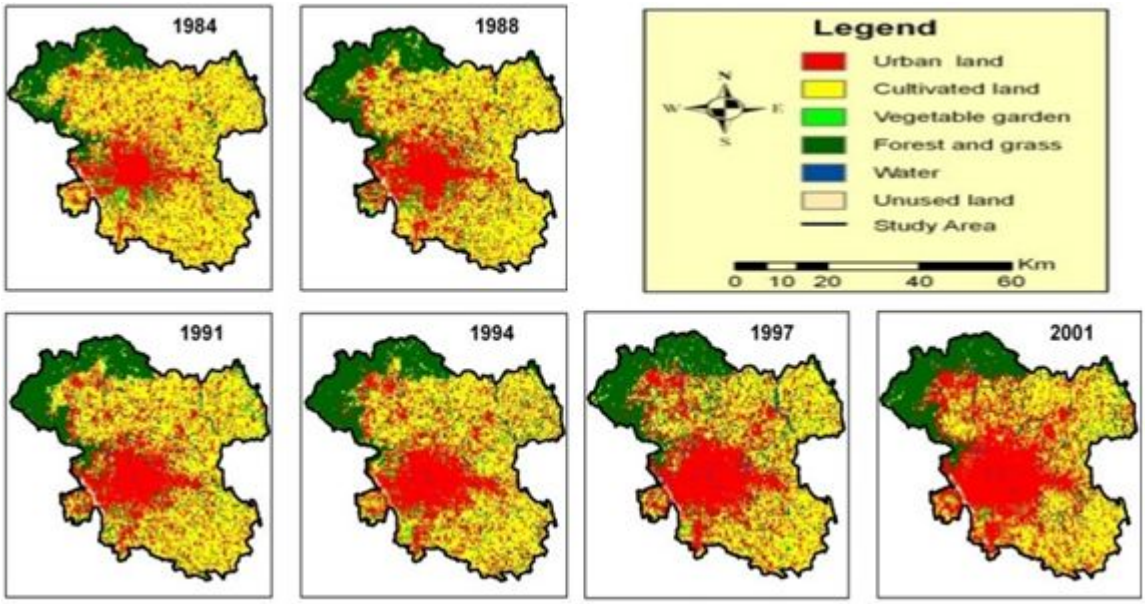


Figure 3-1. Urban land use in Beijing. The expanding red space reveals an increase in urban construction. Source: Landsat TM.

Aerial view of the Forbidden City ***Xidan Shopping District***

Fig. 3-2 Forbidden City and immediate surrounding area. The two areas demonstrate the contrast between ancient and modern neighborhoods. Source: www.zmescience.com, www.womenofchina.com.cn.

The government thus began construction of the 2nd Ring Road in 1987, its first and innermost ringed highway. The 2nd Ring Road formed a rectangular loop around the traditional urban core and connected the developing neighborhoods of the central area together. Construction finished in 1992. The outer edge of the central area was also expanding at that time,

and the number of inhabitants in that region was increasing. Thus, the 3rd Ring Road was completed in 1994 in order to link the inner urban districts together (Yang et al. 495).

Fig. 3-3. Beijing road system. The 2nd Ring Road travels through the Xicheng and Dongcheng districts, while the 3rd Ring Road crosses the Haidian, Chaoyang, Fengtai and Shijingshan districts. Source: Cities. Volume 31: 497.

Development of Urban Infrastructure

Rising incomes contributed to annual increases in car ownership from 15 to 20% during the 1990s, speeding up the construction of new highways and motorways (Huang). By 2000, the government completed a total of 125 bridges, including 103 overpasses and cloverleaves. The number of public transit routes increased by 63%, and the total length soared from 24,680.24 miles to 46,446.88 miles ("Beijing Speeding up Urbanization"). The municipal government also extended Beijing's subway lines. The capital had opened its subway system in 1965 with the introduction of Metro Line 1, which traveled through the middle of Beijing along Chang'an Street for 13.05 miles. Metro Line 2, which almost under-lapped the 2nd Ring Road, started operation in 1984. Planning for an extension of Line 1 to include the western and eastern ends of the Shijingshan and Chaoyang districts began in 1991, and the full length of the line officially opened in 2000 ("1991-2000 Subway Records").

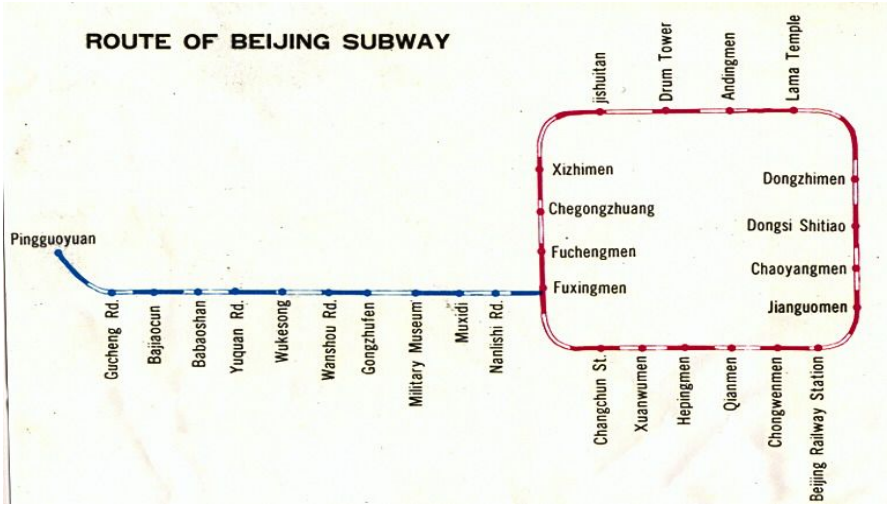


Fig. 3-4. 1995 map of Beijing subway. It served only the city core area. Source: Reed College

First Building Boom

Beijing embarked on its first building boom, which lasted for ten years, after the completion of the China World Trade Center Tower I in 1989. The skyscraper, which towers at 509 feet, today makes up the largest building complex in Beijing and contains 5 star hotels, shopping malls, offices, luxury apartments and conference halls ("China World Trade Center Tower 1"). Additional skyscrapers populated the city's landscape during the 1990s, the majority of which were concentrated in Chaoyang district. The Jing Guang Center, completed in 1990, stood as the tallest building in Beijing until 2006 ("Jing Guang Center"). Other notable skyscrapers include Capital Mansion completed in 1990, the Beijing World Financial Center in 1998, and the China World Trade Center Tower II, built as an addition to the first tower, in 1999. Many of the skyscrapers, which received funding through foreign loans, provided luxury condominiums for Beijing's wealthiest residents and served as business hubs for both domestic and foreign private companies. These skyscrapers reflected Beijing's rapid transition to a modern capital and its drive for new urban construction.

China World Trade Center Tower I ***Jing Guang Center***

Fig. 3-5. Major skyscrapers. Source: www.chinavalue.net, www.tradershotelbeijing.com.

Urbanization through SEZs

SEZs formed in Beijing during this time period and acted as crucial drivers in Beijing's modernization (J. Wang 684). SEZs functioned as distinct geographical areas in the city that specialized in specific industries and offered special tax policies and financial incentives to encourage growth (Yang et al. 497). The first of these SEZs was the Zhongguancun Science Park (ZSP) in the Haidian District, officially recognized by the central government under the name "Beijing High-Technology Industry Development Experimental Zone." ZSP gained the reputation as China's Silicon Valley, known for its IT retailing and manufacturing, research and development on electronics and software, and diversification towards different types of information and communication products (Song, Zhao, and Wang).

ZSP facilitated the growth and development of new Chinese companies, such as the Lenovo Group and Founder Group. Major international technology companies stationed their Chinese headquarters in this zone in the 1990s, including IBM, Hewlett-Packard, Dell, Microsoft, Lucent, Motorola, Intel, General Motors, Panasonic, and SUN (Yang et al. 499). The area managed an above 30% growth rate each year (Song, Zhao, and Wang). As a result, ZSP quickly urbanized as modern company buildings sprang up. In addition, the new source of economic

activity led to the development of modern shopping complexes and residential neighborhoods for the incoming population in the surrounding area.

Fig. 3-6. Zhongguancun Science Park. Source: Photograph by Elvis Lynagh

Satellite Towns

During Mao's era, Beijing had planned approximately 40 industrial towns, each dedicated to a specific sector of the economy, around the city (Song, Zhao, and Wang). These areas benefited from generous investments dedicated towards building and strengthening their specific industries, but urban development was limited as little money remained to provide housing and facilities for the laborers working on the industrial projects (Yeh and Yuan 195). Moreover, urban construction in China came to a complete halt starting in 1966 due to the Cultural Revolution (Chen 2).

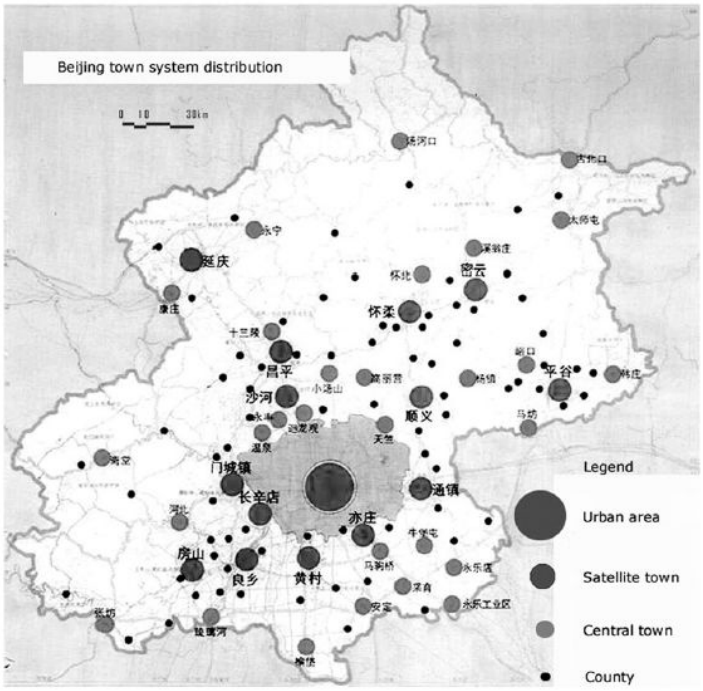


Fig. 3-7. Distribution of satellite towns defined in 1950s. Source: Beijing Municipal Bureau of Urban Planning.

Under the new leadership, the State Council of Beijing approved a comprehensive plan in 1982 that cancelled the previous industrial projects and instead merged them to form 14 satellite towns outside the urban districts of Beijing. During the 1980s, the municipal government embarked on major housing projects in these new towns to ease the huge population pressure in the center city and encourage Beijing's increasing population to settle outside the urban area.

The new master plan of 1993 further elaborated on the idea of satellite towns. The State Council proposed that in addition to providing housing, the satellite towns should acquire functions of the urban center in order to stand as cities independent of Beijing. In this way, these new towns could become well-equipped and self-sufficient, each with their own political, economic and cultural centers. Due to the reforms in the housing and land market during the late 1980s, the number of construction projects in these areas skyrocketed. The government allowed the practice of market rents and home mortgages, as well as the creation of construction companies and real estate enterprises (Zhou 27). Land reform in 1987 acted as a major force in

Beijing's spatial transformation. Prior to this policy, the government owned and allocated land to users free of charge, but afterwards, it sold land to contractors and investors for commercial use as a new source of revenue (Wu and Yeh 1869).

The housing market took off rapidly. Housing units built by the government decreased, while the units built by real estate companies shot up (Chen 3). The land price in urban downtown soared dramatically, while the land price of suburbs remained low and attracted property developers (Wu 12). In need of affordable housing options, Beijing's residents chose to settle in cheaper residential neighborhoods in the suburbs, while the construction of mass transit routes and higher car ownership rates made commuting long distances between suburban and urban Beijing possible (Chen 4). Thus, the areas outside Beijing's urban border, which were once mostly rural, were quickly transforming into developed towns as residential buildings filled the land. By the year 2000, the fourteen satellite towns spanned over 77.22 mi^2 and boasted a total population of 1.3 million (Song, Zhao, and Wang).

