Where and How Much: Density Scenarios for the Residential Build-out of Gaoming, China

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ABSTRACT

The author will use Gaoming District in the western part of China's Pearl River Delta (PRD) as an opportunity to examine the impact a range of residential densities along planned public transportation corridors can have on the rate and degree of agricultural land conversion in urbanizing areas. The author will use collected field data on the existing densities of old and new residential building construction in Gaoming, Gaoming District's 2004 Master Plan, projected population and economic growth figures from the Gaoming Planning Department, and the parameters of land leasing and revenue generation in China as inputs in her analysis. The author will then present scenarios where a range of residential densities is created from variations in the degree of government planning, public transportation investment and land leasing methods. Moreover, the author will present instructions to build an economic model for planners to understand the land valuation process by which private developers bid for land. Lastly, the author will make recommendations to the planners and officials for how they can generate more revenue from land and work towards the sustainable build-out of Gaoming.

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CHAPTER I: OVERVIEW

1.1. *Introduction*

Over the last 20-30 years, China's rapid economic growth has had a significant impact on land use. The rapid rate of industrialization and urbanization is of great concern because Chain's per capital arable land is far below the world's average.[1] The Pearl River Delta (PRD) is one of the most productive agricultural areas in the country and, due to its location and proximity to Hong Kong, also one of the fastest developing regions of China. The unprecedented rate of agricultural land loss[2] in the PRD has resulted in decreases in food production in the coastal regions[3] and increasing negative externalities such as the pollution of land and water resources (See Fig. 1.1. *Loss of Arable Land in the Pearl River Delta, 1990-1998*). In 1994, the State Council passed the Basic Farmland Protection Regulation (BFPR) prohibiting basic farmland[4] conversion to nonagricultural activities. The 1998 Land Administration Law (LAL) required municipalities to offset agricultural land conversion for urban use in one locality with an equal area of agricultural land reclamation in another locality within a certain time limit.[5]

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[1] Ding, Chengri and Gerrit Knaap. "Urban Land Policy Reform in China's Transitional Economy." *Emerging Land & Housing Markets in China,* Lincoln Land Institute: Cambridge, 2005. China feeds more than 20% of the world's population on less than 7% of the world's farmland. Its per capita farmland (1,1,67 sq meters) is half of the world average (2,333 sq meters).

[2] From 1990-1998, the PRD lost 38% or 3,871 sq. km. (about the size of Rhode Island) of its arable land to urbanization. Over the same time period, Foshan Municipality, which includes Gaoming District, lost 20% or 214 sq. km of its cultivated land. Source: Guangdong Statistical Yearbook, www.info.gov.hk/hk2030/hk2030content/wpapers/wpaper_18/English/e_table9.htm (accessed June 2005).

[3] Anthony Gar-on Yeh and Xia Li, "The Need for Compact Development in the Fast-Growing Areas of China: The Pearl River Delta, "*Compact Cities,* London, 2000.

[4] Basic farmland consists of agricultural production bases (such as crops, cotton, edible oils, and other high-quality agricultural products) approved by governments; farmland that has been in production, is highly productive and has good irrigation; vegetable production bases for large and mid-sized cities; and experimental fields of scientific and educational purposes, Ding and Knapp, 2005.

[5] Ding and Knaap.

The State's policies to preserve agricultural farmland are often in direct conflict with other policies that encourage local municipalities to compete globally (and locally with other municipalities) in economic growth. Political leaders are appointed for 5-year terms and are given promotions based primarily on their locale's economic performance and ability to contribute revenue to the State's coffers. While more attention and effort is being focused throughout China at all levels of the government on preserving agricultural land and open space, reducing environmental pollution and improving the quality of the built environment, the political promotion system gives local leaders little incentive to think beyond the short-term impacts of their decisions.

Cultivated Land (in million m^2)

City	1990	1991	1992	1993	1994	1995	1997	1998	Area Loss (1990-1998)	%
Guangzhou	1,646	1,619	1,518	1,380	1,343	1,324	1,263	1,257	-389	-24%
Shenzhen	186	151	103	60	46	44	42	41	-145	-78%
Zhuhai	375	377	361	318	289	276	254	254	-122	-32%
Huizhou	1,475	1,441	1,366	1,319	1,345	1,358	1,318	1,320	-156	-11%
Dongguan	588	586	563	502	479	472	442	442	-146	-25%
Zhongshan	698	704	526	457	429	420	413	427	-271	-39%
Jiangmen	1,861	1,846	1,802	1,713	1,674	1,658	1,641	1,618	-243	-13%
Foshan	1,078	1,067	1,019	936	901	890	874	864	-214	-20%
Zhaoqing	2,402	2,377	2,305	2,247	2,239	2,231	1,384	1,376	-1,026	-43%
Total Delta	10,313	10,168	9,564	8,932	8,744	8,674	6,674	6,442	-3,871	-38%
Total Province	25,290	25,123	24,338	23,505	23,248	23,174	22,988	22,922	-2,367	-9%

Figure 1.1. *Loss of Arable Land in the Pearl River Delta (1990-1998). Source: HK 2030, www.info.gov.hk/hk2030/hk2030content/wpapers/wpaper_18/English/e_table9.htm*

Moreover, of the business and personal taxes collected and paid to the Central Government, only a small portion is allocated to local governments to cover local infrastructure and operational expenses. This kind of fiscal arrangement in China forces local governments to generate revenue to cover their fiscal shortfall. Often, this means resorting to selling land leasing rights to raise revenue at prices lower than the fair market value of the land.

Land use decisions, such as the leasing of land use rights for commercial, industrial and residential development for short-term revenue generation have long-term ramifications. The challenges local governments face include making trade-offs between covering fiscal short-falls in the near-term and creating greater value in the long-term from the efficient planning and use of land in coordination with public infrastructure projects.

The District of Gaoming, located in the western part of the PRD, is one of the many local cities and towns struggling with this dilemma. Gaoming residential and business taxes are paid directly to the Foshan Municipal Government, which then returns a small portion of that to cover operational needs. In recent years, 60% of Gaoming's official total budget was raised from land-leasing revenue.[6]

Increasing demand to lease more land for development can be expected with the anticipated economic development of the Pearl River Delta West region.[7] Examples of poor planning and land use decisions already abound in the Delta East Region. Village enterprises and local governments have allowed rampant, low-density commercial and residential development of the countryside along the Guangzhou-Hong Kong rail corridor. This uncoordinated development requires further encroachment of land with the building of redundant road networks and is a significant impediment to the efficient building of sanitation, sewage and water facilities and public transportation networks.[8]

Gaoming District's stated efforts to balance industrial growth, urbanization and agricultural uses present an opportunity to examine what intensities of land use and residential densities are appropriate for residential land use, with an emphasis on sustainability and environmental preservation. The Mayor of Gaoming and planning officials have assumed that over the next 20-30 years the population will grow to 500,000 within the central district along 18km (12

[6] Statistic obtained from Foshan Planning Department, cited in presentations, Gaoming MIT Studio, February 2005.

[7] One of the biggest infrastructure projects in the world is currently being planned to build a 29-kilometer land bridge connecting Hong Kong, Macau and Zhuhai City across the mouth of the Pearl River Delta. The anticipated benefits include reduced driving times from over 1 hour to less than 30 minutes between those cities, making the relatively undeveloped Western Region more attractive to manufacturing, commercial and other forms of economic development.

[8] Yeh. Dongguan is a cautionary tale of unchecked development along the Guangzhou-Hong Kong rail corridor.

miles) of the banks of the Xi Jiang River, a dramatic increase over the existing population of 288,495.[9] This population increase will stem largely from the influx of workers drawn to the region by the booming economy. The political leaders and planning officials are committed to major upgrades in transportation infrastructure, including highway links to the Foshan, Guangzhou and the East Delta Region as well as highway links to the West Delta. They are also committed to building public transportation networks, although the exact nature of the network and its extent has yet to be decided.

In order to house and accommodate the influx of people and industry to the region, Gaoming officials must make critical decisions based on increasing demands for land use, the finite supply of land, and the political and economic trade-offs between agricultural uses and urbanization. The everyday quality of life for Gaoming's future residents will be affected by the build-out of the physical environment. From neighborhood-level land use decisions, such as the housing people live in, how far they must travel to their work or school, availability of amenities, and access to social and emergency services, to regional-level land uses decisions, like passive open space for aquifer recharge, green zones to separate residential from industrial areas – all are informed by density. To talk about the quality of urban life is to talk about trade-offs inherent in configuring density in an urban area.

For cities like Singapore and Hong Kong, thorough master-planning processes based on an urban land allocation per capita have resulted in high residential densities along reliable, high-capacity public transportation networks. The positive consequences of these policies include the preservation of wide swaths of public open space and compact urban forms that maximize the use of land (See Chapter 2).

In contrast, for cities like Bangkok and Dongguan, little to no land use planning has resulted in low-density cities with indiscriminate mixing of industrial uses adjacent to residential neighborhoods, an inefficient and uneconomical squandering of valuable land resources, sprawling urban areas that requires a large road network and induces private automobile use, adding to congestion and pollution.

[9] The current population figure does not include the 116,450 temporary residents. Gaoming Planning Officials announced this figure on January 20, 2005 at a meeting with the MIT Gaoming Studio.

1.2. *Question*

Given the unique land leasing and economic situation in China and examples of transit-oriented cities in Asia, how should the Mayor and the planners of Gaoming decide the appropriate levels of residential density towards a well-used, high density, transit-oriented city?

1.3. *Goal and Purpose*

The goal of this analysis would be to advise the Mayor and the planners of Gaoming on how to establish guidelines for residential density along transit routes by presenting scenarios that value land prices at different levels.

