

Smart Urban Growth for China

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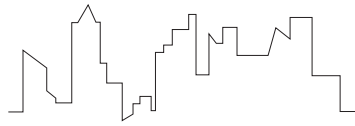
YAN SONG

AND

CHENGRI DING



Smart Urban Growth for China



EDITED BY
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OF LAND POLICY
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FOREWORD

Planners in developed countries largely agree about many aspects of good planning practices for urban development. The elements of good planning, often labeled “smart growth” in the United States, reflect long-standing practices in many other industrial countries. In addition, there are specific policies—not necessarily included in the smart growth rubric—such as green belts, that have been applied in locations as diverse as Seoul, Korea and Montgomery County, Maryland. The question addressed by this volume is: How relevant are these planning practices for guiding urban development in China?

This is an interesting question because China differs dramatically from most developed countries in many important ways. One issue is scale—the size of the country and especially its population substantially exceeds that of most developed countries. Another is the rate of economic growth that has remained remarkably high since 1978. China is completing 30 years with an annual growth rate in the range of 10 percent, a remarkable achievement. Accompanying this high rate of economic growth has been a rapid increase in the urbanized population, which has risen from 18 percent in 1978 to between 41 and 44 percent in 2006. Given its population, this means that currently between 10 and 15 million people are moving to urban areas in China each year. There are also important institutional differences between China and most developed countries. While China’s urban development is market oriented, land is owned by the state, profits from urbanizing land are a key component of municipal revenue, and planning practice is strongly oriented to physical planning, with separate agencies having separate plans that often take little account of market forces.

In terms of the overall determinants of urban development at the metropolitan level, empirical work shows that the growth of China’s cities has much in common with that of other cities. Income growth, transport costs, and the value of contiguous agricultural land play the same role in determining city growth that they do in the United States, for example. However, the outcomes of development patterns differ. China’s cities have large and often poorly utilized industrial zones, spatially separated land uses within the city, dense residential areas with few commercial or nonresiden-

tial uses mixed in, and specialized areas such as university towns. Other patterns are redolent of those seen in developed countries such as low-density fringe developments and extensive provision of infrastructure to support the use of automobiles.

To foster the achievement of better urban development outcomes through better planning and policy, the authors advocate change in four overarching policy areas: the regulatory environment, urban planning practice, public revenue sources, and the government's objective for urban development.

On the regulatory front, the government needs to change its mode of involvement from direct involvement in development to the regulation of externalities related to urban development and the provision of public goods. More attention needs to be paid to the separation of incompatible land uses, environmental protection, the affordability of housing, and the provision of open space for parks, recreation, and other urban services.

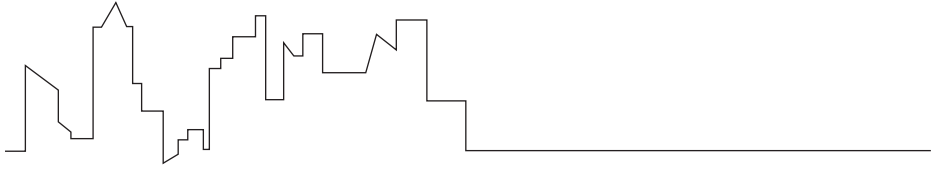
In terms of urban planning, current practice involves the development of separate plans by different ministries and agencies with little coordination between them. This leads to inconsistency and incoherence in policies and practices across agencies. Instead, an integrated plan needs to be developed across agencies so that housing, infrastructure, and environmental policies are spatially consistent. In addition, urban plans need to take more account of market forces that underpin urban development. Allowing more possibilities for public participation in the planning process would also reduce the tensions associated with urban growth.

Following the tax reform carried out in the mid-nineties, municipalities were left with the responsibility to provide many services, but with insufficient revenue to cover the related costs. It became common practice for municipalities to convert land from rural to urban use, which involved ten- to one hundredfold increases in land values. Revenues from these increased values have become a mainstay of municipal budgets, especially to fund infrastructure investment and service provision. Given the underlying incentives, excessive land conversion has occurred, especially for industrial zones. Municipalities need a new revenue source, and the current five-year plan calls for the implementation of a property tax, a proposal endorsed in this volume.

The government's stated overall objective for urban development is to foster economic growth, and the performance of local government managers is assessed in terms of how well they contribute to this objective. This objective needs to be broadened to include additional dimensions such as environmental sustainability, efficient urban forms, and livable communities.

This volume's analyses lead to the conclusion that the precepts of good planning practice would have much to contribute to China's urban development, but that their successful application requires a major reorientation of policies and practices. In fact, all four of the changes described above will be difficult to carry out, as they affect the distribution of power across institutions (e.g., integrated planning) or raise questions about technical capacity (e.g., property taxation). Absent these changes, improvements in planning practices and urban development outcomes will be difficult to achieve.

Gregory K. Ingram
President and CEO
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Introduction

YAN SONG

CHENGRI DING

China's growth story seems never ending. The average annual GDP growth rate between 1979 and 2004 was 10 percent. In 2003, the GDP reached \$1.4 trillion, and the per capita GDP exceeded \$1,000. China's economy was ranked sixth in terms of gross national income, behind the economies of the United States, Japan, Germany, the United Kingdom, and France. China was ranked second, behind the United States, in purchasing power parity. Much has already been written to document this historic growth process and to speculate about China's future growth trajectory. It is commonly agreed that China's economy will continue to grow and mature at a rapid rate.

China's urban growth has been equally unprecedented. During the period between 1978 and 2003, the number of cities with a population larger than one million increased from 13 to 49; the number of cities with a population ranging from half a million to one million increased from 27 to 78; the number of middle-sized cities increased from 59 to 213; and the number of small cities increased from 115 to 320. The annual growth rate of urbanized areas has nearly tripled in two decades, according to the 2005 *China Statistical Yearbook for Cities*.