Fig. 3-8. New construction in Tongzhou, a major satellite town. Source: politics.people.com.cn, news.qq.com

The tables and maps below illustrate the changes in population during two time periods: 1982-1990 and 1990-2000. Although the inner urban districts have the greatest increase in population, the data also reveal a significant amount of the population migrating to the suburbs

for both time periods. The population shift towards this region is evidence of the growth development of satellite towns.

Table 3-1. Population changes in Beijing, 1982 to 1990 and 1990 to 2000. Source: Beijing's Census Office 1982, 1990, 2000

Time Period	Population Changes	City Region Total	Core	Inner Urban Districts	Outer Suburbs	Rural Area
1982-1990	Number Change	158,900	-8,200	114,900	37,900	14,200
	Percent Change (%)	17.21	-3.38	40.46	13.69	11.82
	Annual Percent Change (%)	2.00	-0.43	4.34	1.62	1.41
1990-2000	Number Change	275,000	-22,200	532,000	53,200	4,000
	Percent Change (%)	25.42	-9.50	16.93	16.93	2.94
	Annual Percent Change (%)	2.29	-0.99	1.58	1.58	0.29

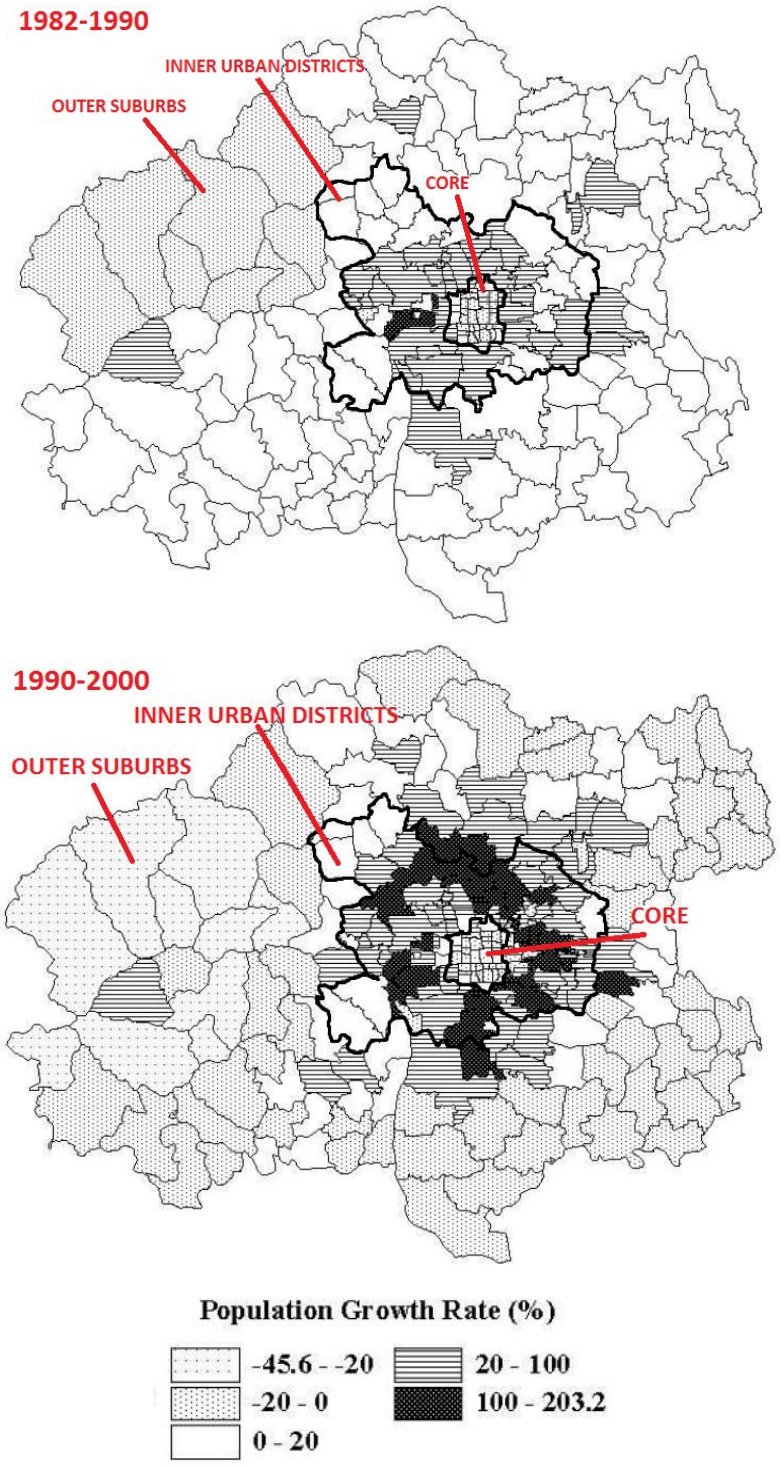


Figure 3-9. Spatial distribution of population growth rates. Note: The maps above do not include rural areas. Source: Beijing's Census Office.

Chapter 4

Modernization Drive of 21st Century Beijing

The rapid modernization in the 1990s laid the foundation for the next decade, characterized by a fierce determination to assert China's importance and status in the global community (Lu). As other countries watched in awe, China grew with increasing momentum to transform itself into one of the world's most advanced and powerful nations, anticipated to become the world's leading economy by 2025 (Hawksworth 13). As the country prospered and modernized, Beijing evolved into a vibrant and dynamic metropolis, a leader in fields such as technology, education, research, modern manufacturing and finance, while showcasing its historical and cultural richness (Yang et al. 500).

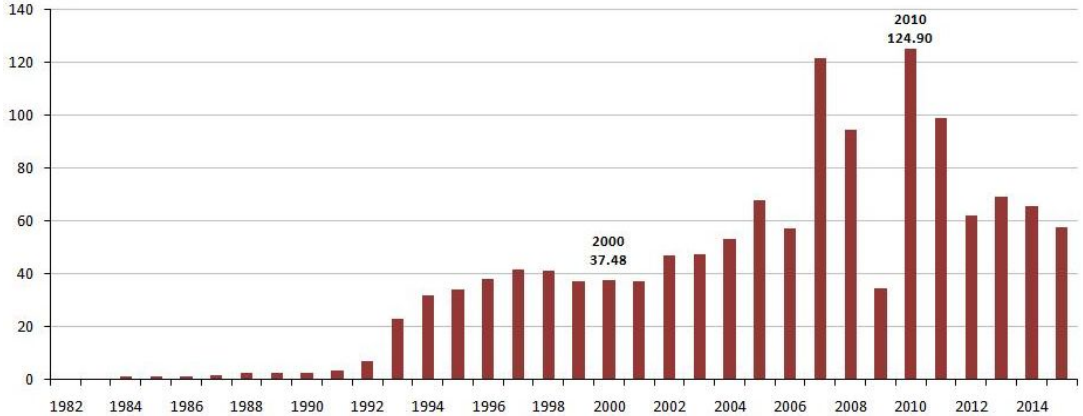
Economic Growth in 2000s

The new reforms of the 2000s emphasized growth through globalization, exports and privatization. The decade marked China's increasing integration with the rest of the world after its admittance to the World Trade Organization (WTO) in 2001. The following year the country became the world's largest recipient of FDI, with the inflow of investment reaching a total of US$400 billion (Guthrie 291). Within ten years, the total value of imports and exports grew to over US$2,561.6 billion (Dong 2805). Along with foreign trade, enterprises privatized in the last decade continued to exhibit growth. The domestic private sector exceeded 50% of the GDP for the first time in 2005 and continued to expand the following years (Schoenleber). From 2001 to 2010, GDP growth averaged at a remarkable 10.5% each year despite the global recession (Bloomberg). China's economic growth rate between 2007 and 2011 equaled that of all the G7 countries combined. By 2007, China replaced Germany as the world's third largest economy.

Three years later, China surpassed Japan to become the world's second largest economy, with a nominal GDP of US$5.8 trillion ("China").

China GDP growth (US$ billion)

China exports by month (US$ hundred million)



China Net Foreign Direct Investment (US$ Billion)

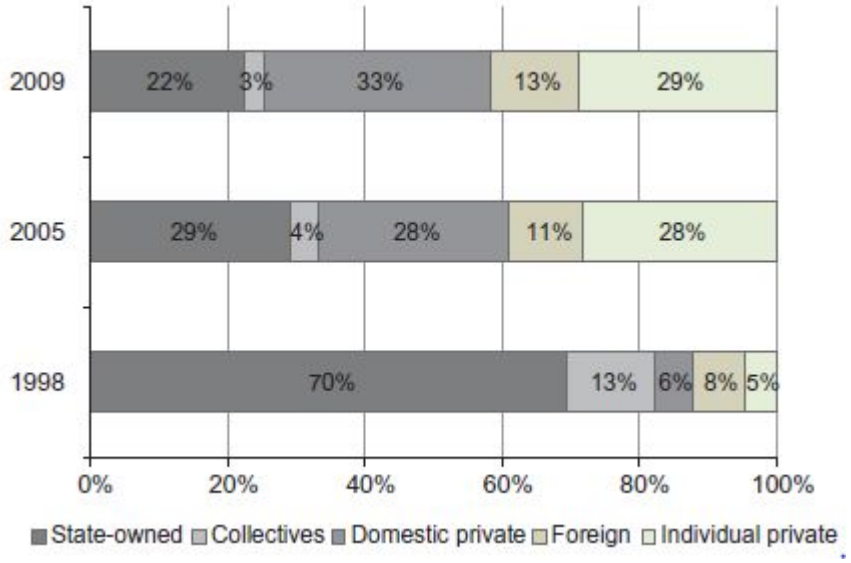


Fig 4-1. Indicators of economic growth. Source: www.tradingeconomics, IMF

Beijing progressed far faster than other Chinese cities. It consistently demonstrated GDP growth greater than 10% since the beginning of the decade and crossed the GDP per capita target of US$6000 in 2006, two years ahead of schedule. This figure was much higher than the national average, which hovered around US$1740 at that time ("Beijing realized the target of US$6000 per capita GDP two years earlier").

Impact of Olympics

Much of Beijing's economic growth in the 21st century was fueled by preparations for the Olympics Games. Planning for this event accelerated the city's modernization drive as well as vitalized many of its industries. The city embarked on a ferocious building boom shortly after winning its bid in 2001 to host the 2008 Olympics. City officials implemented an extensive investment and construction program to build the needed facilities. With China's reputation at stake, the city's appearance was modernized in order to showcase Beijing as a first-class, international metropolis.

Shortly after Beijing received approval to host the event, Tang Long outlined on behalf of the Beijing Municipal Government, the government's plan to inject an estimated US$22 billion in multiple construction projects, which included developing urban infrastructure, extending the transportation network, building sports facilities and venues and renovating more than 96 million ft² of old neighborhoods ("Olympic Games to Accelerate Beijing's Modernization Drive"). In actuality, a budget of approximately US$41 billion went towards the capital's renovation ("Beijing's property outlook to remain positive after the Games"). The billions of dollars invested in construction and related activities generated a combined GDP of US$13.6 billion for Beijing from 2004 to 2008 (Bi). In addition, economic activities related to the Olympic Games boosted China's GDP by an estimated 0.3% (Zhao).

Transportation

Beijing invested US$11.25 billion of the total Olympics budget into constructing subways, light rails, expressways and airports (Dong 2803). The government allocated US$7.69 billion to the subway system alone, and a total of 8 new subway lines opened by 2008 ("1991-2000 Subway Records"). The entire network more than doubled in capacity and length, with an addition of 80 stations to the previously existing 64 stations. The majority of the new lines provided quick access to newly built, high density residential areas in the city suburbs. In addition, a new airport line offered direct access from the inner city to the Beijing Airport. By 2008, the total length of Beijing's metro system reached 136.70 miles (Yang 495).