The **ASSUMPTIONS** in the scenarios include:

- Gaoming will be making public transportation investments along transit corridors and will implement development according to the Master Land Use Plan presented to the MIT Gaoming Studio in January 2005
- Land use regulations (or lack thereof) will establish parameters for use and densities around transit routes
- Demand for land is correlated with projected population growth over the next 20-30 years by 250,000 people
- Steady economic growth will exert increasing demand for all types of housing and land conversion
- Overall district density average to range from 100-120m^2, with higher-end residential uses at lower densities and lower-end residential uses at higher densities.[10]
- Existing preferences for new-construction housing will inform future preferences for housing typologies
- Existing supply of housing will remain on the market with new construction supplying new stock
- Urban land prices will reflect the demand for and supply of land and directly impact residential densities

[10] According to land use planning standards issued by the Ministry of Construction, the build area per capita cannot exceed 120 m^2, and is recommended to be 100 m^2. Of the 100m^2, 18-28 is allocated for residential use, 10-25 for industrial, 7-15 for transportation, and 9+ for open/green space.

- Urban land prices will also reflect the infrastructure cost to the degree that land leasing costs will be adjusted to each parcel's proximity to infrastructure and its designated use
- The visioning and planning preferences of the political leadership and planning bureau are towards efficient land use that creates higher long-term value for the land
- Land leases will be sold and/or traded on the secondary markets (i.e., the land lease will not be conveyed without cost)
- Developers will make a uniform and constant return on investments in land for residential development. The cost of developing residences is also constant.

The inputs that will **CHANGE** with different scenarios include:

- The supply of land depending on the physical conditions and topography; planning and land use decisions; revenue generation need; and political and government regulations
- The value and pricing of land depending on efficient markets (many bidders) or inefficient markets (few bidders) for land leasing through public auction, public tender and/or private negotiation
- The supply of land depending on varying revenue generation needs over varying time periods
- The building of public transit corridors with varying numbers of stops
- The demand for land based on consumer/user preferences for lower-rise (Western suburban model) residential projects or higher-rise towers (Hong Kong-model)
- The demand for land based on a range of densities between high-end and low-end residential housing

This thesis aims to show through three scenarios how varying changes in governmental policies and reforms in the land leasing market can lead to dramatically different land use intensities and thereby the amount of agricultural land that will

need to be converted for urban uses. It also presents instructions to build an economic model that helps planners and local leaders calculate the optimal FAR for parcels of land given certain planning constraints, consumer preferences, market conditions and cost structures. The economic model supports and illustrates how land values and residential densities can change according to various inputs in the different scenarios.

Used together, these scenarios and the accompanying economic model present a framework with which planners and local officials can weigh the benefits and costs of their decisions. In the final chapter, I will make recommendations for further research and put forth recommendations on how the government can think about the impact of how land use rights are leased on the primary markets and at what values, how much to invest in public transportation and by what means its benefits can be maximized, the importance of integrated transportation and land use planning, and how far-thinking and consistent policies can drive precious land resources towards the “highest and best use”.

CHAPTER II: LITERATURE REVIEW AND METHODOLOGY

2.1. *Introduction*

In the first part of this chapter, I will review the existing academic literature on land markets and densities to give a broader theoretical context to frame my discussion of Gaoming's build-out. The review is based on analyses of Western societies, where the land-ownership and free-markets have been in practice for the longest period of time, and from which exist the most extensive literature. Such study of Western practice is of express interest to the planners and policy makers in China, who are actively pursuing knowledge to frame and inform their decisions and work. The MIT Foshan and Gaoming Studios, in Spring 2004 and Spring 2005, are only two examples of the growing number of interactions between Chinese officials, Western practitioners and academic institutions.

In the second part, I will also review academic literature in an Asian-specific context, drawing upon academic studies of China's evolving land markets and pricing valuations and of Hong Kong, Singapore, and Bangkok to frame the unique circumstances of land use rights as they are practiced in Asia. A more in-depth discussion of Chinese Land-Use Rights and the history of land reforms follow in Chapter 3. It is my express interest to use the neoclassical model as a prism through which I can better understand the complexities of the Chinese land-leasing system and to ask whether it has any relevance and applicability to how China can pursue urbanization in a more efficient manner.

Finally, in the third part of this chapter, I will discuss my research methodology, the use of scenarios to illustrate the impact planning and policy decisions can have on Gaoming's residential build-out, and describe the steps I took to create the economic model to illustrate the scenarios in Chapter 4.

2.2. *Part I: The Broader Theoretical Context*

2.2.1. *The Neoclassical Approach to Land Market Assessment*[1]

The neoclassical "market" model presumes Western-style transferable, alienable, and enforceable private property rights in land. The supply of land or housing remains quite inelastic because its location is fixed while demand is quite price elastic because people have choices about where they want to live. Economists argue that land *must* be priced at each site to exactly "compensate" its occupant for the locational advantages existing at the site. This assumes that only demand considerations determine the *relative* value of prices of land or housing at different locations while the regional supply of land plays a role only in setting the overall regional level of prices.

Land value depends on expected returns from the use to which it is currently put, the expected time of change of use, and the expected returns from the more intensive use of the future. People or firms with different utility functions compete for locations and all land goes to the highest bidder.

In terms of residential land development, any expected returns from housing projects equal the housing rent. At any location, it is the sum of three parts: housing capital costs, agricultural land rent and locational rent. Prices for urban residential land equals the capitalized value of annual expected net stream of rentals (present discounted value (PV) of agricultural rent, the PV of the locational rent, and the PV of the expected future increases in locational rent. According to the neoclassical theory, demand for and supply of urban land cannot be properly assessed; rather, it is more appropriate to study demand for, and supply of, a particular use to which the land is, or will be, put to use, say residential or commercial. Land use and land is inseparable.

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[1] DiPasquale, Denise and William C. Wheaton, "Chapter 3: The Urban Land Market: Rents and Prices," Urban Economics and Real Estate Markets, Prentice Hall, Englewood Cliffs, NJ, 1996.

[2]Yang, Zhizhong, "Urban Land Market and the Effect of Regulation on Real Estate Development in the PRC: A Case Study of Shanghai" Master of City Planning and Master of Science in Real Estate Development Thesis, MIT, 1994. Yang offers a thorough and pithy summary of the literature on land market assessments, from which I have pulled information applicable to my inquiry.

Any market assessment for residential land markets includes the delineation of *housing market area*, usually considered to be within one hour travel, or commuting, time from any point to any other point in the market; *demographics* such as household income, distribution, household size, tenure, population growth rate; *population density* and *characteristics* (i.e., housing typology); *current market conditions* including housing stock composition, vacancy rates, current prices, rental rates and absorption rates; *future market demand and supply*; *changes in demand* from net immigration (migration of workers to urbanized areas from rural areas), new household formation and household mobility; *supply factors* such as current new construction activity, current vacancy rates, fallout of existing housing stock; and *particular institutional factors;* and *directions of urban growth.*

By comparing demand and supply factors for housing development, an estimate can be made of the total value of the housing unit based on its market price. The market price net of housing capital costs should be the price for land. According to Yang's assessment of the neoclassical model, it is theoretically sound but there is little empirical evidence due to the difficulties in getting land value data. A land price index does not exist in U.S.; the volume of sales transactions is too small for rigorous research; and data on the repeat sales of identical piece of land is even harder to come by to see how changes (environmental, infrastructure, etc) have impacted prices. In light of these circumstances, sale prices are often hidden and it is hard to separate land value from the value of the improvements upon it.

Given these constraints, how relevant is this neoclassical model for China and for other developing economies, where institutional arrangements of urban land markets are different, and where reliable data is almost nonexistent? An increasing number of researchers, among them Anthony Walker, David Dowall and others would say that much of it does not yet apply to the current situation in China.[2] Instead, the institutional aspects of the market, such as property rights, entitlement and government regulations play a large role in shaping land markets in these developing economies.

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[2] Yang from Anthony Walker, Land, Property and Construction in the PRC (Hong Kong: Hong Kong University Press, 1991) and David E. Dowall, "Establishing a Land Market in Shanghai: A Discussion Paper," UC Berkeley, Working Paper, 1991.

2.2.2. *Property Rights and Economic Behavior in Western, Market Economies*[3]

During the 1980s and 1990s, China introduced some market-oriented property-rights reform to the Special Economic Zones (SEZs). While these reforms contain some elements of the "market" model, the Chinese land leasing system and market retains many "Chinese characteristics." The State still proclaims to be a socialist country with constitutionally established State ownership of the means of production, such as urban land. A review of the literature on institutional analysis can be used to gain a better understanding of the Chinese land market.

The complex nature of institutional arrangements in general and in regard to property rights has produced different behavioral models under different property-rights systems, including centralized and decentralized socialist economies and less development economies. The major contributors to the development of economics of property rights include but is not limited to: Armen A. Alchian, Ronald H. Coase , L. De Alessi, Harold Demsetz, and Douglass North.

North states that institutions make the rules of the game that shape human interaction in society. These institutions structure incentives in economic, social and political exchange.[4] He argues that the kinds of skills and knowledge fostered by the structure of an economy will shape the direction of change and gradually alter the institutional framework. Gershon Feder and David Feeny classified institutions into three categories: constitutional order, institutional arrangements and normative behavioral codes. Property rights in land are included in the category of institutional arrangements, which in turn are created within rules specified by constitutional order. As a social institution, property implies a system of relations between individuals, which involves certain kinds of rights, duties, powers, privileges, forebearance, etc.[5] Property rights are comprised of a bundle of characteristics: exclusivity, inheritability, transferability,

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[3] *Ibid.*
[4] Yang v. Douglass North "Institutions, Institutional Change and Economic Performance," Cambridge: Cambridge University Press, 1990.
[5] Yang v. A. Irving Hallowell, "Culture and Experience," Philadelphia: University of Pennsylvania Press, 1943.

and enforcement mechanisms. “The property rights approach emphasizes interconnectedness of ownership rights, incentives, and economic behavior.[6]

“Property rights impact the performance of the economy, by assigning the ownership of valuable assets and designating who bears the rewards and costs of resource-use decisions. Property rights institutions structure incentives for economic behavior within the society.” Moreover, “by allocating decision-making authority, the prevailing property rights arrangement determines who are the actors in the economic system.”[7]

In regards to the scenarios for this thesis, the property rights analysis of organizational behavior is of particular interest. Behavior depends on appropriability of income streams, that is, on the effective rights to various kinds of income (i.e., rights to control the use of resources and to enjoy the benefits arising therein)**.** Appropriability is constrained by monitoring and policing from outside. If the direct monitoring cost is high, and there is no extra policing device, the decision maker in an organization is apt to use power to gain personal benefits. There is reason to suspect that in the decision maker will not align his own interest with the interest of the property owners. If his/her behavior is not value-maximizing for property-owners, market prices will be distorted.