The level of urbanization in China increased from 18 percent to 41 percent between 1978 and 2003, and the international experience of urbanization suggests that China's urban growth will accelerate in years to come. Most developed nations are about 76 percent urbanized. It is thus expected that 65 percent of the Chinese population will be living in urban areas by 2050.

The expected growth is accompanied by problems that could ultimately jeopardize China's growth and that pose difficult challenges for China's sustainable future. The main problems include extravagant spatial expansion, uncoordinated urban development, and sporadic urban encroachment into rural areas. Some of these problems are the direct result of policies and regulations, such as the farmland protection policy, which forces urban spatial growth into preserved cultivated land. Other

problems are the result of improperly managed and regulated market processes. To seek solutions to these problems, the Lincoln Institute of Land Policy sponsored a conference titled “Smart Urban Growth for China” in May 2007. The conference was the second in a series as part of an effort to better understand the evolution of and issues associated with the rapid urbanization taking place in China. Thirteen papers from the first conference were collected in the book *Urbanization in China: Critical Issues in an Era of Rapid Growth*, published by the Lincoln Institute in 2007.

Acknowledging the growth problems, the Chinese government recently initiated a strategy called the Scientific Outlook on Development, which stresses the importance of creating a harmonic society, with sustainable and balanced development as its basic requirement and coordinated and comprehensive growth as its fundamental approach. Chinese scholars, policy makers, and planners are asking questions such as the following: Are smart growth doctrines developed elsewhere applicable in China? Are public policies effective in managing the problems associated with urban growth? Are China’s various urban plans efficient instruments in guiding urban growth toward more scientific growth?

Three themes are addressed in this volume. First, to what extent is smart growth relevant to China? In other words, what lessons can China learn from the experiences of other countries in their efforts to combat urban sprawl? Second, what are the “dumb” growth patterns—those that are economically inefficient, environmentally unfriendly, or socially undesirable? Third, to what extent is China’s fragmented planning system responsible for uncoordinated urban growth?

Defining Smart Growth for China

Gerrit Knaap and Xingshuo Zhao (chapter 1) start with the following fundamental question: Is the concept of smart growth, developed mainly in the United States, pertinent to the urbanization problems in China? The authors disagree with the argument, based on the observed high development densities, that China is already “growing smart.” They present cases to demonstrate some of the ways China is not obeying smart growth principles: low-density developments in the urban fringe that fail to promote compact growth or preserve open space and farmland; large, high-density residential developments with few commercial, recreational, or other non-residential uses that lack a distinctive sense of place; the rise in car ownership, along with insufficient public investment in urban infrastructure; and finally, the lack of fair public participation, further creating tensions in the development process. China is already experiencing the pains of unintelligent urban growth. Thus, the principles of smart growth, which have the potential to mitigate adverse growth impacts, are as pertinent to China as they are to most parts of the United States.

Dennis Frenchman (chapter 2) prescribes a set of smart urban design strategies to promote livability and sustainability for Chinese cities, based on a range of lessons learned from international experiences. These strategies include preserving access by adding bike lanes, repairing destruction wrought by urban highways, and narrowing streets to reduce the impact of cars; maintaining identifiable but not necessarily new city images; sustaining tradition as a means of differentiating cities

from one another; safeguarding the diversity of cities by advocating for a style of planning as a continuous, incremental process rather than making sweeping changes; and recognizing local culture and preferences to make cities more competitive. Drawing on the successes and failures of cities worldwide, Frenchman argues that only when the above strategies have been included in the place-making process can truly sustainable cities with individual identities be created.

Christine Bae (chapter 3) evaluates the question of the greenbelts, one of the most debated land use issues in Korea, and considers whether it has any relevance to China. After an overview of the origins and the goals of Korea's greenbelts, Bae enumerates their impacts, including increased city size, higher land values and house prices, higher building densities, and increased social inequity. She then outlines the politics surrounding the reform of the greenbelts and describes how the government has turned a political problem into a technical one. Bae provides a constructive discussion on the implications of Korea's experience for China and outlines the reasons a greenbelts policy may be inappropriate for China. Drawing on international experiences, she argues that the rationale for the greenbelts has been undermined due to decreasing concerns about food security and increasing urban population and housing pressures. Finally, she suggests that the major lesson of Korea's greenbelts for China is that property rights should be taken into consideration when development control policies are drafted.

Ding and Song (chapter 4) argue that, as a means of financing China's urban expansion sustainably, a property taxation system merits serious discussion. To support the argument, the authors describe issues of the current land and property tax systems in China, including outdated tax types that no longer function as they were originally intended; narrowly defined land and property tax bases that fail to reflect key features of modern urbanization; redundant and differentiated taxes that fail to follow the principle of equity; and mismatched revenue sharing and public goods spending by local governments, which force those governments to rely heavily on land revenues to finance urban expansion. The authors present two main sets of benefits of the property tax: (1) It can be a reliable and stable source of revenue for local governments; and (2) it has the potential to shape urban development patterns in a more desirable way. Finally, the authors discuss the objectives of the property tax and the challenges that must be overcome to implement a smart fiscal policy in China.

Identifying Urbanization Distortions in China

Alain Bertaud, Jan Brueckner, and Yuming Fu (chapter 5) present an overview of several deficiencies in the spatial organization of Chinese cities, specifically in the locations and functions of land uses, the intensity of land use, and the timing of land development. Based on this overview, the authors provide a set of recommendations designed to foster better urban development management and urban transportation policies, with the goal of improving land-use decisions for Chinese cities. They describe the tasks to be added to the current urban planning process: The environment must be adequately protected and incompatible land uses segregated; land-use regulations must be made consistent with affordability and demand for different

types of land use; and enough primary infrastructure and adequate transport systems must be developed in time to avoid land supply bottlenecks. The authors explain how urban development occurs in market economies and discuss the appropriate role for urban planners. They also offer insights on how shortcomings in the structure of local public institutions and the bureaucratic influence over land use in China lead to land use decisions that are not always economically beneficial, even when government officials attempt to act in society's best interests.