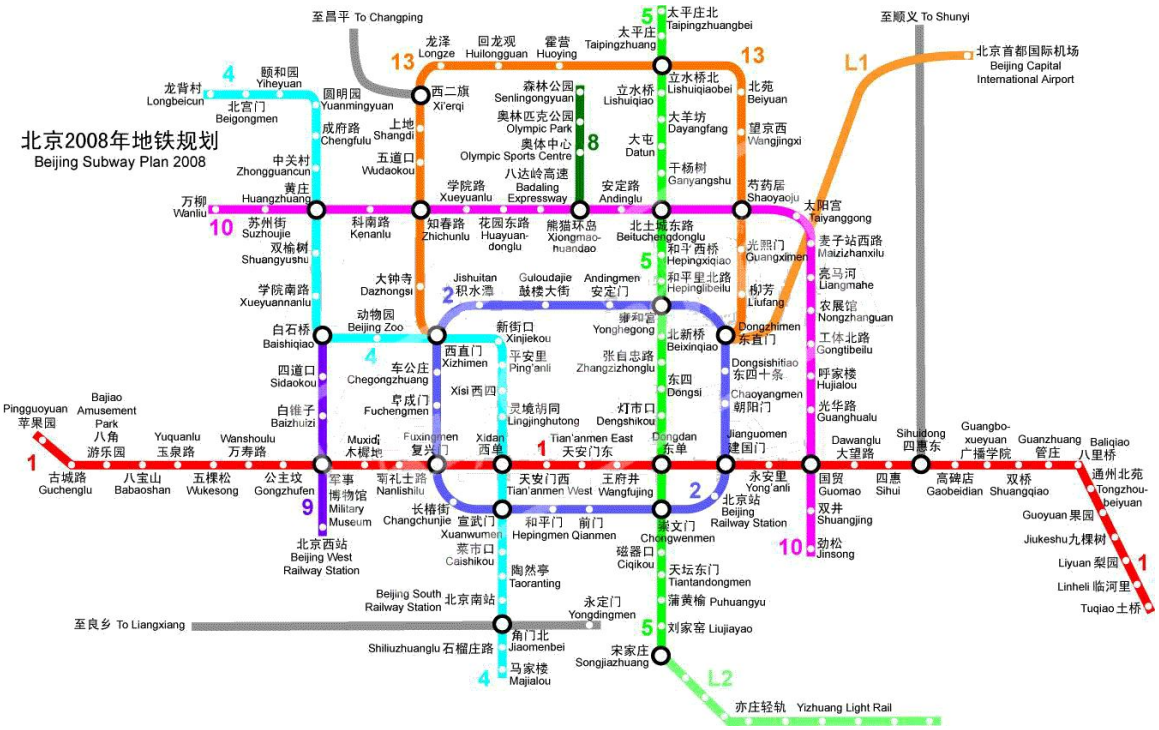


Fig. 4-2. Beijing subway plan 2008. Twelve new lines opened since 1995. Source: www.beijinghotelchina.com.

The municipal government also expanded Beijing's extensive network of roads, completing a total of 12,895.9 miles of expressways and resident area roads by the end of 2007 ("Beijing Transport"). The 4th Ring Road, which finished construction in 2001, traversed through the Zhongguancun technology hub and western Beijing, and served as the border of the inner urban districts. The 5th Ring Road opened in 2003 and linked key subcenters in the outer suburban areas. The 6th Ring Road opened the following year to link the main central towns of Shunyi, Tongzhou, Changping and Daxing ("Roads"). In addition, over five major expressways appeared in Beijing's road system, including the Badaling, Jingcheng, Jingtong, Jingha and Jingshi Expressways ("Expressways").

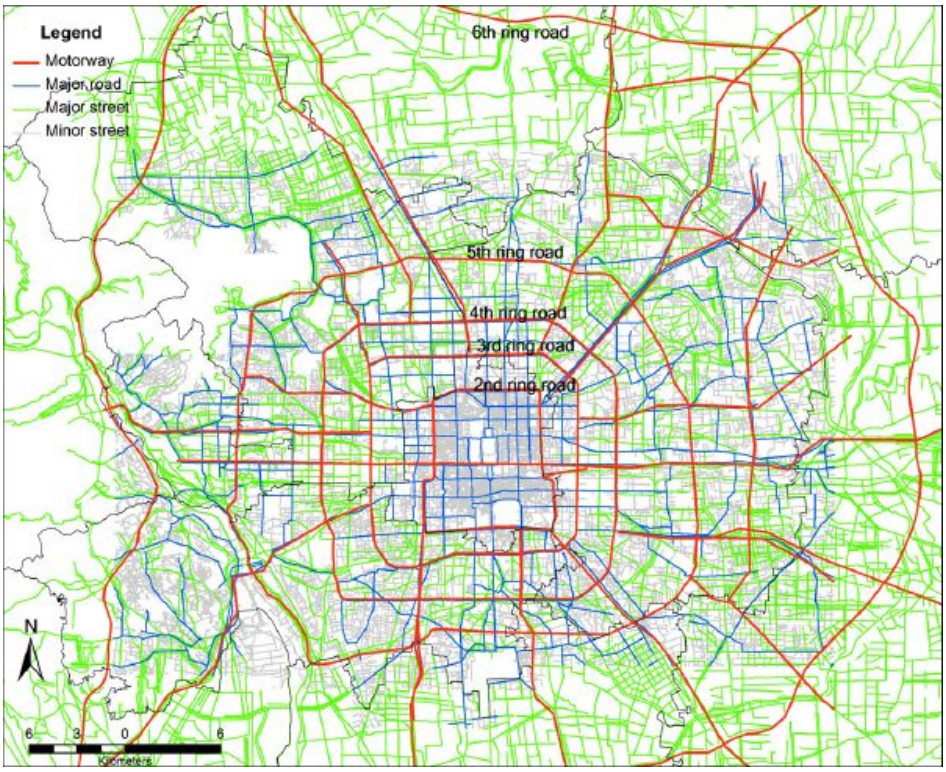


Fig. 4-3. Beijing road network. Source: Beijing Master Plan 2004-2020.

To accommodate the massive traffic volume expected for the Olympic Games, the municipal government embarked on an enormous expansion plan for the Beijing Capital International Airport. Construction of Terminal 3, an addition to the existing two terminals, commenced in March 2004 with a proposed budget of US$3.5 billion and welcomed the first incoming planes in February 2008. At the time of Terminal 3's completion, the Beijing airport stood as the largest man-made structure in the world in terms of area covered. In fact, Terminal 3 was bigger in size than all five terminals combined of the London Heathrow Airport ("Beijing terminal breaks size barrier"). The new, record-breaking airport presented the image of a changed China, a sharp contrast to the shabby and outdated Chinese airports of less than two decades ago.

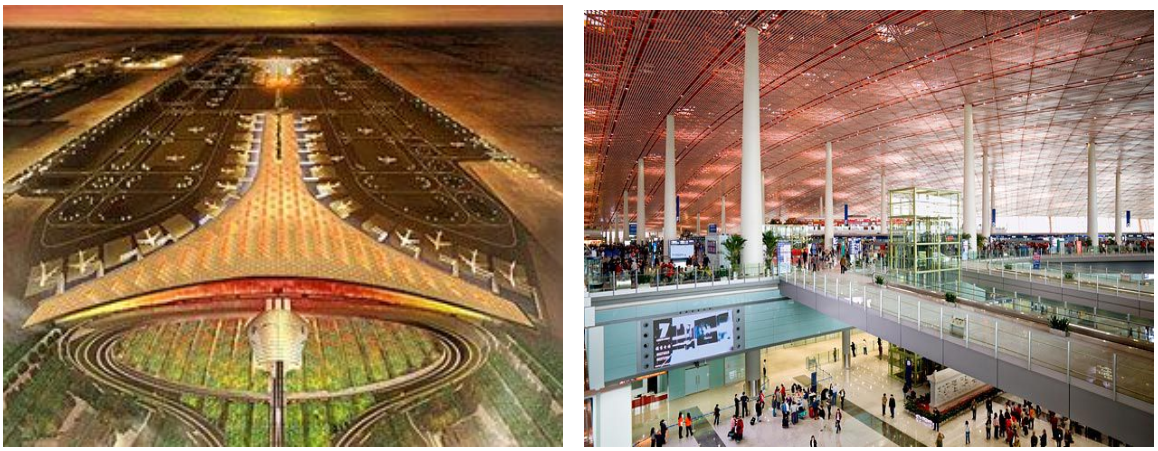


Fig. 4-4. Terminal 3. Source: www.sina.com.cn.

Stadium Building

The Beijing government also faced the daunting task of building the necessary sport facilities and venues within seven years. A direct investment of US$2.72 billion was devoted towards projects for 36 stadiums, 66 training venues and additional specialized facilities. Several stadiums began building as early as December 2003, but all 31 Beijing-based venues were in the process of construction by May 2007 ("All Beijing-based Olympic venues under construction").

The Beijing National Aquatics Center, commonly referred to as the Water Cube, is one of the largest and most famous structures built for the Games. The stadium boasts an area of 856,075 ft² for hosting the swimming competitions ("National Aquatics Center delivered for use"). Other important structures include the Beijing National Indoor Stadium, nicknamed the Fan for its resemblance to a Chinese folding fan. It served as the venue for gymnastics events ("Fan unfolds"). The Olympic Green Convention Center hosted various fencing competitions. It also served as the international broadcast center for the Olympics, the hub for broadcasters from around the world ("The Fencing Hall: Olympic and Paralympic competition venue").

Finally, the Beijing National Stadium, popularly known as the Bird's Nest due to its curved circular shape, was the last major venue to be completed, officially unveiling in June 2008. The

91,000 seat stadium cost a total of US$488 million and became symbolic to the games, hosting the opening and closing ceremonies (Liu).

National Indoor Stadium

National Aquatics Center

National Stadium

Olympic Green Convention Center

Fig. 4-5. New Olympic venues. Source: baike.baidu.com.

Renovation of Old Space

Although the Olympics accelerated the building boom of the 2000s, it also sped up the demolition of Beijing's old areas, in accordance with the municipal's plan to renovate over 96 million ft² of outdated neighborhoods. Many of Beijing's former commercial and residential districts were destroyed and replaced by new roads, towers and buildings, sparking the protest of preservationists who criticized the government for recklessly destroying testimonies of Beijing's history and culture ("Our Mission Statement").

Much of the concern centered on hutongs, Beijing's traditional neighborhoods. Hutongs consist of low-rise stone courtyard homes, where two or three generations often shared a single house, linked together by narrow lanes and alleyways. These neighborhoods formed a vibrant community, where tiny shops and food stands lined the streets and residents shared in daily life. The first demolitions began in the 1960s to make way for Soviet-style apartments that could house more people. Another wave of demolition began after China's land reforms in the 1990s, when stakeholders in the real estate market sought profit through redevelopment; however, this movement did not come into full force until the 2000s after Beijing won its bid for the Olympics. In its drive to transform Beijing as a first-class, modern metropolis, the capital's old and poor neighborhoods began to vanish rapidly from the city landscape in exchange for shopping malls, huge streets and skyscrapers (Ouroussoff).

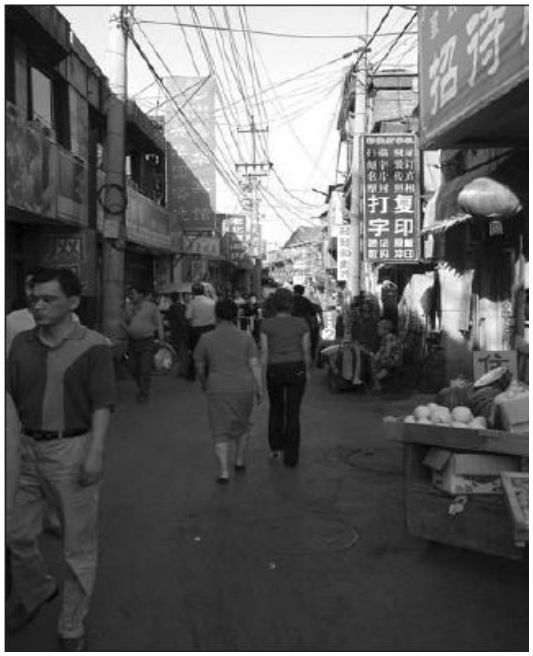
Fig. 4-6. Remaining and demolished hutong neighborhoods. Source: New York Times, www.travel-planet.com.