The property-rights approach has been found to be applicable to different situations, where it provides testable propositions about economic behavior. For socialist countries, it is found that due to egalitarian compensation scheme, government officials and firm managers are more likely to pursue unwarranted personal interests. As Yang further states, “the attenuation of rights to net income reduces the costs of their seeking other satisfactions, including perquisites of office, public reputation, power and patronage.”[8]

In summary, the distinct differences in the property-rights systems between the Westernized market economies and China compels a multi-prong approach that incorporates aspects of the neoclassical “market” model and an in-depth

[6] Yang v. Alchian, Armen A. “Pricing and Society,” Occasional Paper 17, London: Institute of Economic Affairs, 1967.
[7] Yang v. Libecap, Gary D. “Contracting for Property Rights,” Cambridge: Cambridge University Press, 1989.
[8] Yang

understanding of the interactive, overlapping roles the State, the representatives of the State, and local institutions, such as work units and villages, play in the land market. Moreover, the degree to which one can argue whether a true land "market" exists in China depends on the conditions under which land-leasing and land-use laws are implemented in different regions and cities. These conditions include the threat of future expropriation of use rights and of improvements upon the land; the government's revenue generation needs and incentives to allocate land to the private sector; the rights to allocate land; and the extent to which the land market is competitive. These conditions, as applied to China, will be explained in depth in Chapter 3.

2.2.3. *Density and Urban Structure*

The study of density is at once an objective, quantitative measure of the intensity of the built environment and also a subjective proxy measure for the quality of life and of the urban space. To talk about density is to talk about many things at once, depending on the speaker's point of view, profession and area of study. This literature review introduces only the key readings from which this writer has chosen to speak about density - and its application as a measure of the success of Gaoming's future build-out.

Arza Churchman has written the one of the most comprehensive literature review on density, surveying authors and publications from multiple disciplines and touching upon the intersection of the topic and a host of other issues.[9] He defines density as the term that represents the relationship between a given physical area and the number of people who inhabit or use that area. It is expressed as ratio of population size or number of dwelling units (the numerator) to area units (the denominator). There are three different types of density: perceived density, physical density and measured

[9] Churchman, Arza. "Disentangling the Concept of Density," Journal of Planning Literature, Vol. 13, Issue 4, May 1999 (accessible online at: http://jpl.sagepub.com/cgi/content/abstract/13/4/389)

density.[10] Perceived density and crowding are based on the principle that the same density can be perceived and evaluated in different ways by different people, under different circumstances, in different cultures and countries.[11] Physical density is comprised of both objective and physical characteristics of the built environment that are perceived by people in an actual setting. Qualitative measures of physical density include height, spacing between buildings, scale and color. Quantitative measures of physical density try to capture the degree to which a space is filled by people, structures, housing or even built-up floor space.[12]

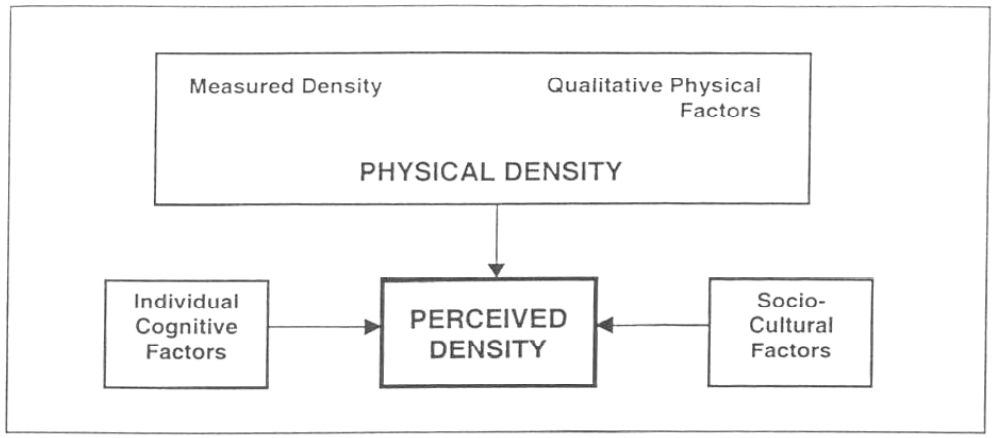


Figure 2.1. *Relationship bet. Different Types of Densities. Source:Chan, 2001.*

Talking about measured density is problematic when evaluating and comparing data across cities, regions and nations. There is no accepted measure of density, with different countries using different numerators and denominators. Beyond that, the actual measure of density varies, with some countries measuring population density (the number of people per given area), while others measure residential density (the number of dwelling units per given area).[13] Moreover, there are even differences in the definition of net and gross density. I have chosen to include Churchman's helpful table of residential density measures and will abide by these definitions in this thesis.

[10] Chan, Claire S. "Measuring Physical Density: Implications on the Use of Different Measures on Land Use Policy in Singapore" Master in City Planning Thesis, MIT, 1999. Chan quotes Alexander and Reed (1988).
[11] Churchman
[12] Chan
[13] Churchman

Parcel density (net-net density, net site density, net density, lot density)	Parcel density is measured in areas designated for residences. The two main ways to express this density are dwelling units per area and floor area per area. In some cases (Toronto, Israel, some regions of the United States), the measure consists only of the number of dwelling units built on parcels allocated for residence—it excludes roads, parks, and other public lands (Alterman and Churchman 1998; Berridge Lewinberg Greenberg, Ltd. 1991b; Wentling 1991). In the Netherlands, net density includes neighborhood-related spaces such as the land of the houses, schools, local streets, and local parks (van Andel 1998). The measure of floor area per area density is expressed in the ratio between the floor area and the lot area, both expressed in square meters. This measure is especially useful when the same parcel consists of land for residential and nonresidential purposes or in areas of high density and large buildings. Since the parcel density denominator is precisely defined, in contrast to other density measures, it is the most unambiguous measure.
Street density (net density)	This measure includes the area of the public street rights-of-way that provide access to the residential parcels. The prevalent numerator is the number of dwelling units, whereas the denominator is typically the parcel area plus half of the public rights-of way adjacent to the residential parcels.
Gross residential area density (gross site density, residential density, residential area density, gross density, gross living area density, neighborhood density)	This term expresses the living space of the population in the residential area, including both private and public space. This measure is useful because many residential areas include a limited variety of nonresidential uses meant to serve the local residents, such as parks, schools, community centers and so forth. It takes into account the space needed by a given residential population, when all the residentially related uses are taken into account, in addition to public streets and the residential parcels. Gross residential density is the most ambiguous measure, because some neighborhoods may include land for purposes that serve a wider population than that of the specific area, for example, zoos, theaters, and so forth. Wentling (1991), for example, defines gross density in parts of the United States as the number of units per acre of initial undeveloped site.
Density measures beyond residential areas (population density, community density)	Since the denominator in this measure includes the entire municipal area, it will reflect the lowest density mentioned so far, because the municipal region includes land that has other than residential uses, as well as undeveloped land. Hitchcock (1994) points out that as the amount of undeveloped land differs from city to city, it is difficult to compare the density of different cities whose density measure is based on dwelling units. On the other hand, Berridge Lewinberg Greenberg, Ltd. (1991a) claims that two measures—gross population density and gross urban density—do not include, in most cases, undeveloped areas and that these measures are therefore useful for a comparative study of cities.

SOURCE: Hitchcock (1994).

Figure 2.2. *Density Measures in Residential Areas. Source: Chuchman, 1999.*

Furthermore, it is common to see in real estate literature the term Floor-Area-Ratio (FAR), which measures density at the net site level. It is often used as a measure of density, in relation to specific lots or parcels in real estate discussions, and is particularly useful for non-residential density measures. FAR is the total built floor area on a parcel divided by the area of that parcel. For example, a building containing 20,000 square feet of floor area on a parcel of 10,000 square feet has a floor area ratio of 2.0.[14]

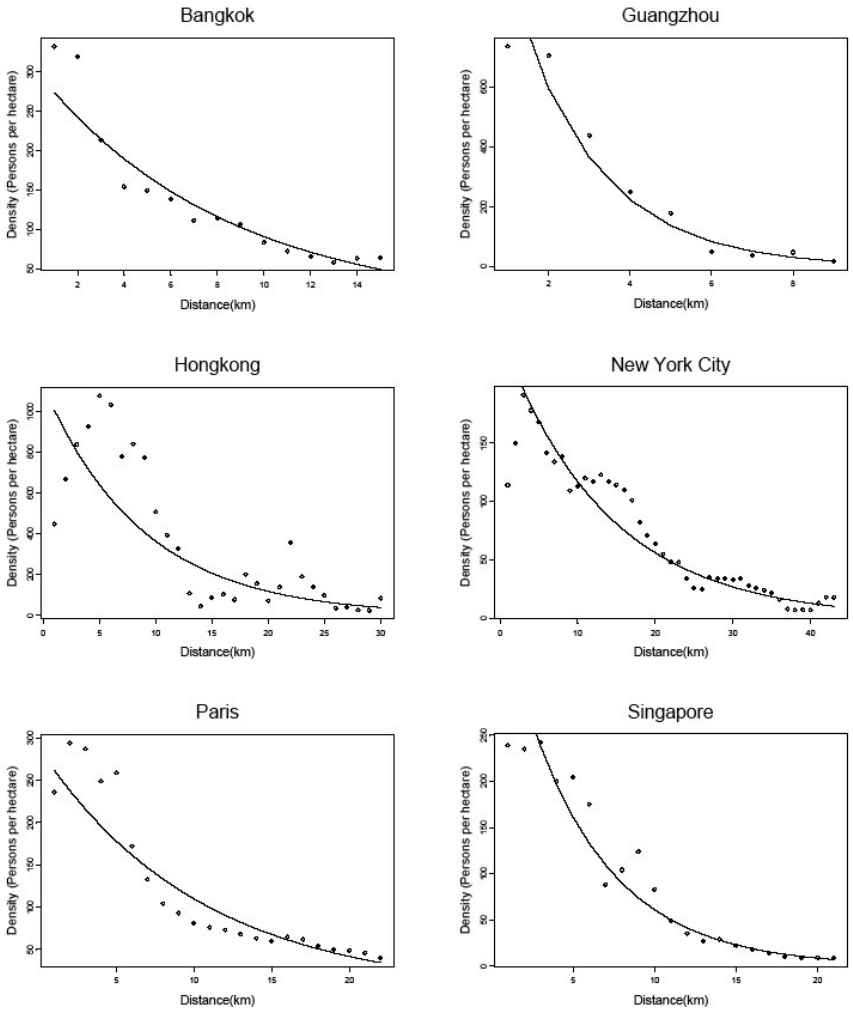
Planners must be mindful of the fact that the perception of density is subjective. The term used for negatively perceived density is crowding. The very subjective evaluation of density suggests that the performance of key policies and strategies to achieve land use optimization - putting the land to "highest" and "best" use – is one that changes from context to context.