Chengri Ding (chapter 6) continues to explore whether and how the structure of local public institutions and bureaucratic influence over land use decisions have resulted in what he has coined as “dumb” growth patterns in Chinese cities. Ding gives more attention to the following four sets of land policies and institutional setups: the Land Use Rights (LUR) system and public land leasing in urban China; mechanisms of land requisition that allow for urban development; efforts made by the central government to protect farmland through the 1998 Land Administration Law (LAL); and land use planning as the implementation tool for farmland protection. He then details how these policies have been used to promote economic growth across cities. As outcomes, Ding illustrates several distinctive urban land use patterns in Chinese cities: establishment of industrial zones, development of university towns, separation of land use zones within a metropolitan area, creation of urban villages within central cities, and leapfrog development in the urban fringe. Ding relates the illustrated irrational growth patterns to aggressive land use decisions motivated by local governments whose main goal is economic development.

Roger Chan (chapter 7) evaluates the overall effectiveness of the key policy tools implemented in China to preserve cultivated land. He argues that, to a large extent, the policies for cultivated land preservation embedded in the 1998 Land Administration Law (LML)—which allocated land by prescribed quota and the approval of the state council, the provincial government, and municipalities—reflect the way resources are distributed in the traditional planned economy. Chan suggests that a market-based mechanism of dynamic balance policy of farmland distribution is more flexible and effective. Comparing China's farmland preservation practice to the smart growth paradigm in the United States, Chan points out that in China's current preservation system each department of the government focuses on the preservation of one element—farmland, for example—while neglecting other goals such as protecting the environment and maintaining the proper layout of urban areas. Chan concludes that an improved monitoring and statistics system that would generate updated and accurate data on dynamic cultivated land changes, a multifaceted preservation system for conserving multiple land types, and a coordinated development management system to balance land preservation and urban expansion would add more intelligence to China's farmland preservation strategies.

Xiangzheng Deng, Jikun Huang, Scott Rozelle, and Emi Uchida (chapter 8) provide empirical evidence for understanding the extent of urban expansion in China from the late 1980s to 2000 and the factors driving that expansion. The authors use a unique dataset of high-resolution satellite imagery data and socioeconomic data for the entire area of coterminous China. Their results demonstrate that income, population, transportation costs, and agricultural rents have played important roles in China's urban expansion. In other words, cities in China expand with rising

income, increasing population size, lower transportation or commuting costs, and lower agricultural rents nearby—not unlike what occurs in the United States. By showing that those four basic factors explain most of the variation in the urban spatial scale of Chinese cities, this chapter indicates that although Chinese cities may have inherited many features of government urban planning, market forces today have exerted a significant influence on urban land use.

Making Smarter Plans

Yang Zhang, Yan Song, and Chengri Ding (chapter 9) provide a thorough description of China's planning system. They show that urban development is guided by four different plans administered by different agencies at different administrative levels. The Economic and Social Development Plan covers long-term development goals. Except for capital investment projects, most economic and social development goals are aspatial and thus do not have direct spatial implications for the distribution of land uses. The Land Use Plan, with its overarching purpose of setting quotas for five main categories of land uses, ranging from protected farmland to urban land, does not necessarily accommodate the goals set in the Economic and Social Development Plan. The Urban Plan, frequently used as a tool to request more land for urban development from the upper level government by the local municipalities, often fails to serve as a guide for sustainable urban form and land use patterns. Finally, the Transportation Plan, created under a convoluted system itself, also falls short of coordinating with other plans. The authors present several cases to illustrate the problems associated with this fragmented planning system. From a technical perspective, they propose a framework of integrated plans for Chinese cities. They believe that China's recent institutional reform promises to increase coordination among plans, which will guide more efficient urban growth.

Yan Song and Xiaohong Pan (chapter 10) take a closer look at China's urban planning system and list some of the unintended effects of various urban plans. They demonstrate that many plans exhibit the following limitations: They have been used to pursue economic growth, overlooking other important goals such as an efficient urban form, a livable community, and a sustainable environment; they have failed to apply land market principles in determining land use type and intensity; they have promoted single-use districts such as residential bedroom communities, industrial districts, and college cities; and they have failed to coordinate with other plans such as land use and transportation plans. The authors also found that the current planning system lacks an effective management component for development. They support what has been called for in the 2006 Explanatory Notes of the City Planning Act; that is, plans need to provide for comprehensive protection of resources, include more public participation, and transit from a physical planning and designing process to a more inclusive public policy- and regulation-making process.

Jiawen Yang, Jian Feng, and Ralph Gakenheimer (chapter 11) discuss the evolution of the job-housing balance in Chinese cities as the country has moved from a planned economy to a market economy. The authors point out that the recent reliance on land and housing markets for workplace and residence location decisions

has loosened the spatial connection between jobs and housing that existed in the prereform era. The spatial organization of cities in the postreform period is controlled not by deliberate government planning and control, but by the aggregated decisions of individual locators such as businesses and households. The authors criticize the current practice of planning, which appears to promote mixed and balanced land uses but is based on inappropriate geographical level through an institutionalized planning process. The outcome is disintegrated and extremely homogenous land uses in different districts of cities. With increasing household income and vehicle ownership, changing job market conditions, and many other social forces, the authors argue that, first, the land use design standard needs to be tailored to each city; and, second, general policies aiming to improve nonmotorized transportation need to be considered in promoting balanced workplace-residence developments.