The city recorded a total of 3,200 hutongs in 1944, but by the 21st century, an estimated one third of Beijing's hutongs has completely disappeared while another one third has lost their original appearance after dramatic renovations (Watt). According to Chinese historian Zhang Wei, around 1,300 hutongs existed in Beijing at the start of year 2000, but that number has more than halved since then (Jin). A study done by the Architecture Department of Tsinghua University estimated that Beijing's hutongs have disappeared at a rate of 600 lanes per year from 2000 to 2004 (Tibet Heritage Fund International 20). Beijing's urban makeover has not come without great cost to its population. Many of the hutongs' residents lose their old homes and are forced to relocate to the suburban areas. An estimated 580,000 people have been displaced due to the clearing out of old neighborhoods (Gallagher).

While the oldest hutongs have been cleared out, other hutongs have undergone heritage conservation projects, which preservationists criticized for turning historic areas into tourist attractions. One such project involved Qianmen Street, a collection of hutongs which have existed for over six centuries and one of the last remnants of ancient Beijing (Chung). In order to attract visitors during the Beijing Olympics, the government poured over US$1.6 billion to repair and rebuild the old neighborhood, citing reasons such as the outdated facilities that did not meet modern needs and the deteriorating conditions of ancient buildings and relics (Blanc).

Starting in 2005 and ending in 2008, construction workers demolished houses in the area's overcrowded streets to make way for a shopping and leisure complex (Chung). Several of the main hutongs were repaired and protected to preserve their original appearance. The government claimed that the work succeeded in retaining most of the historic look while greatly modernizing the urban infrastructure, opening the way for international brands such as Zara, Nike and Starbucks to set up shops on the main street (X. Xu). Critics on the other hand denounced the project for erasing the past and putting an inauthentic version in its place, complete with fake glazed roof tiles and artificial hanging lanterns. He Shuzhang, the founder of the Beijing's Center

for the Protection of Cultural Heritage, labeled the reconstruction of Qianmen gate as an "ignorant, stupid and greedy practice … Ignorant because they do not know the meaning of cultural heritage; stupid because they do not understand the old city's crucial role for society, and greedy because corruption permeates every step of the reconstruction" (Blanc).



Former appearance ***Renovated appearance***

Newly completed buildings on Qianmen Street

Fig. 4-7. Qianmen Street. Source: www.theguardian.com, www.chinadaily.com.cn.

In response to criticism from conservation groups, officials from the Beijing Municipal office admitted that the hutong neighborhoods have disappeared at a rapid speed but asserted that this step was necessary in order to update the city's appearance, create space for skyscrapers and implement modern facilities ("Will Beijing's Hutongs Vanish?"). The extravagant architecture in Oriental Plaza, Financial Street and Jiaodaokou represent three highly urbanized sites where ancient hutongs once stood (Tibet Heritage Fund International 20).

Fig. 4-8. Beijing Financial Street. Source: baike.baidu.com.

Urbanization of the City

In addition to the transformations brought by the Games, hundreds of building projects sprang up throughout Beijing's inner and outer districts. The building boom in Beijing, as well as the rest of China, boosted the gross production value of the construction industry from US$71.812 million in 2001 to an impressive US$209.9 billion in 2008 (Dong 2804). A market analysis conducted by real estate firm Jones Lang Lasalle declared that "Beijing today is almost unrecognizable when compared to the city only a few years ago," ("Beijing Olympics Accelerates City Development").

Jones Lang Lasalle continued by writing that Beijing's many construction projects were an effect of the Olympics, stating that "the government, in their effort to improve Beijing's development landscape, facilitated the completion of a large amount of new, high quality space in key commercial areas through investment and construction approvals" ("Beijing Olympics Accelerates City Development"). In other words, the billions of investment dollars poured into expanding the city's urban infrastructure facilitated the creation of new commercial areas and suburban residential hubs ("Beijing's property outlook to remain positive after the Games").

Table 4-1. Proportion of urban land. Source: Geoscience and Remote Sensing Symposium. Volume 4: 697.

Year	**1997**	**2001**	**2004**	**2007**
Urban Land	33.50%	38.73%	43.75%	50.88%

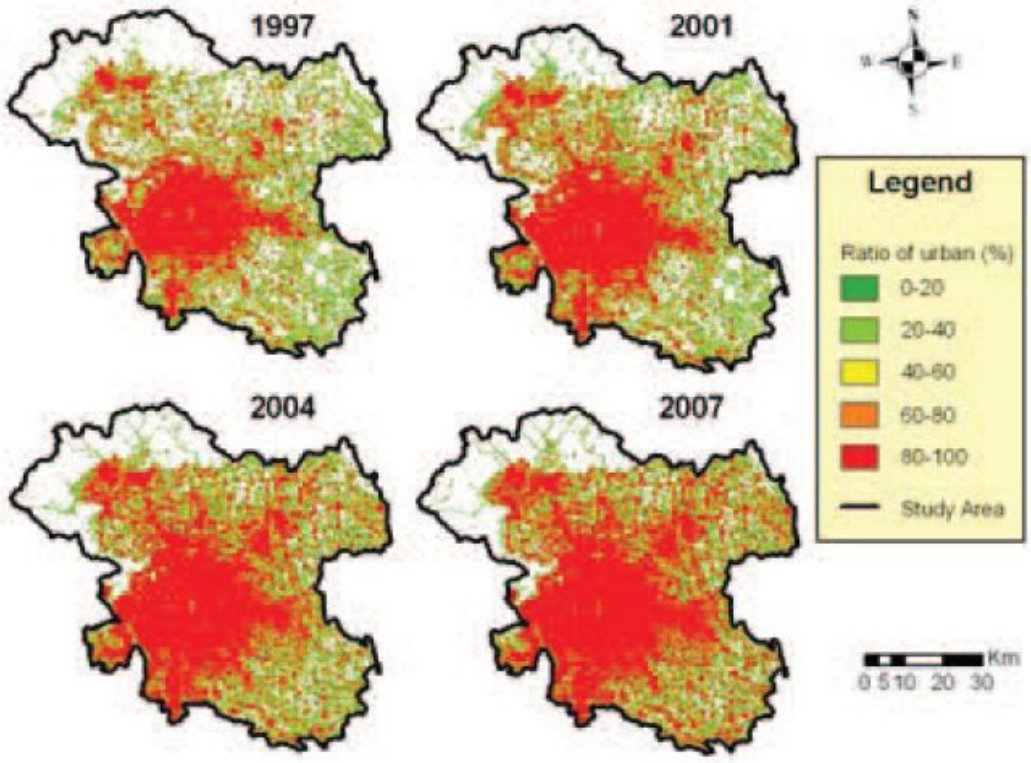


Fig. 4-9. Distribution of urban land. The images show an increasing amount of space for urban structures over the years. Source: Landsat TM.

Furthermore, China's booming economy attracted commercial developers who saw endless opportunities with the city's rising prosperity. The country's increasing global importance placed the capital at the center of attention and pressed both domestic and international corporations to secure a place in Beijing's market. Beijing represented an increasingly critical location for businesses to expand, its consumer sentiment supported the rapid growth of the luxury market, and its booming population accelerated demand for new residential space. Thus, the city experienced substantial expansion in its office, high-end retail and residential sectors, leading to heavy investment in hundreds of major construction projects and the rapid urbanization of the city.

Expansion of Office Sector

As many multinational corporations sought to expand their presence in China, Beijing became an increasingly critical and strategic location for office space occupiers. Entire new business districts sprang up, including the Beijing Central Business District (CBD), one of the most important financial centers in China (Liauw 1). Planning and management of the CBD, situated in Chaoyang district, first began in 2001. The area underwent rapid construction in a period of eight years to become a primary location for finance, media and business services in Beijing, providing important office space for a total of 117 Fortune 500 companies.

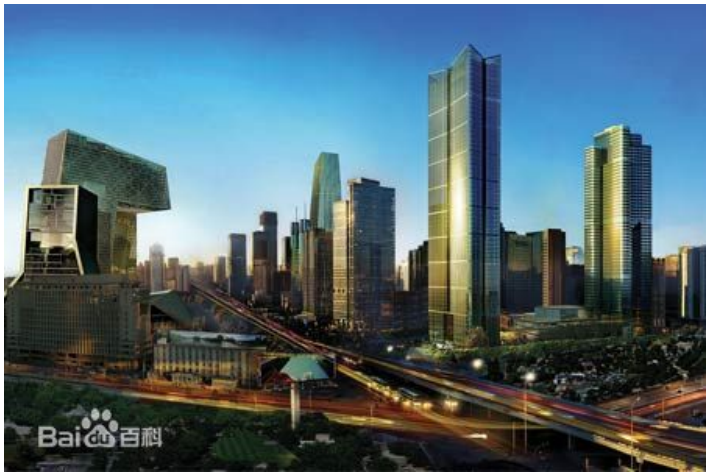


Fig. 4-10. Beijing Central Business District. Source: baike.baidu.com.

Many of the structures in the business district and its surrounding area consist of world famous skyscrapers, such as the Beijing TV Centre, Park Tower and the Fortune Plaza Office buildings, all of which represented the tallest building in Beijing for some time in the 2000s. Other famous structures include the China World Trade Center Tower III, the CCTV Headquarters tower and the Television Culture Centre tower, which all house major corporations.

CCTV Headquarters ***Fortune Plaza Office***

Fig. 4-11. Modern office buildings. Source: baike.baidu.com.

The rapid development of the CBD also spread to other parts of the city and stimulated office space expansion throughout Beijing. In 2007 alone, total stock in the office market increased by 52% with the completion of ten massive office buildings ("Beijing's property outlook to remain positive after the Games"). Construction in 2007 resulted in the creation of over 14 million ft² of new office space, and overall rentals in the office market grew by 17.8% in that year ("Beijing Olympics Accelerate City Development"). By the end of 2008, Beijing contained a total of 895 completed high rise buildings, with over fifty additional projects under construction or in proposal ("Buildings in Beijing").

Expansion of Retail Sector

The development of high quality office space facilitated the development of other high end services, as mega shopping complexes and luxury hotels were strategically built in the vicinity of Beijing's business districts. The luxury retail market in particular has skyrocketed, recording an 89% increase in stock in the years 2007 and 2008 ("Beijing Olympics Accelerate City Development"). The world's biggest luxury brands opened stores at a dizzying pace. In 2008 alone, twenty-nine high-end retail projects were completed, making Beijing the world's fastest-growing luxury market (Conway-Smith). Many of the city's mega shopping complexes have broken records and gained international prestige. The Malls at Oriental Plaza, which opened in 2004, represents the biggest shopping and entertainment venue in Beijing, as well as one of the largest malls in Asia ("Oriental Plaza Sweeps The Real Estate 'Oscars'"). Other renowned shopping malls include the Shin Kong Place, which covers over 1.9 million ft² and houses 938 brands, and the Seasons Place at Financial Street, which features premium brands such as Louis Vuitton, Dior and Gucci (Song and Jingli).

Fig. 4-12. Oriental Plaza. Source: www.orientalplaza.com.

Expansion of Residential Sector

The continued development of satellite towns, facilitated by the expansion of public infrastructure and rapid population growth, created new demand for residential space. Since 1992, the government had proposed in the master plan of Beijing to shift developmental focus from the urban center to the suburban area. The new master plan in 2003 laid out detail plans for several new towns, emphasizing Tongzhou, Shunyi and Yizhuang as the main subcenters outside the city (Chen 38). These three towns have become prime locations for real estate developers.