2.2.4. *Density as a Categorization of the Urban Spatial Form*

On a more macro-level, density can also be used to categorize any patterns of urban spatial form. The classical model of urban form and spatial dispersion has been one where a negative exponential density gradient exists with increasing distance from the city center. Bertaud and Malpezzi's work have consistently found, most recently in a study of about 50 metropolitan areas in 20 countries, that many large cities fit the standard urban model, whereby the negative exponential density gradient flattens with income, with city population and falling transportation costs.[15] (See Figure 3. Population Densities of World Cities).

[14] http://www.nyc.gov/html/dcp/html/zone/glossary.html
[15] Bertaud, Alain and Stephen Malpezzi. "The Spatial Distribution of Population in 48 World Cities: Implications for Economies in Transition"

Figure 2.3. *Population Density of World Cities. Source: Bertaud & Malpezzi, 2003.*



Of interest to this thesis is Bertaud and Malpezzi's finding (validating Mills and Tan, 1980) of persistent and strong patterns of decentralization as incomes rise and cities grow in population. The implications for Gaoming and for many Chinese cities are clear. Will their continued development – with projected rising incomes and record rates of urban migration – follow the pattern of other developed cities around the world? If patterns of decentralization come about, what will be the impact on China's agricultural and undeveloped land? How can the Chinese government counter this trend given its stated goals to prevent further loss of agricultural land?

Encouragingly, Bertaud and Malpezzi have found that the regulatory regime of a city has profound impact on its density.

Whereas natural constraints, such as geography, matter to some degree in determining the density of a city, they have found that man-made constraints matter much more.[16] "Regulation is the transmission mechanism" where changing regulations will, over a very long period, change the form of the city.

This thesis, in its scenarios and modeling, uses the physical measure of (residential) density as a measure that reflects the regulation of the built environment and the impact of these regulations on the urban form. Physical density, then, can be looked at in two ways: as a planning tool to capture the intensity of land use, and as a performance indicator of the successes and failures of planning policies.[17] In this thesis, land use optimization is one where parcels of land are differentiated and valued for its physical and locational attributes, such that the price paid for land use rights reflect the highest bid for a particular parcel among an open pool of bidders. As an example, land located in the commercial district of a metropolitan center will be valued highest by commercial users, who value that space more than residential or industrial users, because of the agglomeration benefits that accrue to being in proximity to other commercial firms. The concept of "highest" and "best" use then reflects the practice of land use optimization where the bidders' bids reflect their utility.

2.3. *Part II: The Greater Asia Context*

2.3.1. *Development of Hong Kong, Singapore and Bangkok*

The following citations are but a brief look at the vast literature concerning the development of other Asian cities. I have chosen these cities, Singapore, Hong Kong and Bangkok, and these studies because they have also used the prism of physical density as a measure of successful land planning and development. As applicable to Gaoming, these

[16] *Ibid.*
[17] Claire Chan's thesis and its use of density provided the key insight to how I have used the measure of density for this thesis.

examples point out how important the role of government and thoughtful planning practices play in regulating land development.

One of the best examples of disciplined land use planning and high quality of life is Singapore. Claire Chan's 1999 Master's thesis looks at how physical density has been measured in Singapore and assesses the suitability of the methods of measurement. She also evaluates current planning practice to determine how successful they have been to achieve the goal of optimizing land use. Her major finding is that Singapore has a rigorous process of planning analysis that conveys the intended land use intensity transparently to stakeholders. The use of FAR as a density measure is the result of a macro Concept Plan for the whole island that draws upon long-term planning intentions and determines the amount of housing, commercial space, working space, etc. be provided for the population.[18] These projections are then translated for each of Singapore's 55 local planning areas (DGP), that covers a population of approximately 150,000 people served by a town center. Upon completion, the DGP is designated as a new Master Plan.[19]

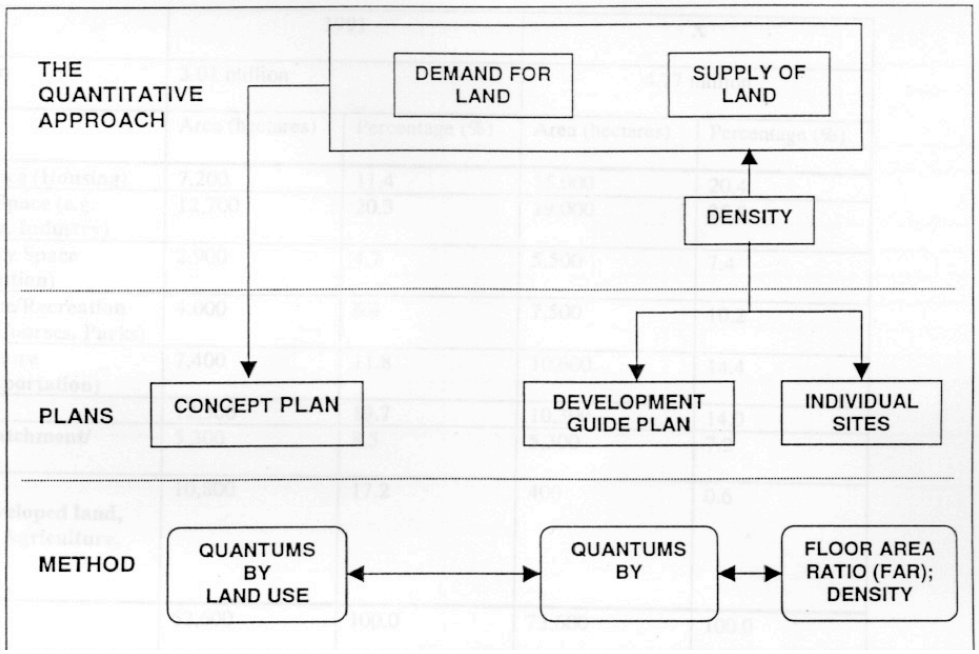


Figure 2.4. *Singapore Quantitative Planning Process. Source: Chan, 1999.*

For instance, in planning a new

[18] Chan.
[19] Singapore Urban Redevelopment Authority. Outram Planning Area Planning Report 1995.

residential area, planners first determines the number of people to be housed there based on population growth projection, household size, etc; then decided on how many residential dwelling units needed to be planned to accommodate the population, the quantum of commercial space needed to service the population, and the transportation, infrastructure, education and recreation facilities to be provided for (according to URA site area standards). Then FARs are assigned to individual land parcels.[20]

Kwame Addae-Dapaah suggests that under-pricing and under-utilization of some urban low-density residential lands in Singapore has led to less than optimum utilization of land. This is caused by institutional constraints that value units of land primarily on the basis of the plot ratio, even though the land-use capacity of the parcels of land is equal. This means that the price of a low-density housing plot is lower than a medium/high-density housing plot, at high financial cost to society as most of the land is state-owned. The fix for the problem will be to "economically" price the land on the opportunity cost calculated by land-use capacity, as it is being sold and taxed. The advantages will be to increase the proceeds from the sale of state land to benefit society and income from property tax will be substantially increase; and only a few people who can afford to pay the "economic price" of land for low-density housing will be able to live there.[21]

Roger Bristow presents a comprehensive history and analysis of land-use planning in Hong Kong from 1841 to the mid-80s. Of particular relevance to Gaoming's development are case studies of the redevelopment of Central and the planning challenges that Hong Kong faced involving land policies with the existing villages in the New Territories.[22]