Daniel Rodríguez (chapter 12) acknowledges that the integration of land use and transportation is a major step toward smart urban development and argues that growing Chinese cities lack coordination between land development and transportation investments. Institutional responsibilities for land planning and transportation often overlap horizontally (various agencies within a single jurisdiction share common or related responsibilities) and vertically (local, provincial, and central governments share common or related responsibilities). The author promotes an integrated approach to modeling transportation and land development that would increase links between development intensity, land use, growth management, multimodal infrastructure investments, expanded policy analysis, and forecasting. The author recognizes the challenges Chinese cities face in modeling land use and transportation integration, such as an immature land market, incoherent institutional structure, and limited data sources; and he outlines the desired features of an integrated model as being able to portray the complexity of actors in the land development game, convey uncertainty, support policy scenario analysis, treat transportation more comprehensively, consider the relationship between land development and the built environment, have explicit spatial dimension, and provide adequate scalability.

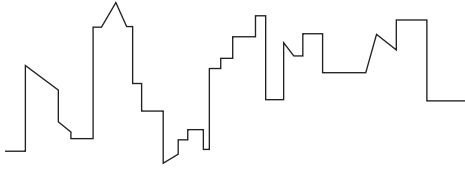
Paul Cheshire (chapter 13) provides several principles for integrating and coordinating the fragmented planning system in China. He specifically takes on three spatial policies: land use planning, local economic development policies, and transportation planning. He argues that the choice of spatial level at which these three planning policies are designed and implemented should be guided by four basic principles. The first is that specific policies need to be tailored to regional or local circumstances because factors influencing people's demands or resource supply vary across space. The second is that the geographical area over which a policy's benefits extend should coincide with the area over which its costs are incurred to minimized unintended spillover effects across space. The third is to identify any significant scale economies that will affect policy design or implementation so that local public goods can be provided in the most efficient manner. The fourth is to identify potential synergies and coordination issues within and between types of policy, so that as far as possible policies can be coordinated in their implementation. Although Cheshire draws on a case from the United Kingdom, the principles are put into a wider analytical and institutional context and are thus applicable to Chinese cities.

In summary, China's transition from a planned economy to a market-based economy is moving at a fast pace. Economic reform has proved to be successful, and the urbanized area and urban population in China have been increasing at an unprecedented rate. However, China's urban development style has signaled an alarming trend. Rapid development produces great challenges for planning, as many unwanted outcomes have emerged. It is essential that scholars, policy makers, and planners identify smart policies and plans to reverse the trend. With that need in mind, this book makes a first effort in collecting thoughts from a variety of authors who are committed to a sustainable urban future.

Part I



Defining Smart Growth
for China



Smart Growth and Urbanization in China: Can an American Tonic Treat the Growing Pains of Asia?

GERRIT KNAAP

XINGSHUO ZHAO

Over the next several decades, countries in Asia will undergo a transformation of settlement patterns unlike any the world has ever seen. The rate of urbanization in China, in particular, will rise from just over 30 percent to over 60 percent over the next three decades. The pace of change alone will raise the question of whether Chinese cities are growing smart. The smart growth movement, however, was born in the United States and designed primarily to address North American development problems—for example, the problem of urban sprawl. This chapter will examine whether the principles of smart growth are applicable to the urbanization problems of Asia, where sprawl, if it exists, is quite different from sprawl in the United States.

Between 2000 and 2010 the majority of the world's population will live in urban areas for the first time in history (United Nations 2003). By 2030, it is estimated that more than 60 percent of the world's population will live in cities. And while urbanization is occurring worldwide, the rate of urbanization varies tremendously. In 2000, the urbanized population in the United States was 77 percent; in China it was only 36 percent (United Nations 2003).

Although the United States is more urbanized than most of the developing world, most people do not consider U.S. development patterns as a good model to follow. Many U.S. residents, frustrated by rising taxes, longer commutes, less open space, more roads, and more cars clamor for an end to urban sprawl and for the development pattern known as smart growth. Smart growth has many definitions, but generally smart growth patterns feature compact and mixed land uses; promote transit, bicycle, and pedestrian-friendly projects; favor urban infill and redevelopment; conserve natural resources; and encourage citizen participation. While the efficacy of smart growth remains in doubt, there is growing evidence in the United States that smart growth can serve to mitigate the adverse environmental effects of urbanization. The question here is whether smart growth can similarly mitigate adverse growth impacts in China.

Global Urbanization

The ramifications of global urbanization are difficult to overstate. On the positive side, urbanization is generally concurrent with industrialization, and industrialization typically brings rapid economic growth. Further, industrialization brings higher incomes, higher rates of literacy, and lower rates of fertility and infant mortality. Urbanization also, however, often brings significant environmental disruption, especially if rapidly urbanizing nations develop in patterns similar to those in the United States.

According to the United Nations Human Settlements Programme (UN-HABITAT), the highly urbanized developed regions of the world generate by far the greatest proportion of carbon dioxide (CO₂), the principal greenhouse gas, primarily by burning fossil fuels such as petrol and coal (UN-HABITAT 2006). The reasons are twofold: The economies of developed nations are more energy intensive, and in developed nations citizens drive more cars. The reasons those citizens drive more cars are twofold as well: They have higher incomes, and their cities are built around the automobile.

Differences in urban form between the developed and developing countries are striking. As shown in figure 1.1, densities in U.S. cities are by far the second lowest on the planet; Asian cities are the most dense. According to Newman (2000), these differences in density lead directly to differences in choice of transportation mode and thus differences in energy consumption and carbon dioxide emissions. The percent of travel using public transportation or nonautomobile travel in 1990 varied from a low of 14 percent in the United States to 80 percent in wealthy Asian cities (figure 1.2). Similarly, kilometer traveled in 1990 varied from a high of 13,000 in Houston to a low of 351 in Beijing (figure 1.3). Consequently, energy consumption per capita ranged from 56,000 mega joules in the United States to 7,000 mega joules in Asian countries (figure 1.4). Finally, the transportation sector contributes well over 80 percent of carbon dioxide emissions, 50 percent of nitrogen oxide emissions, almost 40 percent of volatile organic compound (VOC) emissions, and over 30 percent of the

FIGURE 1.1
Urban Density Worldwide, 1990

SOURCE: Newman (2000).