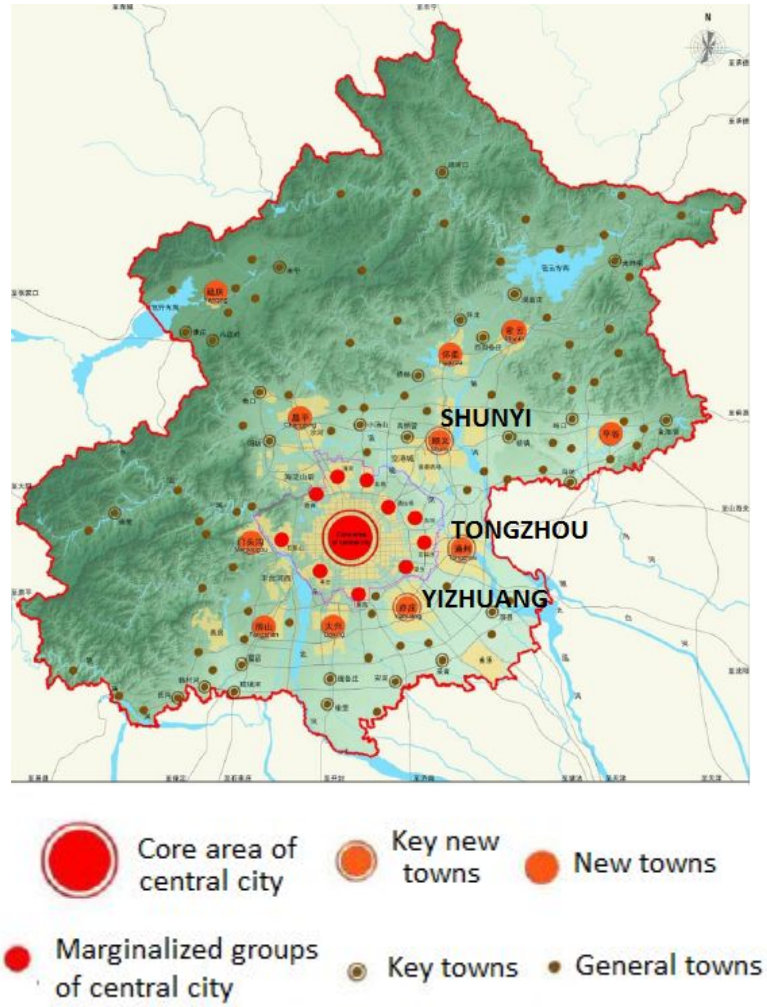


Fig. 4-13. Beijing Master Plan 2004-2020. Source: Beijing's people government.

For instance, Tongzhou has earned the reputation of Beijing's main "dormitory" town due to the high proportion of space being allocated for residential use. It is the closest town to

urban Beijing, lying eight miles east of the Central Business District and twelve miles east of the city center. It has existed since 1914 but experienced very slow development until the launch of Beijing's master plan in 2003.

In the early years of its development, only a few small developers established residential buildings of "low quality, low price" for the population that could not afford housing in the city center. After 2003, Tongzhou's prospects began to change due to the expansion of the CBD, as well as the opening of the Batong metro line, which decreased the town's distance to the central city. With its close distance to the CBD and relatively cheap housing, Tongzhou became an attractive option for workers unable to afford downtown's high housing costs. Dozens of famous real estate companies initiated residential projects. The success of these projects further boosted real estate development and also attracted higher income groups, creating demand for new types of housing such as villas, flats and garden houses.

Fig. 4-14. Giant residential complexes in Tongzhou. Source: Personal photography by Mengyi Chen.

According to the "White Book of Commercial Real Estate in Tongzhou," the newly developed residential space in Tongzhou from 2003 to 2006 covered over 107 million ft² (Phelps

468). In addition, over 400,000 new inhabitants settled in the town from 2000 to 2007 (Xiao 7). By the start of 2007, over 50% of the land was used for residential space, compared to the 30% average in urban Beijing (Chen 60).

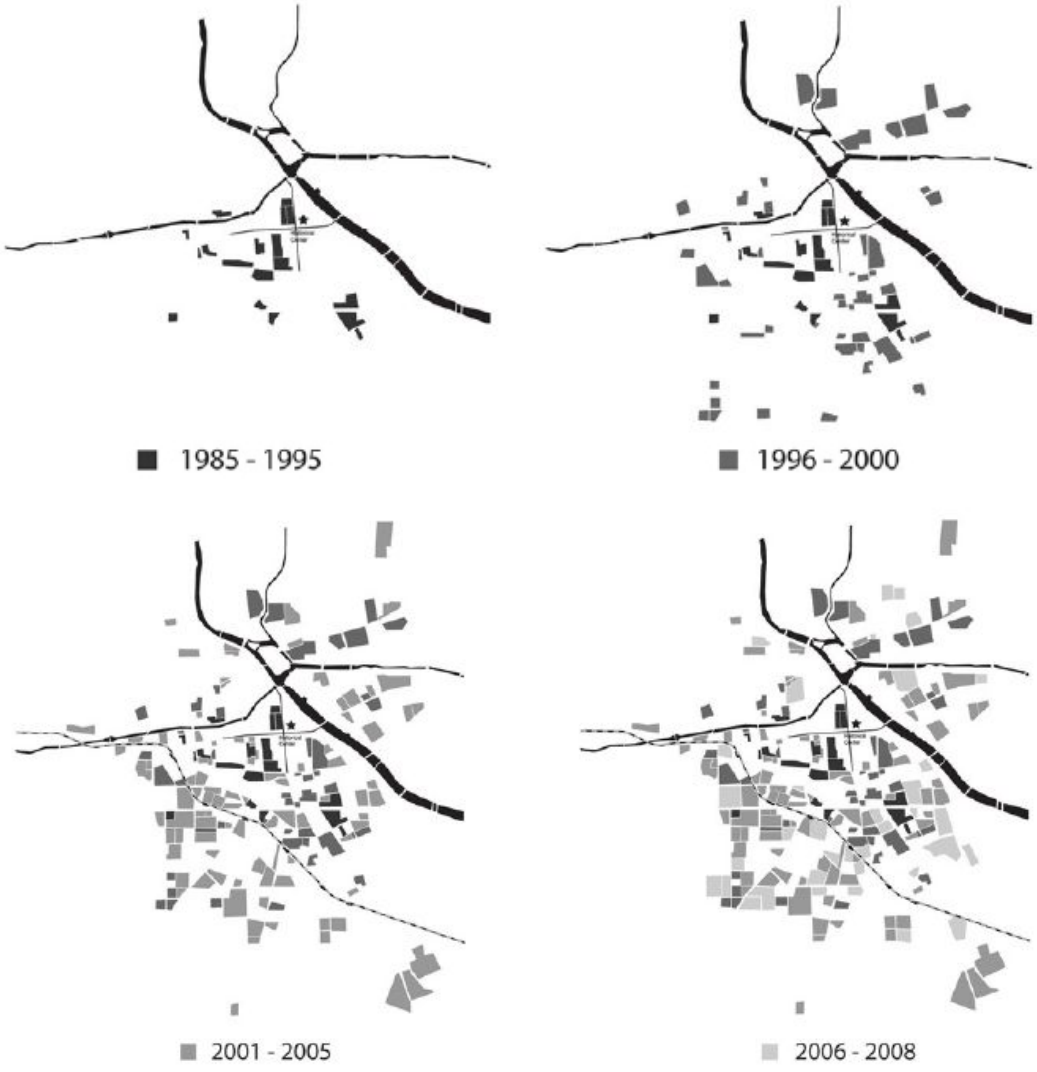


Fig. 4-15. Real estate development in Tongzhou. Source: Tongzhou Bureau of Statistics.

The strong housing demand was also reflected in the rest of the city and contributed to the process of urban renewal. Between 1998 and 2009, over 3 billion ft² of commodity housing were completed, equivalent to 0.237 million units annually (Yao 16).

Chapter 5

Current Challenges of Urban and Economic Growth

China's rapid development has pushed it into the ranks of one of the world's most modern and powerful countries. Starting in 1979, economic reforms and the rapid rate of urbanization lifted the country out of its state of poverty, but they have also contributed to many new social, ecological and economic problems that threaten future development. Beijing especially, which grew at a faster rate than most other Chinese cities, is experiencing severe problems with the widening income gap, worsening ecological conditions and stagnating development of satellite towns.

Income Inequality

In the early 1980s, the mass majority of Chinese households had low income, and thus China's income distribution demonstrated more equality than that of other emerging economies, according to a report by the Organization of Economic Cooperation and Development (OECD) (Rapoza). The Gini coefficient, which measures the severity of income inequality on a scale of 0 to 1, was recorded to be a low 0.16 in 1985; however, once the market-oriented reforms started to take effect, the notion of social equality became an increasingly foreign concept in Chinese society. Millions of the population were able to reach middle or upper-class status, while other families were left behind. The Gini coefficient climbed to 0.20 in 1995 and then to 0.32 in 2000 (Dai 20). It reached its peak in 2008, recording a value of 0.491, before dropping slightly to 0.474 in 2012 (E. Wong). According to poverty researchers, values above 0.4 threaten to destabilize the social structure of society (Roberts).

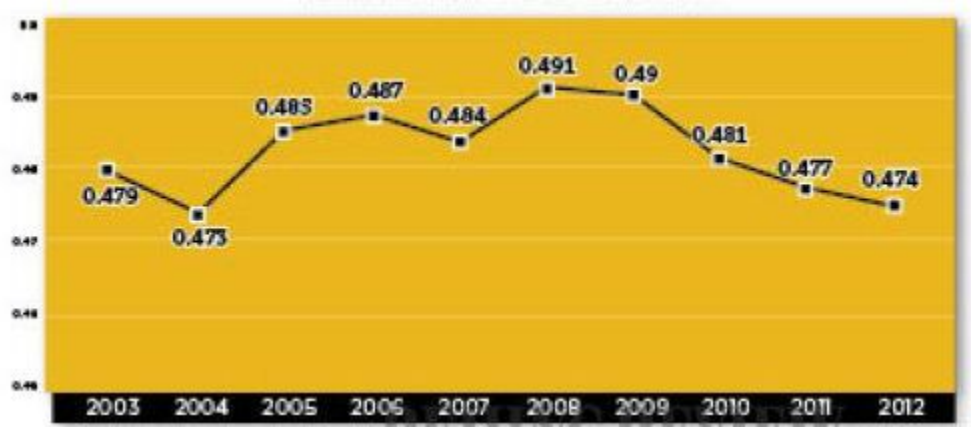


Fig. 5-1. China's Gini Coefficient 2003-2012. Source: www.bjreview.com.

A national study conducted by Beijing University found that in 2012, the top 5% wealthiest households earned 23% of the country's total household income, while the lowest 5% contributed only 0.1% (E. Wong). Official figures also indicate that the top 10% of urban residents earn 23 times more than the lowest 10%. In Beijing, where income disparity is especially apparent, this figure is estimated to be as high as 65 times (Roberts). In fact, Beijing is home to the greatest number of wealthy people in China. In 2012, it had 179,000 millionaires, of which 10,500 earned over US$10 million (Z. Wang).

China's income boom resulted from labor-market policies that boosted wages, financial reforms that stimulated employment, and government decentralization that encouraged private enterprises (Barton, Chen, and Jin). In addition, the government recognized the importance of a consumption society in sustaining and promoting economic growth. It facilitated the creation of the upper and middle classes by implementing strategies that increased purchasing power and boosted consumption demand (Tomba 7).

The municipal government of Beijing consistently raised the incomes of selected employees throughout the years. Workers in the healthcare sector enjoyed a 168% increase in their salaries between 1995 and 2000, permitting their annual incomes to hover 40% above the city average of US$1,560 per year (Tomba 8). Employees in tertiary education and scientific

institutions received similar benefits with income increases of 158% within the same five years, allowing them to earn 31% more than the average household (Cao 125). Due to gains in disposable income, sectors such as tourism, higher education and cars as well as financial and insurance services benefited due to increased spending.

Other industries began to flourish and created the need for highly technical skills. Workers with skills in specific areas of expertise contributed to the competitiveness in salaries. In 2001, occupations such as telecommunication technicians earned US$5640 annually, software engineers earned US$4430 and bank clerks earned $3210, much higher than the Beijing average (Tomba 9).

Beijing succeeded in creating in a consumer-oriented middle class by the 21st century, defined as households earning between US$1333 and US$8000 per year. By 2010, the average income in Beijing was US$1600, higher than the national average of US$1200 per year (Censky). In a survey conducted by consulting firm McKinsey & Company, an estimated 56% of the upper-middle class and 36% of the mass middle class purchased electronic products such as laptops and digital cameras in 2012 (Barton, Chen, and Jin). In addition, China overtook Japan in 2012 as the second largest luxury goods consumer in the world, after the United States (Censky). Beijing residents contributed significantly to this rapid growth, boosting the luxury goods consumption rate between 16% to 20% annually from 2008 to 2012 (Barton, Chen, and Jin).