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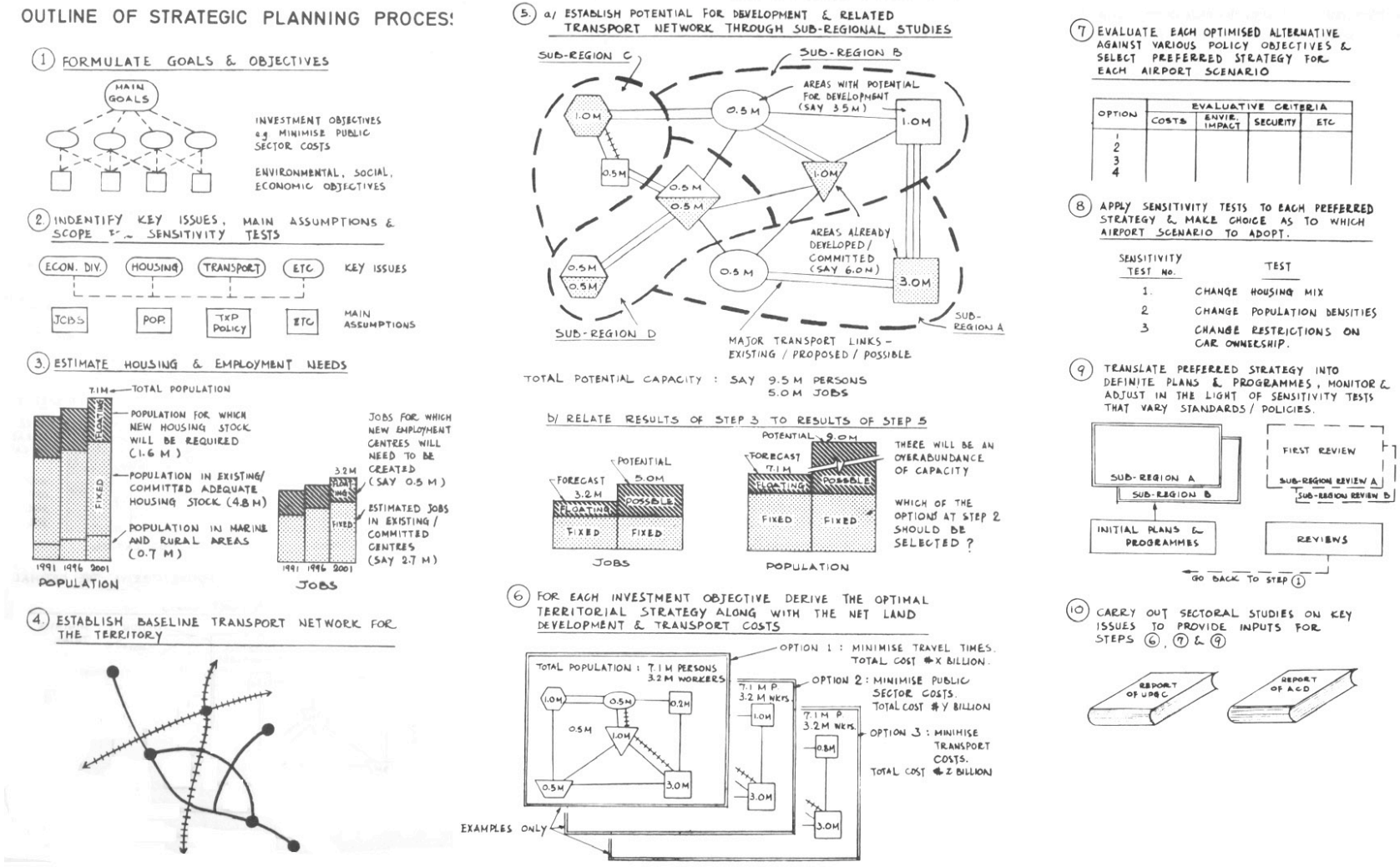
[20] Chan.

[21] Addae-Dapaah, Kwame. "Utilization of urban residential land: a case study of Singapore." *Cities*, Vol. 16, No. 2, pp. 93-101, 1999.

[22] Bristow, Roger. Land-use Planning in Hong Kong: History, Policies and Procedures, Oxford University Press: Hong Kong, 1984.

Figure 2.5. *Hong Kong Strategic Planning Process. Source: Bristow, 1984.*



Source: Plan SPU 82 / 276 A, Strategic Plan Unit, Lands and Works Branch, Hong Kong Government (Bristow)

Sharmin Gani compares variables in Singapore and Bangkok's policies related to developing urban density measures, on the premise that the success or failure of urban density measures of any plan is a good indicator of the success or failure of the planning system. He concludes that Bangkok suffers from traffic congestion, pollution, inadequate infrastructure and poor communication facilities as a result of limited public sector involvement and failed planning practices to anticipate urban development. The government failed to develop the economy in other parts of the country, thus centralizing population growth into the Bangkok Metropolitan Area. Population migration was further encouraged by investments in major roads and bridges, thus increasing the population's mobility. Meanwhile, the government failed to invest in building infrastructure and to intervene with planning controls for high-density housing, resulting in vast amounts of private development along the urban edge of agricultural land. Belated attempts on the government's part to increase the minimum FAR in the city center was not accompanied by parallel investments in necessary transit facilities, thus leading to greater congestion of the already too narrow secondary road network.[23]

Lastly, a study by Mee-Kam Ng and Peter Hill compares and contrasts give globalizing metropolises in Asia: Tokyo, Hong Kong, Singapore, Taipei and Shanghai, finding that while these cities have accumulated considerable economic wealth to build world-class infrastructure, their ability to address sustainability concerns such as developing an enlightened mode of governance to nourish social and environmental capital spans a wide range of successful outcomes. This paper presents a broad framework to link the discussion of sustainable cities and world cities, including discussions on population, urban densities, economic drivers, governance structures, cultural offerings, and environmental management.[24]

[23] Gani, Sharmin. Urban Density Measures in Planning for the Pearl River Delta, Master Thesis, MIT, 2000
[24] Ng, Mee Kam and Peter Hills. "World Cities or great cities? A comparative study of five Asian metropolises." *Cities*, Vol. 20, No. 3, p. 151-165, 2003.

2.4. *Part III: Methodology*

2.4.1. *Data Collection*

- Field Research throughout the PRD in Shenzhen, Guangzhou, Panyu and Gaoming over 3 trips, January 2004, June 2004 and January 2005
    - Walk-through examinations, and drawing analyses of existing the housing stock and neighborhood densities
    - Collection of marketing brochures and Interviews with real estate brokers in sales offices to analyze new development patterns and consumer preferences
- Interviews with academics, researchers and government consultants
    - Anthony Yeh (Hong Kong University)
    - Mee Kam Ng (Hong Kong University)
    - Yu-hung Hong (The Lincoln Land Institute)
- Presentations, formal Q & A sessions and informal discussions in January 2004, June 2004 and January 2005 with
    - Foshan and Gaoming Planners
    - The Mayor of Foshan and Gaoming
- Review of previous academic research & field studies in MIT libraries

2.4.2. *Analytical Framework: Scenario Building*

Scenarios offer a series of narratives based on extrapolations from existing data for envisioning the future of Gaoming. Scenarios are "tools for ordering one's perceptions about alternative future environments in which today's decisions might be played out."[25] The flexibility of this exercise stems from the fact that it does not require extensive data (see Gaps in Data later in this chapter) for its use, since scenarios are not predictive models. Rather, the advantage lies

[25] Project 2022. http://www.cityu.edu.hk/p2022/scenario/scfm.htm. (Accessed 7/22/05).

in the power of ordering the perceptions of planners and leaders to aid them in their decision making process, to allow them to see the potential macro-level ramifications of their actions. Scenarios should be used as a means to order priorities, establish goals and to establish action steps for data collection, planning and implementation (see Chapter 4).

2.4.3. *Analytical Framework: Modeling of Land Values and Densities*

After the planners have completed the scenario building and visioning process to prioritize the overall planning goals in Gaoming, their next steps are to address the details and the implementation of the plan. It is often quite difficult to make the leap from establishing meaningful goals, such as "building a sustainable city with residential uses clustered in proximity to public transit stops," to writing the specific guidelines for the zoning and land use, such as "each parcel within 250 meters of a public transit stop should have a minimum build-out of 250 pph/ hectare or an FAR of 2.0."

Specifically, planners can only offer specific guidelines for the development of each parcel, such as designating land use and minimum FAR. It is up to each private developer to determine the "highest" and "best use" for the parcels in a competitive, market-oriented system. Each developer has his/her own specific cost-structure, analysis of the market, and expected return upon which the bid price for the land is determined.[26] Planners therefore must understand the land valuation process in order to

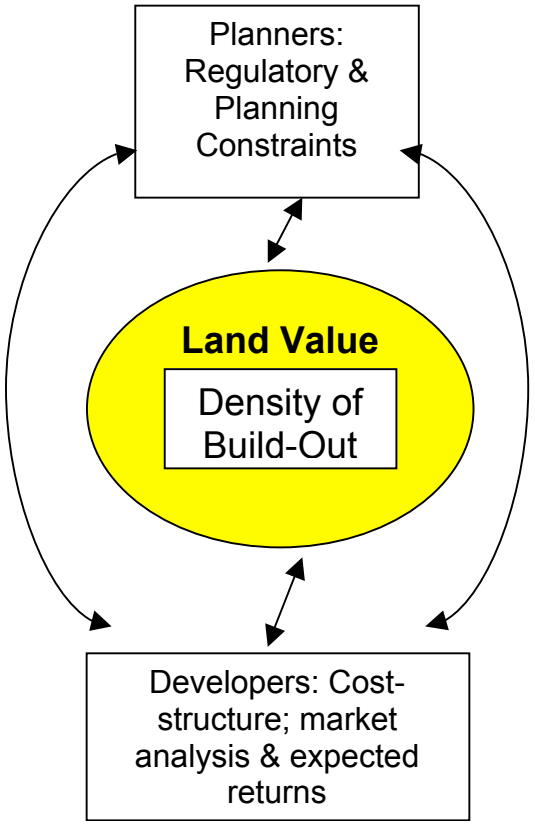


Figure 2.6. *Density and Land Value Derivation.*

[26] DiPasquale and Wheaton, Chapter 4, 1996.

drive development towards optimal densities that derive the "highest" and "best use" from the land.

I have prepared an economic model to help planners understand the potential land values of each parcel. The model rests on the assumption that land or housing *prices* are derived from the land or housing *rent* that an end user is willing to pay for the use of a particular piece of land, with the assumption that the parcel will go to the user who is willing to pay the highest rent.[27] The following is a list (by no means exhaustive) of the factors that impact the land price, or land rent:

- Physical condition of land (typography, previous uses or structures, environmental impacts, etc.)
- Location in proximity to employment centers
- Location in proximity to amenities (public transit, retail, entertainment, open space, recreation, etc.)
- Regulatory/planning constraints for physical build-out (min/max FAR, height limits, min/max site-coverage, etc.)
- Regulatory/planning constraints for land use (residential, commercial, manufacturing, etc.)
- Availability of infrastructure (sewers, utility hookup, roads, streets, etc.)