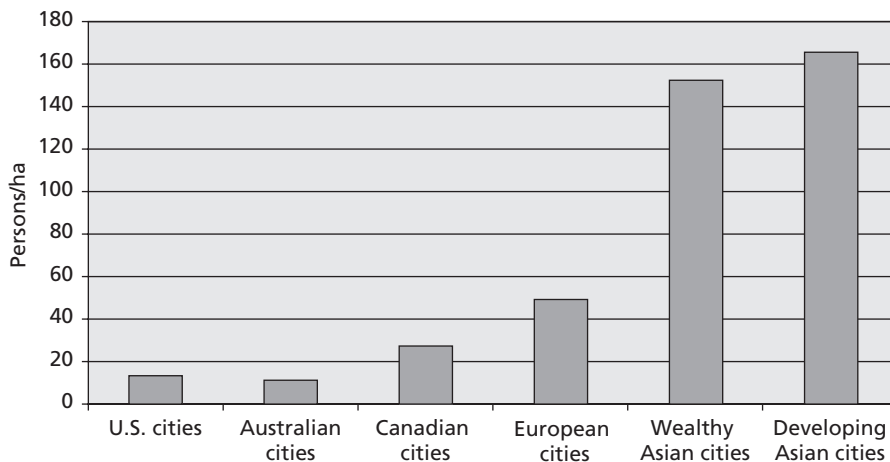


FIGURE 1.2
Urban Nonauto Transport Worldwide, 1990

SOURCE: Newman (2000).

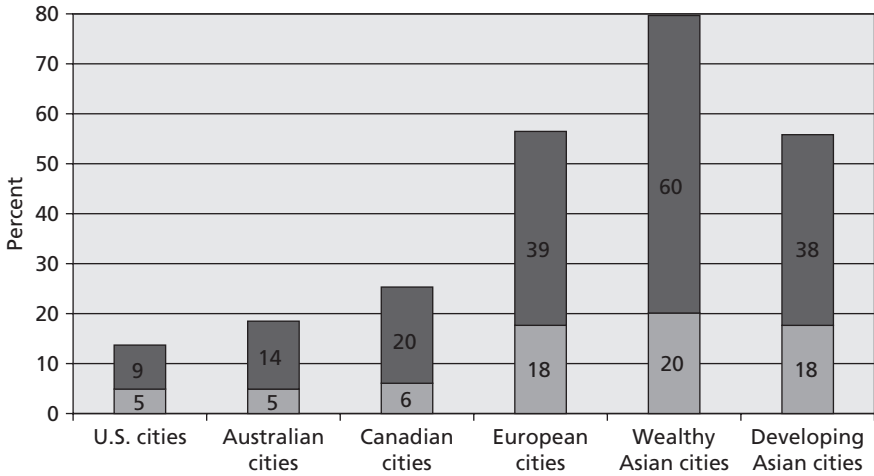
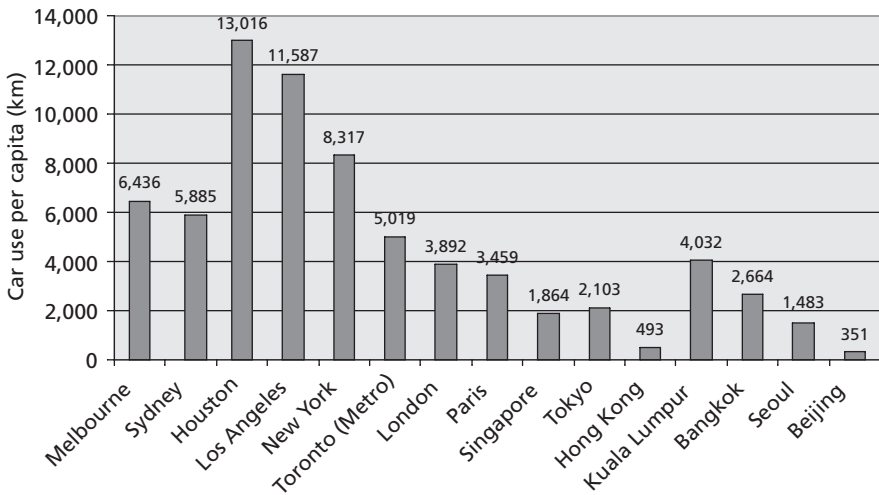


FIGURE 1.3
Urban Car Use Worldwide, 1990

SOURCE: Newman (2000).



lead emissions (figure 1.5). Since over 90 percent of the world’s population growth in the next three decades will occur in the urban areas of the developing world, it is easy to see why these patterns of development are of significant planetary concern.

Urbanization in China

Perhaps nowhere on earth is the change in settlement pattern occurring more rapidly and with more global consequences than in China. In 2000, the People’s Republic

FIGURE 1.4
Per Capita Energy Consumption of Cars, 1990

SOURCE: Newman (2000).