Furthermore, Beijing incomes and Chinese incomes in general are expected to be much higher than reported by the government, and residents openly acknowledge that additional income can be obtained through various sources (Censky). Undisclosed income can include kickbacks to businesses, subsidized housing offered by companies, or investments made in the stock and real estate markets (Roberts). Employees can obtain additional income through under-the-table payments, bribes or land deals, while households often underreport their income out of fear that the government will pass their information to tax collectors.

In a report by financial services company Credit Suisse, the average income in Beijing is estimated to be 90% higher than government statistics suggest. In an interview with Chen Zhiheng, who earns US$36,000 a year as a doctor, she reveals that she owns a US$4,700 Gucci watch, a US$1,600 Burberry coat and a US$320 Hermes silk scarf. Chen reports to having only $800 free to spend each month, but discloses that "Somehow people always seem to have a lot of cash, even if the data shows income at about US$3000 per capita. There's a lot of gray income in China" (Censky). If actual incomes were taken into account, the Gini coefficient could be significantly higher, indicating a more extreme income gap than anticipated.

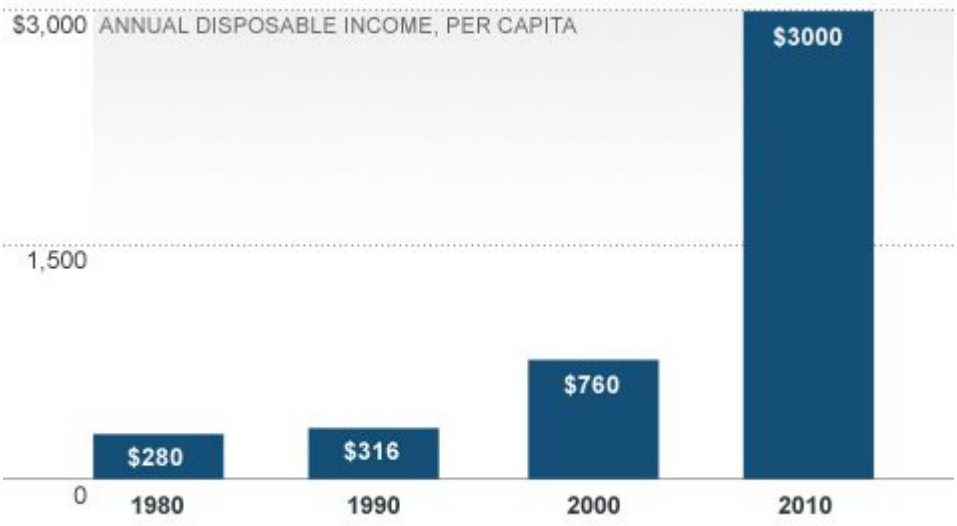


Fig. 5-2. China's income boom. Source: China Market Research Group.

By 2010, an estimated 5.4 million residents, or 40% of the city' population, belonged to the middle class ("Beijing's middle class expands to 5.4 million"). On the other hand, Beijing had a migrant population of 8.25 million in 2011 ("Beijing's migrant population shrinking"). These migrant workers, also called the temporary or floating population, are the largest contributor to urban poverty in the city.

Beijing's massive influx of migrant workers stemmed from rural reforms launched in 1978. This policy replaced the commune farming system with private enterprises, which resulted

in improved efficiency and productivity but also made many agricultural laborers redundant. Surplus labor and unemployment soon became common problems in the countryside (Gu 2). In the same time period, reforms in the housing registration system, employment system and urban housing system facilitated immigration from rural to urban areas. The relaxation of these rural-urban migration policies encouraged millions of peasants to move to metropolitan cities such as Beijing, Shanghai and Guangzhou.

Beijing served as an attractive destination due to the opening of urban jobs in construction and factories. In addition, the growing wealth of Beijing's urban residents created the need for jobs in various urban services (Gu 3). Starting in the late 1970s and continuing on for the next two decades, the growth of Beijing's migrant population exceeded 20% each year. By 2013, the migrant population represented 35% of Beijing's residents (Lin). However, the uncontrolled growth of the floating population in Beijing actually resulted in growing unemployment and the formation of slums. The floating population is a major contributor to urban poverty and the widening income gap.

Many migrant workers often resort to unstable, temporary and insecure jobs, which local residents find unattractive. On average, migrants earn less than half of what their native Beijing counterparts earn (Gu 5). Common occupation choices include high labor intensity, low income but formal jobs, which entail positions in tertiary and secondary industries. Many migrants are employed in manufacturing factories and work as spinners, casters, assemblers and builders under poor labor conditions. Other members of the floating population perform private or public services such as professional typists, printers, waitresses and cashiers.

Another portion of the temporary population has stable, contracting but temporary jobs. These occupations can range from domestic services, such as family servant, babysitter, or housekeeper. It can also involve decorating houses, repairing furniture, cleaning streets and making deliveries. The mass majority of migrants in this category are construction workers who

are employed for the duration of the project but released upon completion. Often these jobs place workers in dangerous conditions and require them to work over 12 hours per day. Many of these construction workers have reported instances of where their employer withheld wages and never paid them for their work.

Fig. 5-3. Migrant workers at construction site. Source: www.asiasociety.org.

A third category of migrant workers have unstable, temporary and insecure jobs. These jobs often involve street vendors or other forms of outdoor services. Migrant families, unable to find formal employment, often resort to selling cheap products on streets or collecting cans to earn money for recycling. Others set up outdoor services that include providing rickshaw rides, mending shoes, fixing bicycles, repairing watches and sharpening knives. According to one migrant couple who owns a street food stand, they live a "more or less fleeting lifestyle." Their pattern of work involves choosing a location and remaining in that area until it becomes unprofitable. Having to adapt to changing circumstances, the couple are often forced to change locations once every two months and are never guaranteed a stable source of income to meet their living needs (Chan 44).

Fig. 5-4. Migrants working as recyclers. Source: www.macaudailytimes.com.mo.

Finally, a small group of migrant workers choose to be employees in their own small firms, restaurants or factories. There exist a few enterprises owned by immigrants that have managed to thrive in Beijing society, such as the New Ajing restaurant, which has managed to launch four additional branch restaurants in the city (Gu 6).

The migrant population is generally overlooked in official government statistics, but surveys conducted outside the government estimate that in 2000, 37.3% of the migrant population work in the public sector, which includes construction, 35.3% consider themselves self-employed, which includes both street vendors and firm owners, and 23.5% work in the private sector, which includes the restaurant and retail industry. Finally, the remaining 3.9% are either unemployed or have other forms of employment (Chan 34).

As most migrant workers fail to secure well-paying, stable jobs, many struggle to find affordable housing and provide for their daily needs. For instance, Tang Yuanchao, who works as a trash collector, reports to moving on a regularly basis due to skyrocketing rents. He states, "We are treated differently than people who were born in Beijing. As a migrant worker, I earn less money than regular employees who do the same job" (McLaughlin). Liang Ming, a fast food delivery driver, also states, "The rent in Beijing is too high. About a quarter of my monthly income goes to rent. ... Rents go up much faster than pay increases do" (Lin). Consequently,

unsightly slum neighborhoods have formed throughout Beijing, as migrants tend to live in clusters where rent is comparatively cheap. The housing facilities, however, often lack running water or bathrooms, and three or more people share a room of less than 10 m². In contrast with the brand new apartment complexes in wealthy areas of the city, these migrant clusters have aggravated signs of social segregation in Beijing.

Segregation is further enforced in the resident registration system, which acts as a barrier for migrant households to advance in society. This system only grants newcomers to the city with urban resident status if they come through formal immigration. This process involves furnishing documents ranging from certificates of release and appointment from the respective places of work to letters of acceptance from the relevant institutions (Gu 7). Most of the floating population in Beijing came through informal immigration, which requires very little paperwork, and thus are not considered official residents, regardless of how long they have lived in the city.

The difference in status has denied the floating population many of the rights and benefits provided to official residents and thus face additional costs related to the urban life. Migrant workers lack social assistance programs such as pension payment and unemployment allowance, services readily available to urban residents. In addition, migrants do not have equivalent access to children's education, health services, housing and employment opportunities. The cost of citizenship, which includes maintaining public buildings, services, social security, education and housing, amounts to US$26,670 per capita (Lin). Already burdened by these public costs, the Beijing government has not allocated a significant amount of money to provide social services for migrants, forcing the temporary population to live at a lower level than permanent residents.

For instance, children of migrant parents are blocked from attending state-funded public schools. These restrictions to education have forced migrant communities to build schools of their own that run solely on donations, while receiving no monetary aid through authorities. In 2011, the Beijing government closed 24 migrant schools in the Haidian, Chaoyang and Daxing

without warning. According to teachers, the schools were not given adequate explanations for the closures and were ordered to shut down the very day they received notice. Officials promised to move the children to state-run schools, but did not specify when this plan would take place, while commentators pointed out that "providing adequate places for thousands of children - when those places did not exist before - will be challenging." The school closures, and other forms of action against migrant workers, are considered by many citizens to be part of a wider plan to force the floating population out of the city, as the large number of migrant workers has proved to be a growing concern for government officials (Bristow).

Fig. 5-5. Migrant school in Beijing. Source: www.bbc.co.uk.

The unequal income distribution has thus contributed to worsening living conditions and increased social segregations for millions of migrant workers, but the problem may actually be worse than what official statistics suggest. Migrants are considered as undocumented workers and do not count towards municipal economic statistics; thus, the income level of migrant households is ignored in reports collected by the government (Dai 2). In 2012, the Gini coefficient was revealed to be 0.474; however, the actual income distribution in Beijing is not reflected accurately through government-released figures. If both the earnings of migrant households and undisclosed incomes of permanent residents were taken into account, the actual income gap could be far worse than suggested.

The impact of the income gap has been widely debated, but in a survey conducted by the Economy and Nation Weekly magazine, 34 out of 50 leading Chinese economists believed that the excessively wide income gap was the top threat to the future development of China's economy (Tong). Yu Bin, the director of macroeconomic research at the State Council Development Center, stressed the urgency of China's inequality problem, declaring that "It is time for China's income system to be adjusted" (Lan).

Migrants continue to pour in the capital, but without the same access to services and benefits, the majority of the incoming population struggle to afford Beijing's rising housing and living costs. Without equal opportunity, most continue to live in poverty. On the other side, policies that favor that upper-middle and upper class add to the widening income gap and increase segregation in Beijing's society. Patrick Chovanec, a professor in the School Of Economics and Management at Tsinghua University, took the issue farther by declaring that China's problem was not only an inequality of income, but the "inequality of privilege" that resulted.

Ecological Problems

Water Scarcity

Water scarcity, a growing concern for cities such as Beijing, threatens to severely hinder China's future development. Although larger in size, China has a smaller water supply than the United States. In addition, it suffers from a severe water imbalance, with 80% of the water supply located in the south, while many of its major cities are located in the north (Yardley). Despite these disadvantages, the country had adequate water sources and provided residents with an average of 1,000 cubic meters of water per person in 1949; however, water usage has more than quintupled since then, and per capita water availability has declined to less than 230 cubic meters by 2007 (Qing 5).

China's water table had already started falling under Mao during the 1970s, but it began to diminish with increasing speed once market-oriented reforms were set into place. Guided by a culture that emphasized economic growth over conservation, water demand rose to boost production for industry and agriculture (G. Wong). Scientists estimated that depending on the product, industry in China required 3 to 10 times more water than industries in other developed nations (Yardley). Rapid urbanization further fueled the water scarcity problem. As metropolitan areas such as Beijing grew in size, an increasing amount of water was needed to sustain the inflowing population. Finally, rising industrial use created severe pollution problems, contaminating the already limited water supply (G. Wong). Untreated wastewater from factory plants is often dumped directly into rivers and has affected up to 75% of each region's aquifer system. Richard Evans, a hydrologist for the World Bank estimates that within 30 years, most of China's water sources will have run dry if the current usage rate continues (Yardley).