Real estate markets the world over has shown that land prices largely reflect how different users value the availability and mix of those factors. In general, the availability of infrastructure, greater proximity to amenities and the extent of the regulatory and planning constraints will reflect in higher prices.

However, for planners and government officials who must decide on the regulatory and planning constraints for development in new areas where infrastructure does not yet exist, they must grapple with what the potential demand and uses are and how their decisions will influence that potential.

- What are the potential uses for the land and who are the potential users?
- What kind of and the extent of the infrastructure will these users need?
- How many users will use the space?
- How much money is available for infrastructure? For public transit?
- How will the potential users value?

[27] *Ibid.*

The regulatory and planning constraints determine the potential of the parcel, but the regulatory and planning constraints are also predicated on this potential. One is not determined before the other. The question of what comes first, the regulatory constraints or the potential, is akin to the classic chicken-or-egg question.

The value of the land varies with the minimum or maximum FAR placed on the land by regulatory and planning bodies. The higher the FAR, the bigger the development project can be and more revenue it can generate. Based on that, the developer will be willing to pay more for that parcel of land. However, what is the right FAR to place on that piece of land in order to give developers enough incentives to build to that FAR?

I do not pretend to have solved that problem in regards to how Gaoming should be built out. This model is but one of many ways planners and officials can begin thinking about Gaoming's potential, about the trade-offs between the upfront cost of building infrastructure and public transit and the benefits of preserving more agricultural land and natural resources.

2.4.3.1 *Step 1: Derive the Optimal FAR (F*)*

Housing Price (P) = d – bF Formula 1a
Cost of Construction (C) = m + tF Formula 1b
Land price (p) = F(P-C) Formula 1c[28]

Where	Assumptions & Sources
d = location factor	All housing and locational factors besides FAR
b = marginal impact of FAR	Based on price per square meter
F = Floor-Area Ratio	Varies from 1-7, based on studies in PRD, Hong Kong and Singapore
m = "baseline" cost of "stick" construction	Varies greatly if using steel construction
t = marginal impact of FAR	Based on cost per square meter
p = land price (developer's residual)	Profit, driven towards zero with increasing competition
P = housing Price (value of asset)	Price per square meter of floor area in housing unit
C = Cost of Construction (with normal rate of return)	Increasing with increasing FAR

[28] *Ibid.*

Take the derivative of the Land Price equation with respect to F, and set it equal to 0 (zero) to derive F*.

$$p = F [P – C]$$
$$= \partial p/\partial F$$
$$= [\alpha - \mu] – 2F[\beta + \tau] = 0$$
$$F^* = [\alpha - \mu] / 2[\beta + \tau]$$

The optimal FAR (or optimal residential density defined as the number of housing units per hectare) is the point where the potential residual value (price of asset – cost of construction) is maximized.

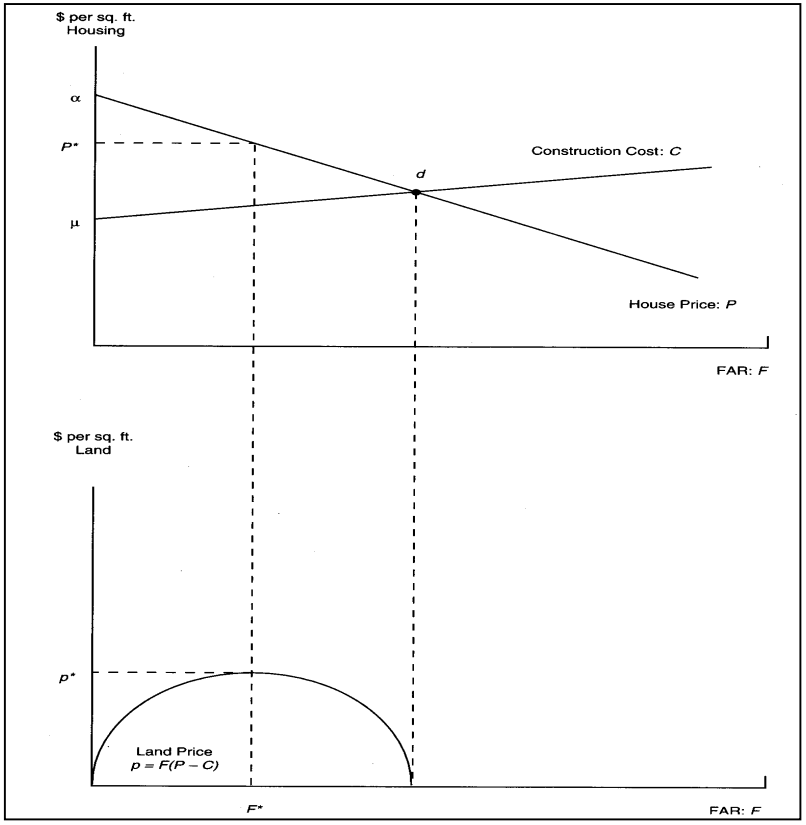


Figure 2.7. *Optimal FAR. Source: DiPasquale and Wheaton, 1996.*

2.4.3.2. *Step 2: Derive the Optimal Land Price (p*)*

Optimal Land Price $(p^*) = [\alpha - \mu]^2 / 4[\beta + \tau]$ Formula 2[29]

Take F*, substitute it back into the land cost equation (Formula 1c) to find p*. The optimal land price is equal to the optimal residual or profit the developer can derive from the parcel given the optimal FAR.

2.4.3.3. *Step 3: Derive the Optimal Land Acquisition Cost (A*)*

$A^* = p^* - C - \varepsilon$ Formula 3

Where	Assumptions & Sources
A* = Optimal Land Acquisition Cost	Residual of developer's residual (p) derived from subtracting other costs in socialist system (see below)
p* = Optimal Land Price	Derived from Step #2 above
C = Cost of Construction (with normal rate of return)	Increasing with increasing FAR
ε = Land use rights transaction fees	Represents "hidden" transaction costs in land use rights leasing

Land Cost $= \alpha (R)(F) + (R \times I) + (\beta \times D) + A$

Where

Land Cost = prices of land use rights per square meter

F = land use rights fee (see Fig. 7)

α = floor-area adjustment coefficient (see Fig. 8)

R = floor-area ratio (FAR)

I = infrastructure cost

β = demolition adjustment coefficient, which is dependent on land uses

D = demolition cost

A = land acquisition cost

Figure 2.8. *The Benchmark Land Use Rights Price System in China. Source: Ding and Knaap, 2005.*

[29] *Ibid.* The optimal land price or residual value for residential uses must, in the long run, be greater than the opportunity cost of agricultural land use and other competing land uses for each parcel of land.

The Optimal Land Acquisition Cost formula is derived from the optimal land price (Formula 2) and the land cost (Fig. 6) by taking into account the unique land leasing system situation in China, where other costs, such as land use rights fees, demolition and infrastructure fees, in addition to standard acquisition costs, must be paid to the government as part of the leasing process. The total land cost (see Fig. 6), with the exception of the land acquisition cost (A), can be combined with other standard construction costs in Formula 1b to derive the cost of construction (C) in Formula 3. In addition, this formula takes into account the extra "hidden" costs (ε) related to land use rights transactions, which include gifts, incentives and other pay-outs to local officials by developers, that are a common part of privately negotiated deals.

Figure 2.9. *Land Use Rights Fees by Land Grade and Land Use Type, 1996 (in 1,000 RMB). Source: Ding and Knaap, 2005.*

Land Grade	Land Use Type			
	Commercial	Apartments	Residential	Industrial
1	3,200–5,400	3,000–4,600	2,000–2,700	320–540
2	2,400–3,200	2,200–3,000	1,500–2,000	240–320
3	2,000–2,400	1,800–2,200	1,000–1,500	180–240
4	1,500–2,000	1,400–1,800	800–1,000	140–180
5	1,000–1,500	1,000–1,400	600–800	100–140
6	500–1,000	500–1,000	400–600	70–100
7	400–500	300–500	150–400	30–70
8	70–400	70–300	50–150	25–30
9	50–70	40–70	30–50	20–25
10	45–50	30–40	20–30	15–20

SOURCE: China Land Newspaper (1996)

Figure 2.10. *Relationship between Floor-Area Adjustment Coefficient and Floor-Area Ratio. Source: Ding and Knaap, 2005.*

Adjustment Coefficient of Floor-Area Ratio										
Floor-area ratio	<1	2	3	4	5	6	7	8	9	10
Floor-area adjustment coefficient	1	1.91	2.74	3.5	4.2	4.9	5.6	6.3	7	7.7

SOURCE: http://www.law999.net/law/doc/d001/1993/07/06/00035268.html

2.5. *Summary of Methodology*

Formula 3, in effect, factors into the normal land valuation process as practiced in real estate markets in the West, the unique land leasing and "hidden" costs associated

with real estate transactions in China. The optimal land acquisition cost (A*), in essence, represents the residual of the developer's profits, the ultimate value of the land as determined by each developer in his/her bid.

Planners and local leaders, ideally, would be able to use these formulas and the economic model (See Appendix A) to test whether the planned density and land use guidelines established from the scenario building exercises are realistic given different conditions in different market and sub-markets, and given competing uses. These estimates would not only serve to refine the Master Plan for the variations in each area, but will also give planners and officials more information and leverage to guide their negotiations or selection of the best bid in the public auction and tender process.

One can see as well from Formula 3 that the land acquisition cost can be maximized by driving each developer to lower their other "hidden" land use rights transaction costs (ε). Planners and local leaders would ideally want to maximize land acquisition costs to increase the amount of revenue generated from leasing the land use rights and to develop the land to its "highest" and "best use". As Chapter 3 will detail, the current dual track market system and the practice of leasing land through private negotiations have kept land acquisition prices artificially low. This had led to chronic shortages in revenue for local municipalities and cities and has engendered a cycle of leasing land at below-market prices to meet budget shortfalls. This suggests as well that planners and local officials have not been effective in guiding the development of land towards "highest" and "best use." Chapter 4 presents different scenarios where planners and local officials proactively manage the development process and use tools such as the economic model described above to achieve more efficient land uses at optimal densities.