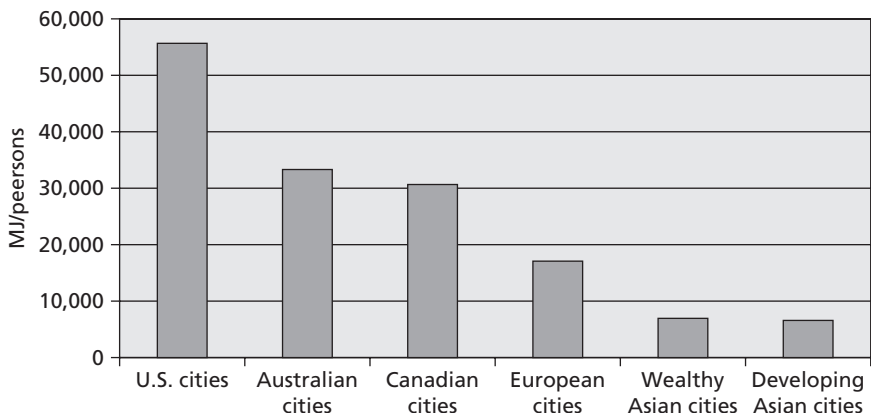
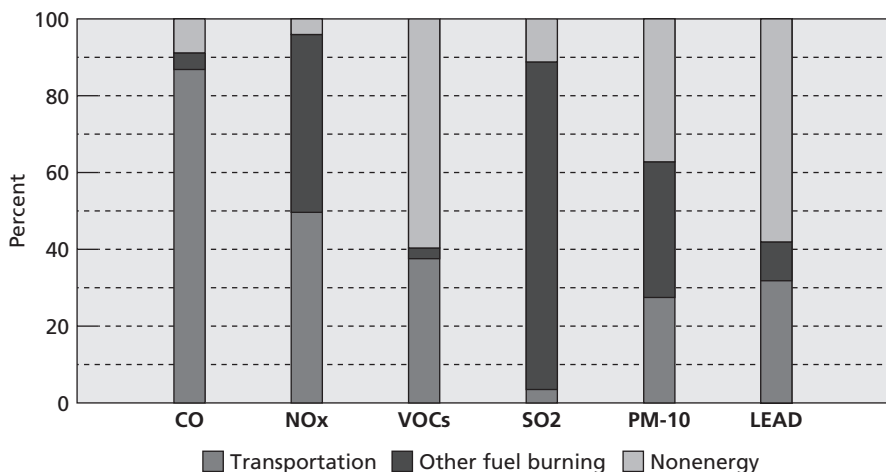


FIGURE 1.5
Percentage of Emissions by Source, 1995

SOURCE: National Air Quality and Emissions Trends Report, 1995, EPA 454/R-96-005 (1996).



of China was the home of more than 1.3 billion people, or about one-fifth of the world's population (Pannell 2003). At the same time, although only about 37 percent of China's population lives in urban areas, it has the world's largest urban population: about 480 million people (Pannell 2003). Already, China has more than 90 cities with more than one million residents. Over the period from 2000 to 2050, China's urban population is expected to grow approximately 4–5 percent per year, such that by 2050 the urbanized share of the population will reach 60 percent (Pannell 2003). Over this period, more than 400 million residents will move from rural to urban areas. It is estimated that China will add about the population of New York City to its urban population in every year (Oster 2006).

This phenomenal rate of urbanization is the product of interrelated trends. First, the country is undergoing significant political reform. Although the central government still plays a major role in all aspects of Chinese society, the opening of its markets to foreign investments, the demise of the state enterprise as the dominant economic institution, and the relaxation of the *hukou* system of population control have also contributed significantly. As in all other nations, however, urbanization in China is closely associated with its industrialization. The gross domestic product in China continues to grow at approximately 10 percent per year, with most of that growth coming from the developed eastern coastal region. Consequently, most of the urban growth in China is occurring in the coastal cities of Shanghai, Guangzhou, Shenzhen, and others. Without doubt, this mega region of China is fast becoming one of the leading economic growth engines of the twenty-first century.

Despite its relatively low level of urbanization, China is already experiencing the pains of urban growth. Respiratory disease, for example, is a leading cause of death in China, accounting for approximately 25 percent of all deaths (Weisbrod 1999). Rates of the chronic obstructive pulmonary diseases, including emphysema and chronic bronchitis, are twice the average for developing countries.

In China, as elsewhere, rates of respiratory disease are clearly related to the extremely high levels of harmful air pollutants. In 1995, concentrations of particulates and sulfur dioxide were between two and five times in excess of the public health standards established by the World Health Organization (WHO) (Weisbrod 1999). Beijing and Shenyang had four times the WHO particulate standards and twice the level of Bangkok, widely known for its soot. Sulfur dioxide (SO₂) levels in Beijing, Shenyang, Taiyuan, Jinan, and Chongqing all exceeded WHO standards, Chongqing by almost six times (Weisbrod 1999).

Vehicular emissions are the predominant source of China's urban air pollution. Approximately 50–60 percent of urban air pollution comes from vehicle emissions (Weisbrod 1999). Although China's transportation sector is small compared to that of other countries, its transportation and urban design choices have already become issues. China has less than 6 percent of the number of vehicles the United States has, 11 million compared to 190 million (Weisbrod 1999). According to Weisbrod, China now has one vehicle per 115 people, while the United States has one vehicle per 1.3 people (Weisbrod 1999). How many vehicles will China have in 20 years?

In 1998, Lee Schipper and Gareth Lewis-Davis looked at vehicle growth for a large number of nations; they found that vehicle growth strongly correlated with per capita income and had a positive relationship in nations with car production or assembly facilities and with road infrastructure. On this basis, Schipper and Davis posited three scenarios, the most likely of which is that by 2020 China will have 180 million vehicles. Trucks could add an additional 30 percent for a total of 234 million vehicles. Schipper and Davis's scenario would mean that by 2020, China would have the same order of magnitude of vehicles as the United States, on a land mass of approximately the same size. However, those vehicles would be operating in a country already facing severe air and water pollution problems and with a population four times larger than that of the United States.

Smart Growth as an Urban Development Strategy

In response to the growing dependence on automobiles and its resultant environmental effects, the land use strategy called smart growth developed in the United States. The principles of smart growth are listed in table 1.1. Smart growth grew out of the growth management movement of the 1970s and 1980s, but it differs in some important respects. Unlike growth management, which sought to slow growth and better manage the process, smart growth focuses on four basic issues: (1) the location of development (encouraging compact growth, preserving farmland and open spaces, investing in established communities); (2) the design of development (providing a range of housing opportunities, fostering distinctive communities and mixed uses); (3) transportation and land use connections (creating walkable communities with transportation choices); and (4) urban development procedures (encouraging stakeholder participation and making development decisions fair and predictable).