Beijing, in particular, is one of the most water-scarce cities in the world. The capital receives two-thirds of its water from groundwater and the remaining one-third from reservoirs and rivers (Qing 4). Dozens of reservoirs, built in the 1950s, have since dried up. The Beijing Water Resources Notice recorded that by 2009, Beijing only held 676 million cubic meters of surface water, compared to over 4 billion cubic meters in the 1960s ("Severe water shortage hits China's capital"). The two largest reservoirs, Miyun and Guanting, contain less than 10% of their original storage. The Guanting dam, in particular, has ceased to provide drinking water since 1997 due to severe pollution ("Running Short of Water, Beijing Looks for Help"). The groundwater supply has also dwindled by over 10.6 billion cubic meters since the 1960s, and in 2009, only 1.5 billion cubic meters of underground water remained. The water table is expected to continue falling by 634 million cubic meters per year ("Severe water shortage hits China's capital").

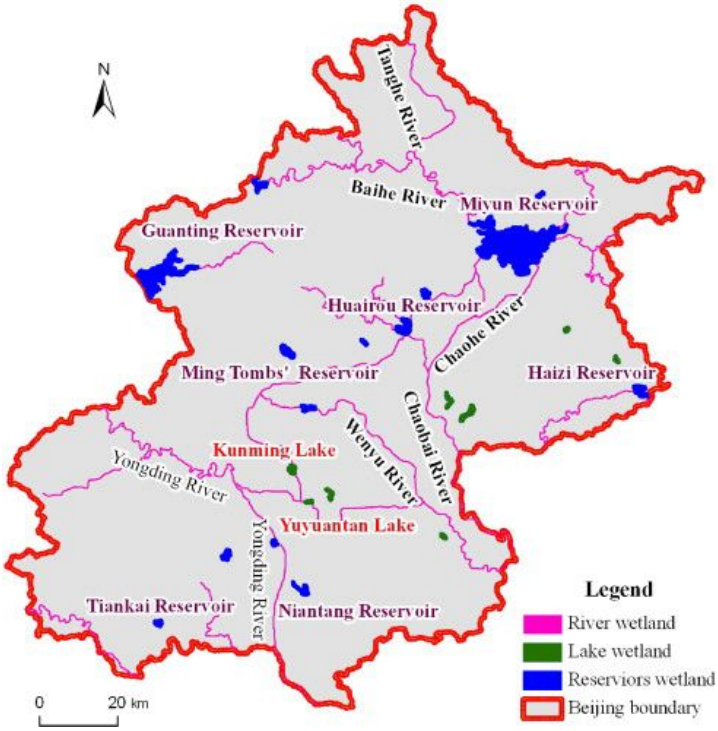


Fig. 5-6. Sources of water in Beijing. Source: www.elsevier.com.

By 2013, the annual water consumption level in Beijing reached 3.6 billion cubic meters, far exceeding the 2.1 billion cubic meters of water available locally. The per capita annual water availability hovered at 120 cubic meters, much lower than the absolute water scarcity threshold, set by the United Nations at 1,000 cubic meters ("Beijing water shortage worse than the Middle East"). On the other hand, Beijing residents use an average of 210 cubic meters per year ("Running Short of Water, Beijing Looks for Help"). This problem is further aggravated by the city's rapid population growth. During the early 2000s, the government had projected that the population would reach 18 million by 2020 (Yang et al. 502). In reality, the population had already surged over 20 million by 2013, while Beijing's water capacity could only sustain 12 million people ("Beijing water shortage worse than the Middle East").

The water scarcity situation has forced the municipal government to undertake drastic and costly plans of action. Starting in 2008, the government has initiated emergency water transfers to the city from reservoirs in the Hebei province and the Yangtze River in the Hubei

Province (Qing 5). In addition, China embarked on the ambitious South-to-North Water Transfer project to transport water from the southern to northern region. Costing over US$79 billion, it is one of the world's most expensive engineering projects and upon completion, is anticipated to transport more than 12 trillion gallons of water north each year (Yardley). The water tunnels, which have already reached Beijing, provide the capital with an additional 1 billion cubic meters each year ("Beijing water shortage worse than the Middle East"). Unfortunately, fears of water contamination have been raised. Reports of pollution problems have occurred in Danjiangkou, a crucial water source in the transfer project, where four out of its five rivers failed to meet standards for safe daily consumption.

Fig. 5-7. South-to-North Water Transfer project. Source: www.bbc.co.uk.

Since 1979, water has been crucial in sustaining China's economic boom, but continually rising demands could mean that the country will be unable to sustain future development. Cities, industry and farming, the top competitors for the water supply, will be forced to face drastic cuts in many of their main functions. The water scarcity in Beijing poses a serious threat to the city's ability to sustain its current population and rapid urbanization. The problem has caused policy

makers to "find ways to change the economic development pattern, expedite the transition of industries to make them more water-friendly and accelerate technological and systemic innovation to lower the demand and consumption of water" ("Water shortage in Beijing severe").

The emergency measures in Beijing cannot serve as fundamental solution to sustain the growing population, as long distance water transportation is both expensive and environmentally damaging (Qing 5). Zhao Zhangyuan, a researcher at the Chinese Research Academy of Environmental Science, emphasized the need for industries to actively cut down on waste and for the government to implement long-term solutions. According to him, emergency measures, the South-to-North Water Transfer project and similar plans of action will only serve to be "potential pitfalls" to Beijing's future ("Beijing water shortage worse than Middle East").

Air Pollution

China's rapid development brought about the expansion of mega cities, resulting in increases of energy consumption, emissions of air pollutants, the number of poor air quality days, and growing occurrences of associated health effects (Chan and Yao 1). Beijing currently suffers from one of the world's worst air pollution problems. According to the Air Pollution Index (API) created by the United States Environmental Protection Agency (EPA), Beijing consistently has a daily API value between 150-200. This level indicates an unhealthy air quality and increases the risk of heart or lung disease and premature death ("U.S Embassy Beijing Air Quality Monitor").

Starting from the 1980s, China saw massive waves of migration to large and developed cities for better job opportunities. The urban population made up 40.5% of the total population by 2005, up from 19.6% in 1980. The number of cities increased to over 660, and over 170 cities had more than 1 million permanent residents by 2004. Mega cities such as Beijing, defined as cities with over 10 million residents, began to emerge in the 1990s, which additionally promoted the development of city clusters in the surrounding area (Chan and Yao 3). To sustain China's trend towards urbanization, the total energy consumption in 2005 reached 2.2 billion tons of coal,

three times the amount needed in 1978 (Chao and Yao 2). Heavy industry and uncontrolled consumption have created sky-high pollution levels for many Chinese cities.

The most dangerous pollutant affecting China's air quality is fine particulate matter (PM), which can be categorized into PM2.5, particles with diameters less than 2.5 micrometers, or PM10, less than 10 micrometers. Common sources for PM include power plants, motor vehicles and industrial facilities. Atmospheric gases, such as ammonium sulfate, ammonium nitrate and secondary organic aerosols, also form reactions with other substances and contribute to the PM concentration in the air (Streets et al. 481). PM2.5, which poses the largest health threat, significantly increases the risk of heart or lung disease ("U.S Embassy Beijing Air Quality Monitor").

Beijing suffers from worse air pollution than the majority of Chinese cities. One major contributor is the placement of four large urban centers, all within several hundred kilometers of Beijing. These cities, Shijiazhuang, Qingdao, Jinan and Taiyuan, specialize in heavy industries that depend primarily on coal-burning. Furthermore, environmental controls are less stringent in these areas, resulting in higher levels of emissions that are eventually transported to Beijing (Streets et al. 481). In addition, Beijing has developed at a faster rate than other Chinese cities. Since 1990, the capital's population has risen at a rate of 2% each year, which has stimulated property development, boosted demand for vehicles and increased the domestic energy consumption (Beijing Municipal Bureau of Statistics).

Fig. 5-8. Beijing factories and buildings covered in smog. Source: www.theguardian.co.uk.

A five-year study, conducted from 1999 to 2004 discovered that the daily PM10 concentrations in the capital exceeded China's Grade II standard of 100 $\mu g/m^3$. On 30% of the days, it even surpassed China's Grade III level of 150 $\mu g/m^3$. The highest recorded level of PM10 concentration was 368 $\mu g/m^3$ in August 2003 (Chan et al. 5122). China has yet to create air quality standards for PM2.5 concentration, but according to the National Ambient Air Quality Standards (NAAQS) created by the EPA, Beijing's average daily PM2.5 concentration from 1993 to 2004 also exceeded warning levels set at 65 $\mu g/m^3$. In fact, the daily PM2.5 concentration generally ranged from 91 to 169 $\mu g/m^3$.

To combat dangerous levels of fine PM, twelve phases of air pollution control measures have taken place since 1998, and dozens of short-term measures were implemented to provide clean air for the 2008 Olympics. Many high emission plants relocated to regions outside of Beijing (Chan and Yao 7). Factories used cleaner production techniques and practiced technologies such as desulfurization (Hao and Wang 1300).

During the early years of the 2000s, the environmental measures contributed to a brief period of decline in the concentration levels of fine PM, despite the building boom and the number of vehicles increasing by 15% each year. The annual average of PM10 decreased to 142 $\mu g/m^3$ in 2005, compared to 180 $\mu g/m^3$ in 1999 (Chan and Yao 11). The annual average of

PM2.5 showed a significant decrease to 96.5 μg/m^3 in 2002, compared to 115 μg/m^3 in 1999 (Duan et al. 269). Despite the reduction in harmful emissions, the levels of PM10 remained 40% higher than Chinese Grade II standards for annual measurements, and both PM10 and PM25 concentration were 7 times greater than the WHO Air Quality Guidelines in 2005.

In 2008, the government embarked on another aggressive campaign to curb pollution and provide clean air for the Olympic Games. New policies pulled over 2 million vehicles off the roads, halted construction projects, and instructed factories to use natural gas over coal (Cornell University). Conditions in Beijing improved significantly that year, but the air quality deteriorated rapidly following the Olympic Games, with pollution levels hitting record highs. The municipal government lifted previous traffic restrictions and allowed several factories to reopen. Chinese environmentalists also cite the growing number of vehicles, estimated at 1,500 additions per day, as a major contributor ("Beijing's Air Is Cleaner, but Far From Clean."). In addition, an increasing number of factories and villages located in the city outskirts burned coal during winter (C. Zhang).

Fig 5-9. Beijing's days of grade 1-quality air. The number of quality days peaked in 2008 before declining. Source: Ministry of Environmental Protection.

From 2009 onwards, the city regularly saw API readings of over 300, which according to the EPA, is considered so hazardous that all outdoor activity should be avoided (Wan). This level is equivalent to a daily measurement of over 250 $\mu g/m^3$ of PM2.5. The air contamination level went off the charts for the first time in 2010. The API, which measures the air pollution on a scale of 0 to 500, recorded values slightly over 500 for several days in November over 250 $\mu g/m^3$ of PM2.5 (C. Zhang). In January 2013, the API reached a record breaking value of 755, over 20 times more than the amount of fine PM deemed safe ("On Scale of 0 to 500, Beijing's Air Quality Tops Crazy Bad at 755"). Indoor air, as well, have escalated to dangerous levels at 208 $\mu g/m^3$, five times higher than the level considered safe by the EPA (Lim).

Fig. 5-10. Air quality in Beijing in 2013. The majority of days are in the unhealthy to hazardous range. Source: www.qz.com.

Beijing's rapidly deteriorating air quality has drastically affected the health and lifestyle of its population, as smog-forming pollutants continue to fill the air. Residents have complained of the "suffocating siege" and reported symptoms such as stinging eyes, chest pains and breathing difficulties (Wan). Health experts estimate that long-term exposure to the pollution reduces life expectancy by five years, and data reveals that mortality rates for heart disease and other respiratory-diseases have increased. Chinese newspapers labeled the hazy air as a "severe

hazard" and declared that the lung cancer rate has increased by 60% during the past decade while the smoking rate has remained constant (Lim).