2.6. *Gaps in Data*

These formulas and the economic model for which they serve as a basis assume the ready availability of up-to-date and reliable market data, including housing prices (value per area unit per housing unit), the cost of construction (which increases exponentially with FAR), demolition costs, and land acquisition costs. Due to the constraints of time and

resources, this author lack many crucial sets of data that will make the model useful. The following is some of the data that would need to be included in any model:

- Definition of the market area, based on walking, transport, or driving times
- Housing prices (per unit of housing) in different areas of the CBD, broken down by housing characteristics, such as number of bedrooms, bathrooms, amenities such as open space, recreational facilities, location in relation to retail, job centers, transit, etc.
- Construction costs of local area, which will vary depending on type of construction
- Survey of net parcel density of residential projects to determine the marginal impact of FAR on house price and construction costs

CHAPTER III: GAOMING'S CONTEXT

3.1. *Introduction*

Before we can imagine how Gaoming will develop over the next 20 – 30 years, this chapter first focuses on Gaoming's geographic and economic situation to contextualize its projected development. Then, China's political and planning structure and its history of land reform are discussed to illustrate the complexities of its land leasing system and emerging land markets. Many forces exert influence on land valuations and the densities at which developers build properties, not least of which the role local government agents play in determining the price and supply of land available for development.

In Chapter 2, I reviewed existing academic literature on the neoclassical "market" model, property-rights and economic behavior, and densities. This chapter will give further context to the discussion of how best we can understand land valuations in Gaoming and throughout China. Is there a land "market" in Gaoming? What kind of impact has local decision makers and holders of land use rights had on the development of China? How can planners and local leaders predict and guide the future development of Gaoming towards a more efficient urban form?

Figure 3.1. *Map of Gaoming in the Pearl River Delta.*

3.2. *Physical Geography and Demographics*

Gaoming District is a county level city situated on the Western region of the PRD about 46 km (28 miles) from Foshan, the prefecture-level city, 68 km (42 miles) from Guangzhou by existing roadways, and 98 nautical miles (181 km) from Hong Kong.[1] Its physical land area covers 960 sq km (96,000 hectare or 370 sq miles). Situated on the banks of the Xi Jiang River, it has plentiful road and ferry connections to Foshan (30 minutes), Guangzhou (1 hour), Macau (1.5 hours) and Hong Kong (2 hours).

As of 2005, it had a population of 288,495 permanent residents and 116,450 temporary residents.[2] At its urban core, residential density range from 5,000-15,000 pph/km^2 (50-150 pph/hectare).[3] In the outlying villages and suburban areas, residential densities decrease to 3,500 – 5,000 pph/km^2 (35-50 pph/hectare). In some of my field observations, blocks in the inner city, around

3.3. *Industry, Agriculture and Natural Resources*

In 1981, Gaoming's total industrial and agriculture output was only 42.49 million RMB. With rapid economic and industrial expansion, its main industrial outputs include plastics, textiles, building products (like cement), chemistry and light production capabilities. In 2000, the total industrial output was 13.8 billion RMB, 19.2% more than the previous year.

Gaoming is perhaps best known for its natural resources. 30% of the total area is mountainous, 44% planted vegetation, and 30% of the land without any development. 10 townships fall within its jurisdiction; 3 of these townships make up the city center on the banks of the Xi Jiang River.[4] It has vast tracts of fertile land and abundant agricultural resources. As one of the main rice production areas in Guangdong province, about half of its land is under cultivation,

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[1] http://www.gmzs.com/gmzs/english/investment_environment/investment_environment.htm. (accessed 6/28/05).
[2] Presentation on Gaoming, Shenzhen Planning Exhibition Hall, Shenzhen, China, January 17, 2005.
[3] Leman, Edward. "China Issues Notes #4. Metropolitan Regions: New Challenges for an Urbanizing China." Chreod Ltd., Ottawa, Canada: 2005.
[4] Shenzhen Planning Exhibition Hall, Shenzhen, China, January 17, 2005.

although the alluvial plains of the rivers are also used for planting rice during the dry season. The gross agricultural output is 1.51 billion RMB in 2000, 9.9% more than the previous year.[5]

Primary industries make up 13.4% of its total industrial output, while secondary and tertiary industries account for 56.6% and 34.0%, respectively.

A growing segment of Gaoming's economic development program calls for capitalizing on its natural resources. Several golf resorts have already been built over the last few years, attracting an increasing number of golf enthusiasts from around the PRD and also from Hong Kong, who travel by ferry.[6]

3.4. *Political and Planning Structure*

Physical planning in China revolves around 5 year plans as mandated by the Central Government. Since Foshan Prefecture administrates the Gaoming District, the Foshan government approves all plans at the local level.

As documented by academic research and noted by state sources such as the People's Daily, economic development has superseded attempts to pursue physical planning in a measured process. Urbanization is often the end result of uncontrolled

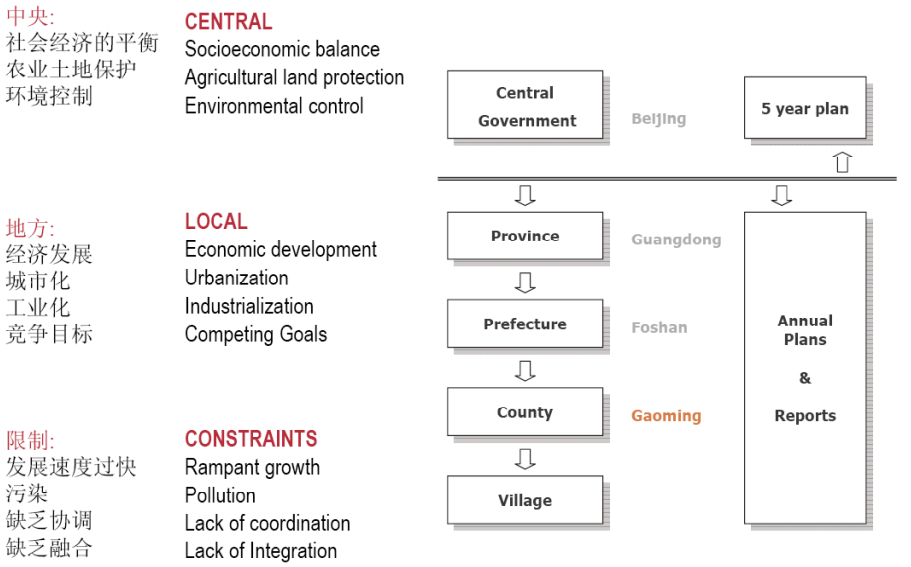

Figure 3.1. *Planning Structure. Source: MIT Gaoming Studio, Spring 2005.*

[5] http://www.gmzs.com/gmzs/english/investment_environment/investment_environment.htm. (Accessed 6/28/05).
[6] Tour of golf resort in Gaoming, China, MIT Foshan Studio, January 11, 2004.

agricultural or undeveloped land being converted to other uses on a haphazard basis. It is rarely the result of a detailed and planned process.

3.5 *Revenue Generation and Budget*

The current system of taxation and revenue generation for the city makes it difficult for long-term physical planning to be carried out. Taxes from personal income and businesses are paid directly to the Prefecture. For Gaoming, this important source of operating revenue is sent directly to Foshan, which reallocates some of that resource back to the local government. Rarely does this reallocation cover the city's operational needs; local governments are forced to cover fiscal shortfalls by other means. Oftentimes, the most direct way to raise funds is through the leasing of land use rights for private development and allowing village enterprises to develop small-scale industry. In recent years, land-leasing revenue accounted for up almost 60% of Gaoming's official budget.[7]

3.6. *China's Land Reforms: Pre-Mao Collectivisation*

Over the 20th century, China has undergone massive changes in land reform that has transferred the ownership and use of land from private hands to state-control and now into a dual-track system. Consolidation of privately owned lands has been an on-going process since the 1920s with the over-throw of the Qing Dynasty by the Kuomintang. By 1953, the Chinese Communist Party (CCP) had consolidated almost all land into either collective- or state-ownership with the Marxist notion that this would end indirect exploitation of labor and reallocate land resources throughout society. Public ownership, state control over land distribution, free at point of use and non-transferability of land-use rights were important characteristics of China's land policy before 1978.

Collective ownership of land has resulted in large-scale inefficiencies in land use. Managers of state-owned firms and work units had not incentive to use land efficiently and to conserve it because the free land did not impact production

[7] MIT Gaoming Studio Presentation, February 2005.

costs.[8] Low rents charged for urban housing were often insufficient to cover maintenance costs so residential areas became run-down. Residents had *de facto* rights to their properties so relocating or evicting them for redevelopment was nearly impossible.[9] Rural areas suffered as well from lack of land-use management. Land was illegally occupied and left idle. In 1985, China lost 15 million mu (1 million hectares) of arable land, which is largest annual loss since 1949.

3.7. *China's Land Reforms: Post-Mao Decollectivisation*

In the post-Mao era, the Chinese leadership had again changed course to undertake economic reform, of which land decollectivisation was a major component. The separation of politics from economics under the "socialist market economic system" enabled market mechanisms to be reintroduced, where the ban on land leases was lifted and land use rights can be transferred. It implicitly treated land as a factor of production, attributed value to the land and aimed to improve land use efficiency.[10]

Market reforms were first introduced in certain geographic regions, Special Economic Zones (SEZs), and only within certain sectors until gradually, as the experimental reforms proved successful, the CCP was ready to codify these changes with the revised 1998 Land Administrative Law (LAL). Civil law, such as the recognition and regulation of contract obligations, and market transactions, such as the exchange and sale of leaseholds as a basis for land possession, applied throughout the country to citizens and private enterprises. However, certain state enterprises and agencies were still subject to the old administrative mechanisms.[11]

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[8] According to People's Daily (overseas edition, May 20, 1992) 4% of urban land distributed administratively to firms lay vacant; another 4% was underused, resulting in an annual loss of 80 billion RMB, Yang, 2004.