It is unlikely that smart growth alone will solve China's growing transportation and ambient air pollution problems, but it has the potential to play a significant role. To test possible solutions to China's growing air quality problems, for example, the World Bank posited three scenarios: (1) an automobile-dominated strategy with business as usual; (2) an automobile-dominated strategy but with improvements to vehicles and upgraded gasoline and diesel; and (3) a land use and public transit strategy that would cluster developments along corridors with established transport nodes. The third scenario could be called a smart growth strategy.

The World Bank found that the capital cost of scenario number three would be high; it would take a \$24 trillion investment between 2000 and 2010. The capital cost of the automobile-based strategies would be higher, about \$29 trillion in the same period, and those strategies incur the added costs of much higher automotive fuel use.

In terms of the environment, the business-as-usual strategy of unconstrained growth of vehicles with no enforcement of emissions standards would result in an

TABLE 1.1
Ten Principles of Smart Growth

-
1. Mix land uses.
 2. Take advantage of compact building design.
 3. Create a range of housing opportunities and choices.
 4. Create walkable neighborhoods.
 5. Foster distinctive, attractive communities with a strong sense of place.
 6. Preserve open space, farmland, natural beauty, and critical environmental areas.
 7. Strengthen and direct development toward existing communities.
 8. Provide a variety of transportation choices.
 9. Make development decisions predictable, fair, and cost effective.
 10. Encourage community and stakeholder collaboration in development decisions.
-

approximately twenty-five-fold increase in the amount of emissions released in 2020 as opposed to the base year of 1993. According to the World Bank, the improvement scenario, which would consist of implementing and enforcing tough emissions standards and improving traffic management, would hold emissions to a fifteen-fold increase. Even the land use strategy, with improved bus-based public transit, would result in an approximately five-fold increase in emissions.

Is China Growing Smart?

According to Kenworthy and Hu (2000), China is in many respects already growing smart: “By any international standards, Chinese cities, like their other Asian neighbors, have high urban densities and are characterized by quite intensively mixed land uses in their built-up areas.”

To the extent that China is already growing smart, or has always grown smart, smart growth and its advocates have little to offer China concerning land use, especially as it pertains to taming the automobile and preserving environmental quality. If China is not growing smart, then it makes sense to inform Chinese policy makers about the “American” approach to managing urban growth.

Compact Growth and the Preservation of Open Space

Smart growth development patterns are compact and relatively contiguous, which serves to protect farmland and open space. To support their assertion that Chinese cities generally have grown smart, Kenworthy and Hu present tables 1.2 and 1.3. As shown, Chinese cities in 1990 averaged approximately 146 persons per hectare, while U.S. cities, for example, averaged only 14 persons per hectare. As discussed earlier, Chinese cities are among the most densely developed cities in the world. But aggregate density is not the whole story.

According to more than anecdotal evidence, densities in Chinese cities are falling and urban growth is consuming large areas of farmland and open spaces. A series of

TABLE 1.2
Urban Densities in Chinese Cities (persons per ha, 1995)

City	Estimated Population in Built-up Area (in thousands)	Size of Built-up Area (ha)	Density in Built-up Area (persons/ha)
Beijing	6,528	47,700	137
Shanghai	7,656	39,000	196
Tianjin	4,752	35,900	132
Guangzhou	3,083	25,900	119
Hangzhou	1,148	9,600	120
Ningbo	914	6,200	147
Average	4,014	27,400	146

SOURCE: Kenworth and Hu (2000).

TABLE 1.3
Urban Densities in Selected Cities (persons per ha, 1990)

Groups of Cities	U.S. Cities on Average		Chinese Cities (1995)						
Urban density	13		146						
Selected Asian Cities	Manila	Surabaya	Jakarta	Bangkok	Tokyo	Hong Kong	Seoul	Singapore	Kuala Lumpur
Urban density	198	177	171	144	104	300	245	87	59

SOURCE: Kenworthy and Hu (2000).

studies by Anthony Yeh of the Pearl River Delta found that national statistics significantly underestimate actual land consumption by urban growth (Yeh and Li 1997). Furthermore, according to Lichtenberg and Ding (2004), China lost approximately 4.7 million hectares of farmland between 1978 and 1996.

Not all development in China occurs at high densities. Some low-density development (figure 1.6) is designed to meet the private space demands of newly high-income citizens. Other low-density development (figure 1.7) is occurring in the urban fringe on land owned by rural cooperatives. Since each family that belongs to the cooperative has the right to build its own house on a small piece of land that is allocated by rural cooperative, development in the rural fringe of many Chinese cities occurs haphazardly, without the benefit of carefully planned urban infrastructure.

Mixed Use with a Distinctive Sense of Place

Smart growth features development patterns that not only are dense, but also combine land uses in a way that creates a feeling of community and a distinctive sense of place. Given the absence of good data, it is hard to demonstrate quantitatively how mixed the land uses are in Chinese cities. Using a series of photographs like that in figure 1.8, Kenworthy and Hu argue that land uses in Chinese cities feature a healthy mix of commercial and residential uses. In smaller urban areas, a typical row house often includes a street-level commercial establishment directly below the residence of the proprietor.

But as in developed countries, fine-grain mixtures of uses and richly diverse urban environments in China are giving way to large-scale, single-use developments. (For more discussions on recent homogenous land developments in China, see the section on “District Plans and Associated Effects” in chapter 10 in this book.) To capture economies of scale in production and to minimize financial risk, many new residential developments are extremely dense but largely limited to residential uses.