On days with heavy smog, residents have reported difficulty seeing skyscrapers a few blocks away ("On Scale of 0 to 500, Beijing's Air Quality Tops Crazy Bad at 755"). On certain weeks, the haze has caused hundreds of flight cancellations and road closures (Lim). Residents have resorted to wearing face masks, installing air filters and staying inside whenever pollution reaches dangerous levels, describing the air as "post-apocalyptic," "terrifying," and "beyond belief." Zhao Jing, a prominent Internet commentator, explained "I've closed all the doors and windows; the air purifiers are all running automatically at full power" ("On Scale of 0 to 500, Beijing's Air Quality Tops Crazy Bad at 755"). The smog has also led schools to ban physical education activities outside and organizations to cancel outdoor events. For instance, David Niven, chief operating officer of China Club Football, claimed that he had canceled over ten days' worth of games for youth and adult football leagues in a period of three months. He commented that "If the air is above 240, some of the schools will ask us to move football games indoors or cancel them altogether. Because of the bad air this year, we've had to cancel more games than ever before" (C. Zhang).

Fig. 5-11. Beijing residents coping with heavy smog. Source: AP News.

In response to the heavy smog in January 2013, the municipal government undertook emergency emission reduction measures. Approximately 30% of official vehicles were suspended for 3 days, and 103 heavily polluting factories temporarily halted production (Global Times). The measures have eased pollution levels temporarily, but Beijing residents, state media and international organizations have all called for policies to reduce pollution in the long-run.

China has long favored rapid development, but more and more officials have begun asserting that environmental protection needs to take a higher priority. The state-run newspaper, the *Global Times* acknowledged that environmental preservation can come at the cost of China's development but called for both the government and citizens to "confront the sharp questions being raised about air pollution and be clear about what we really want. We should adjust the relationship between development and environmental pollution and strike a long-term balance between the two."

Satellite Towns

Since the 1990s, the government has prioritized the development of satellite towns as an important step towards speeding up Beijing's urbanization process. The faster than anticipated population growth resulted in more people competing for work, housing and transportation than the municipal government had initially considered in its policies and plans (Yang et al. 502). Officials thus promoted the investment and construction of satellite towns scattered around the 5th and 6th Ring Roads during the 21st century. The city clusters, with varying distances from the urban center, were planned to connect directly or indirectly to each other, forming a main development zone for the city (T. Zhang).

The new towns were proposed to decrease the population and industrial densities of the central city by establishing high-tech industrial bases, higher education parks and residential quarters of their own. The government also increased the attractiveness of the satellite towns by expanding transportation networks to reach the outer suburban areas. New expressways and

railways planned to create direct routes to towns such as Tongzhou, Yizhuang, Huangcun, Changxindian and Liangxiang (T. Zhang). Five new metro lines opened in 2010, bringing the total length of the subway system to 186.41 miles (Chou). Furthermore, soaring apartment prices within the 3rd and 4th ring roads encouraged both permanent residents and migrants to look for housing beyond the 5th Ring Road (Garst). As a result, the government expected satellite cities to house 5.7 million of its residents by 2020 (Wee and Martina).

Fig. 5-12. Overview of Yizhuang. Source: baike.baidu.com.

Despite the growth in size of the satellite towns, pressure has not been eased from the urban center due to a lack of specific development policies, coordination and management ("Beijing urban and suburban satellite town relations"). Urban planning expert Jeffrey Johnson explained that "although the intention was to create new and independent economic and cultural centers, most of the satellite towns remain economically dependent on Beijing, and have only become dormitory towns" (Wee and Martina). Though an increasing number of citizens reside in

satellite towns, the majority travel to the city center for work, resulting in massive traffic jams and one of the world's longest average commute times.

Many of the residents complain of the lack of facilities and employment opportunities in the new city clusters. Tongzhou has undergone dramatic construction to rise from its status as a small village, but as of 2011, it still lacked many facilities to constitute a real town. Ma Teng, who moved from an outside province, stated "I came here because I could only afford the housing prices in this part of Beijing. When I bought my apartment in 2007, the area around was desolate. There is no entertainment, you can't even go to a movie here." Other inhabitants of Tongzhou have expressed similar opinions, claiming that "people don't have faith in the education and medical services here, nor does the area have enough businesses. They can't develop real careers in Tongzhou, so eight out of ten still work downtown" (Wee and Martina).

These complaints point to a lack of careful planning in the development of satellite towns. Wang Jianguo, a senior project officer at the Asian Development Bank's Beijing office pointed out that, "any kind of plan for decentralizing the population requires a series of policies that work together. If you only have a population policy without an employment policy, without an industry development policy, education, medical policy, it won't work" (Wee and Martina).

Rather than independent cities, many towns have become clusters of low-density housing (Garst). For instance, Tongzhou's master plan originally planned the town to function as a "future new city and urban integrated services center, supplemented area for administrative offices and financial center, guiding the functions of administrative offices, finance, culture, and exhibition" (Chen 66). After the housing market formally formed in the 1990s, the local government realized the importance of Tongzhou's close distance to the CBD and sold land to real estate developers for quick profits. While the real estate market boomed, this short-sighted method also led to severe underplanning in public facilities for health care, education and culture.

As a result, Tongzhou faces serious challenges of becoming the prospering city it was expected to be.

Lack of development in areas outside of real estate has allowed other industries to fall behind. In 2006, the GDP of Tongzhou ranked 12th out of all of Beijing's districts. The tertiary industry contributed to only 42.29% of the GDP in Tongzhou, while the overall level in Beijing was 70.91%. Real estate accounted for the highest proportion of GDP in the tertiary industries, while the financial, scientific research and culture industries contributed very little (Chen 61). In 2010, residential land represented 81.4% of total for sale area, while the Beijing average was far below at 55.6% (China Financial Information (2010)). Furthermore, an estimated 80% of new residential compounds developed after 2000 have no middle-sized or large commercial area in its vicinity (Chen 62). As a result, Tongzhou has formed into a single-function, giant dormitory town. The local government overemphasized the real estate market to pursue short-term profit; however, to sustain future development, Tongzhou must shift to developing other industry sectors.

There also exist towns which have not developed into dormitory towns, but on the contrary, have become almost entirely industrial towns. For instance, the industrial center, Yizhuang, formed in 1994 with the main task of attracting foreign investment, promoting exportation and developing new technologies. Similar to Tongzhou, updated plans from the State Council called for Yizhuang to also function as independent city center, providing residents with both work, commercial and entertainment facilities.

From its development in 1994 to 2010, Yizhuang has attracted more than 2,000 enterprises and drew in a total investment volume of US$15 billion. Yizhuang prospered as an industrial base, but like Tongzhou, it has failed to become a self-sustained town. The problem of Yizhuang also stems from misuse of the land market. After the introduction of the new land policy, the local government sold industrial land to generate revenue and stimulate economic growth; however, land sales did not bring enough profit to build the needed infrastructure and

public facilities. Residential development thus served as an important source of additional income.

The local government sold land to independent stakeholders, who focused on low-density, high-class residential housing in order to obtain higher profits. These contractors thus developed luxury housing estates to create one of Beijing's wealthiest residential neighborhoods. Motivated by economic benefits, the government failed to develop housing that met the real needs of the workers. Many employees working in Yizhuang's industrial bases earn an annual average of US$5385.60 (Chen 51). Although these workers fit comfortably into the middle class, the pay level is far below the affordability of high-class housing, which can cost several million.

Yizhuang has thus been criticized: "People who are living in Yizhuang are not working in Yizhuang; people who are working in Yizhuang are not living in Yizhuang." The Beijing Municipal Institute of Urban Planning and Design reported in 2005 that within the total working population in Yizhuang, only 16% lived in Yizhuang, while 35.6% lived in the city center, 25,4% in the Tongzhou district, and 17.7% in the Daxing district. On the other hand, 50% of Yizhuang's residents have high-paying jobs in the CBD, while 30% work in other places in Beijing's city center, and 10% in other places. Only 10% of the residents work within Yizhuang. As a result, Yizhuang also lacks the resources to serve as a fully functioning, self-sufficient city center.

The stagnating development of satellite towns such as Yizhuang and Tongzhou has forced residents to commute long distances to the city center for work opportunities. A study conducted by the Chinese Academy of Sciences found that out of 50 major cities in China, Beijing had the highest average commuting time at 52 minutes, though many citizens, especially residents of satellite towns, claim that they spend far more time on the road ("For Beijingers, 52 minutes to get to work"). For instance, Zhang Yu lives close to Beijing's Tiantongyuanbei subway station, approximately 13.05 miles north of the city center. At this stop, thousands of

commuters cram onto the subway train each day, and entering the station door alone requires a 15 minute wait. Speaking about her two-hour commute, Zhang Yu answered, “Yes, it’s annoying, it’s crowded. But it’s also our best option” (Wee and Martina). For many inhabitants like Zhang Yu, the extra time spent commuting results in less time spent communicating with families, exercising or exercising, all of which undermine their physical health and contribute to psychological stress (Garst).

Fig. 5-13. Crowded metro stations. Source: Personal photograph by Mengyi Chen.

The lack of adequate city subcenters has further exacerbated Beijing’s already severe traffic problems. In 2007, Beijing’s roads contained approximately 3.1 million cars and buses, 2.3 times above the number counted in 2000 (Yang et al. 504). By 2010, the number of registered vehicles surpassed 4.7 million, and traffic experts estimate when the number of vehicles totals 6.5 million, the roads will be completely saturated. Rush hour speeds in 2010 averaged at 15 miles per hour, roughly bicycle speed. Officials from the China Academy of Urban Planning and Design have reported record amounts of spending on flyovers, expressways, subways, and bus lines; however, according to Duan Haizhu, a taxi driver, “The speed of building roads is nowhere near the speed of people buying cars. And people won’t stop buying cars” (“Multiplying Drivers Run Over Beijing Traffic Plan”).

Fig. 5-14. Traffic congestion. Source: www.chinadaily.com.cn.

Overpopulation in Beijing has created problems such as pollution, traffic jams, unemployment and strained resources. Officials have emphasized the need for solutions to accommodate the booming population, but relocating people outward has not eased population pressure from the central city. According to a growing number of city planners, "Satellite cities are not a reasonable answer unless they are so far from the Beijing urban area that commuting to Beijing is not possible. So long as the large urban area can be reached, people will commute there" (Cox). To improve the conditions of satellite towns, better management and policies need to be put into place that does not concentrate on profit, but on the overall healthy development of all sectors, including population, employment, education, industry and health.

Chapter 6

Conclusion

Few cities have developed as rapidly as Beijing; however, as the capital continues to expand into the future, it must deal with the consequences of uncontrolled economic growth. As a result, policy makers now face tough decisions regarding the city and its future sustainability.

One concern is the massive income gap, which has left millions of migrant workers disadvantaged. In addition, Beijing's water supply has dropped to threateningly low levels, and air pollution levels have hit record highs. Finally, the government has attempted to decrease population pressure from the urban districts, but the stagnating development of satellite towns has not reduced congestion in the city center.

All of these problems can be traced back to Beijing's rapid, and often careless, economic growth. The city and its local governments prioritized the economy and modernization, without adequately providing for the needs of its residents or taking into account environmental consequences. The satellite towns represent another instance when short-term economic growth has taken precedence over healthy and balanced development.

Beijing has long favored economic growth and urbanization, but a growing number of residents, media outlets and government officials have called for a change in priorities. Reducing the income gap may involve providing full social security coverage and increasing salaries in labor-intensive industries. Protecting the environment may involve cutting down on consumption and implementing cleaner technologies. Facilitating the development of satellite towns may involve placing restrictions on the real estate market. If these kinds of policies are implemented, it may result in a slower growth of the economy; however, for the future sustainability of the capital,

less emphasis on the GDP can actually create a healthier, more dynamic and more secure Beijing in the future.

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Minors in Mathematics, French

Study Abroad: IES French Studies Program, Paris, France, Fall 2012

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Honors and Awards

Dean's List Fall 2010-Fall 2011, Fall 2012-Fall 2013

Association Memberships/Activities

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Professional Experience

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