Transportation Choices

Smart growth features a pattern of development that facilitates walking and biking, as well as access to public transportation. As shown in table 1.4, the percentage of

FIGURE 1.6
Low-Density Development in Beijing

SOURCE: <http://www.napavalley.com.cn/index1.asp>.



trips taken by walking and bicycling is higher in Chinese cities than in the cities of any other major country in the world. The public transit share of nearly 20 percent is almost double that of the United States but considerably lower than European cities. The question is whether that high level can be sustained.

For a number of reasons, the choice of any transportation mode other than private vehicles is likely to fall in China over the coming years. First, as discussed above, car ownership will certainly rise. Even without changes in urban populations or urban form, car ownership will rise as incomes rise. Second, as the economy develops and the vestiges of the *danwei* (work unit) system give way to the pressures of urban land markets, the distances between home and work are expected to rise. As discussed above, economies of scale in the workplace, as well as in residential construction, will lead to the separation of living and work places. Third, spending on public transit is unlikely to keep pace with the growing demands for urban transportation.

There is also evidence that development patterns and public investments in urban infrastructure are not conducive to minimize mode share in private automobiles. Investment in roads and highways is increasing rapidly, and much of that investment not only discourages alternative modes of public transit but also leads to further sprawling urban form (see figure 1.9).

FIGURE 1.7
Exurbia of Hangzhou, Zhejiang Province,
August 2007



FIGURE 1.8
Mixed-Use Development, January 2008



TABLE 1.4
Mode of Transportation by Cities

Cities	Year	Walking and Cycling	Public Transit	Private Motor Vehicle	Other	Total
Beijing	1995	61.5	30.1	4.1	4.3	100.0
Shanghai	1995	77.9	15.1	2.8	4.3	100.0
Guangzhou	1996	69.4	14.2	9.4	7.0	100.0
Average		69.6	19.8	5.4	5.2	100.0
American cities	1990	4.5	10.6	84.9		100.0
Australian cities	1990	5.0	15.3	79.7		100.0
European cities	1990	18.4	38.8	42.8		100.0
Developed Asian cities	1990	20.3	59.6	20.1		100.0
Developing Asian cities	1990	18.1	33.0	48.5	0.4	100.0

SOURCE: Kenworthy and Hu (2000).

FIGURE 1.9
Freeway Bridges in Beijing and New Development Zone in Xi'an



Fair, Predictable, and Participatory Decision Making

Smart growth features a development process that involves a high degree of public participation, a high degree of regulatory certainty (and a low degree of administrative discretion), and a relatively equal standing of all citizens in the decision making. Kenworthy and Hu are silent on development process, except to note that the high degree of central planning creates the potential for well-planned and managed communities. In their words, “There is no evidence to show that Chinese cities (except in remote areas) would be allowed to reduce their density to a medium or significantly low level to accommodate cars” (2000).

Evidence of regulatory stringency, however, is not necessarily evidence of a fair or public participatory process. Public participation in general has never been an established feature of the development process in China. In addition, erosion of the *danwei* social contract has further distanced the public from decision-making authority. According to the *China Development Brief* (Derleth and Koldyk 2002), most administrative decisions in China are made behind closed doors before dissemination to the public. While there have been several attempts recently to involve the public more directly in planning and development processes, the role of the public remains marginal.

The process of land conversion at the urban fringe remains problematic, particularly with respect to its fairness and predictability. Urban land is allocated by a combination of administrative and market mechanisms, which create substantial arbitrage opportunities for private enterprises and government entities. Private enterprises can lease land from municipal governments in return for payment of a conveyance fee. Local governments can acquire land by paying a compensation package set according to administrative formulas based on agricultural income, which is typically far lower than the conveyance fee. Revenue from land transactions is a major source of funding for local governments; according to some estimates, it can account for between a quarter and a half of all municipal revenue (Lichtenberg and Ding 2004). As a result, local governments have strong incentives to expand into rural areas to finance their ongoing obligations in the areas of infrastructure and housing.

Current regulations also make it more attractive for local governments to provide housing for growing populations by expanding into rural areas rather than increasing density within existing urban boundaries. Redevelopment of existing municipal land requires governments to pay compensation to current tenants and to cover resettlement expenses. Compensation paid to current residents is much higher than that paid to rural inhabitants. In Beijing, for example, land costs (primarily compensation) make up as much as 60 percent of the redevelopment cost of existing urban areas, compared to 30 to 40 percent of the cost of developing converted rural land (Lichtenberg and Ding 2004). Tenants may also resist displacement tenaciously, which at the very least creates significant delays.

Tensions created in this process have recently led to citizen unrest and violence. As reported in the *Washington Post*, "Land disputes have been a prime reason for popular explosions of violence, which the Public Security Ministry estimates involved 3.76 million people in 74,000 incidents during 2004" (Cody 2005).

Summary and Conclusions

Urban populations are growing across the globe, but in no place is the urbanization process more pervasive or important than in China. Because of its population size, its rapid economic ascendance, and its growing geopolitical importance, the urbanization of China has important implications for the entire planet.

In developed countries, particularly the United States, urbanization fostered urban decentralization and ever-spreading dominance of the automobile as the primary mode of transportation. If China follows the U.S. pattern of development, the

implications for energy use and environmental disruption are enormous. If, instead, China adopts smart growth policies, perhaps some adverse consequences can be mitigated or reversed.

Many have argued that China is already growing smart and that prescriptions of smart growth are inappropriate for China at this stage of development. The evidence above, however, suggests that is not the case. While development densities in China remain notably high, there is evidence of low-density sprawl at the urban fringe of many Chinese cities; many developments of variable densities lack a mixture of uses; many public investments inhibit walking, bicycling, and transit ridership; and development processes fail to include public participation and are not particularly predictable or fair.

In short, the principles of smart growth are as pertinent to China as they are to most parts of the United States. Seeing that policy makers in both China and the United States understand and incorporate these principles remains the challenge of urban advocates around the world.

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