[9] *Ibid.*

[10] For a brief but thorough history of urban land reform in China and the instruments and outcomes of the reforms to date, see Zhang, Xing Quan, "Urban Land Reform in China" *Land Use Policy*, Vol. 14, No. 3, pp. 187-199, 1997.

[11] Valletta, William, "The Land Administration Law of 1998 and Its Impact on Urban Development," Emerging Land & Housing Markets in China, Cambridge: Lincoln Land Institute, 2005.

The objectives and goals of the land use rights reforms were to improve land management through land markets instead of administrative channels; improve land use efficiency; make land an important asset that has value attached to it; increase government revenues; manage supply and coordination of land development throughout the country; and preserve farmland and control of illegal conversion from farmland to urban land.[12]

3.8. *The Dual-Track Land Market System*

This created a dual-track system land market system that is characterized by three main types of land ownership: collective ownership (by farmers) of rural land; titular ownership of urban land occupied by various state work units (i.e., administratively allocated land); and, urban land owned by the state, which can transfer land use rights to users in exchange for payment. Under this system, city and municipal governments receives a substantial source of revenue previously unavailable, which can then be used to improve urban infrastructure, improve accessibility and open up new land for development. Land values are increased through this process, creating more revenue for governments and providing more funding for infrastructure. This engenders a cycle of development often referred to as "land breeding land development." For instance, Guangzhou City (as well as others) is using the paid transfer of land use rights to finance underground subway systems. Substantial amounts of residential and commercial development

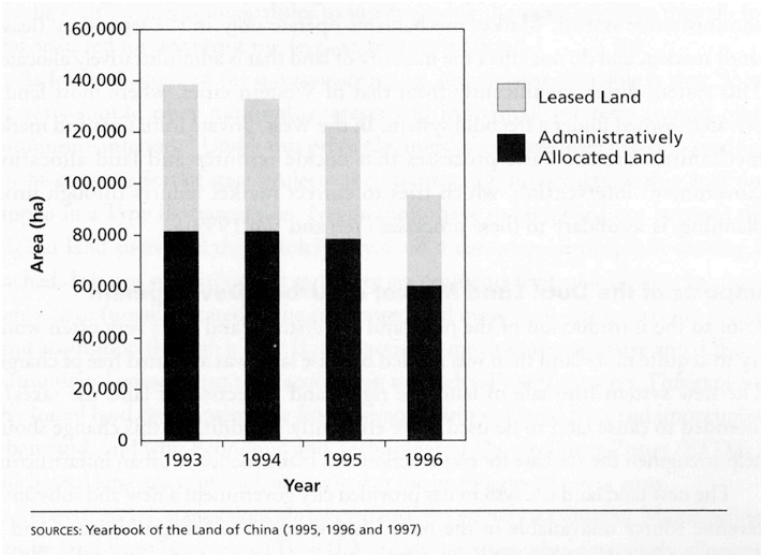


Figure 3.3. *Amount of Leased and Administratively Allocated Land in China, 1993-1996. Source: Yeh, 2005.*

[12] Ding and Knaap, 2005.

have sprouted along the public transit routes.

However, many experts maintain that prices for land use rights continue to be artificially dampened by the amount of land still being allocated administratively and the methods by which these rights are leased on the secondary and tertiary markets.

A large amount of land in China is still being allocated administratively, creating a difference in the prices of land. (see Fig. 3.3, *Amount of Leased and Administratively Allocated Land in China, 1993-1996*). State enterprises and institutions are allocated land at very low prices (primary land markets) with the understanding that they will be the sole users. LURs are then resold through the secondary (from sole users to end users) and tertiary (between end users) markets for higher prices. This is usually done through private negotiation, where sole users, usually local government agents acting on behalf of the state, sell for artificially low prices and receive kickbacks and various incentives from developers. As many reports have noted, corruption is endemic.[13] In 2003, Liu Zhifeng, vice minister of construction remarked, "At present there is indeed a great deal of corruption in real estate development especially in the relocation of people and in city planning."[14]

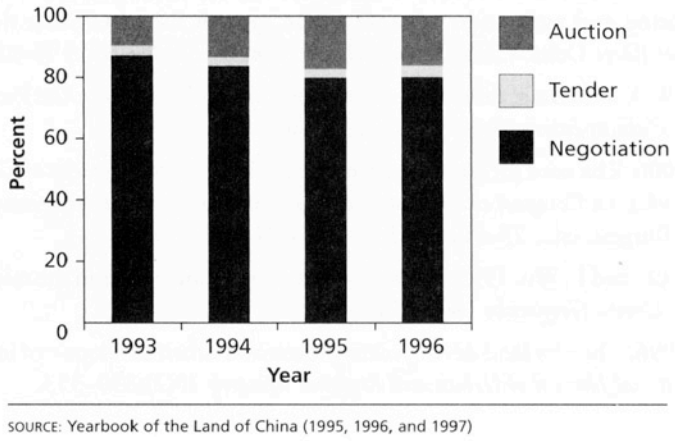


Figure 3.4. *Land Leasing Methods in China, 1993-1996. Source: Yeh, 2005.*

Prices for land leased through auction and tender tend to be higher because of the competitive process. However, the process is not practiced often enough (see Fig. 3.4. *Land Leasing Methods in*

[13] Han, Rongliang, "Put a Stop to 'Real Estate Corruption' & Advocate 'Five Openness', Economist," *People's Daily Online*, July 20, 2003, http://english.people.com.cn/200307/20/eng20030720_120656.shtml (Accessed 7/8/05) and Zha, Jianying, "The Turtles," *The New Yorker*, July 11 & 18, 2005. Profile of the Beijing-based firm SOHO China details the real estate boom in China.

[14] http://quickstart.clari.net/qs_se/webnews/wed/dp/Qchina-politics.RZrH_DOM.html (Accessed 7/8/05).

China, 1993-1996) and is less than transparent. Until recently, the public tender process had closed bids, where a bidder was not entitled to know what other bidders offered and underbidders often prevailed by offering kickbacks to a few relevant officials. This past August, the State finally established new rules that called for open auctions in Beijing.[15]

[15] *Ibid.*

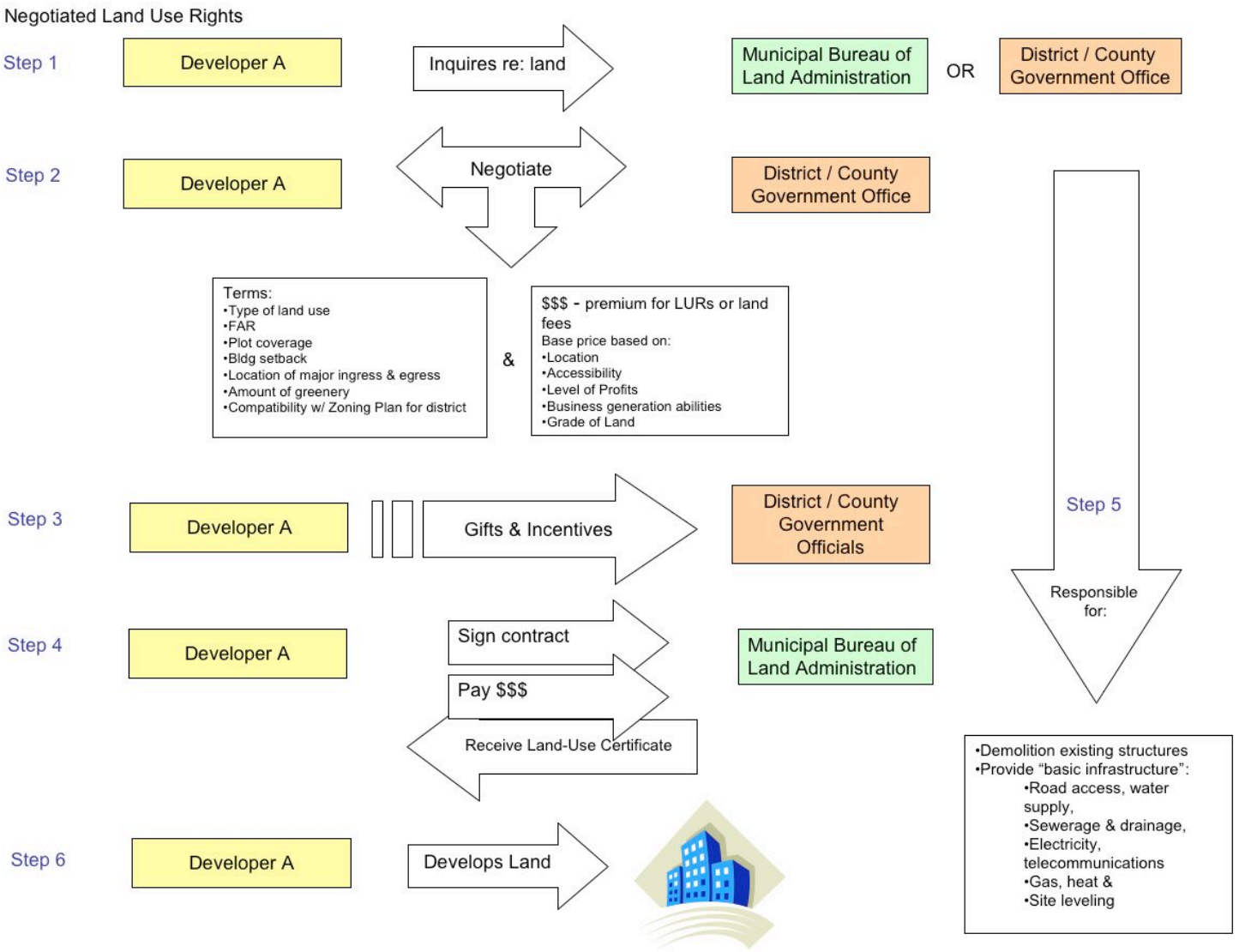


Figure 3.5. *Acquisition of Land Use Rights through Negotiation Diagram.*

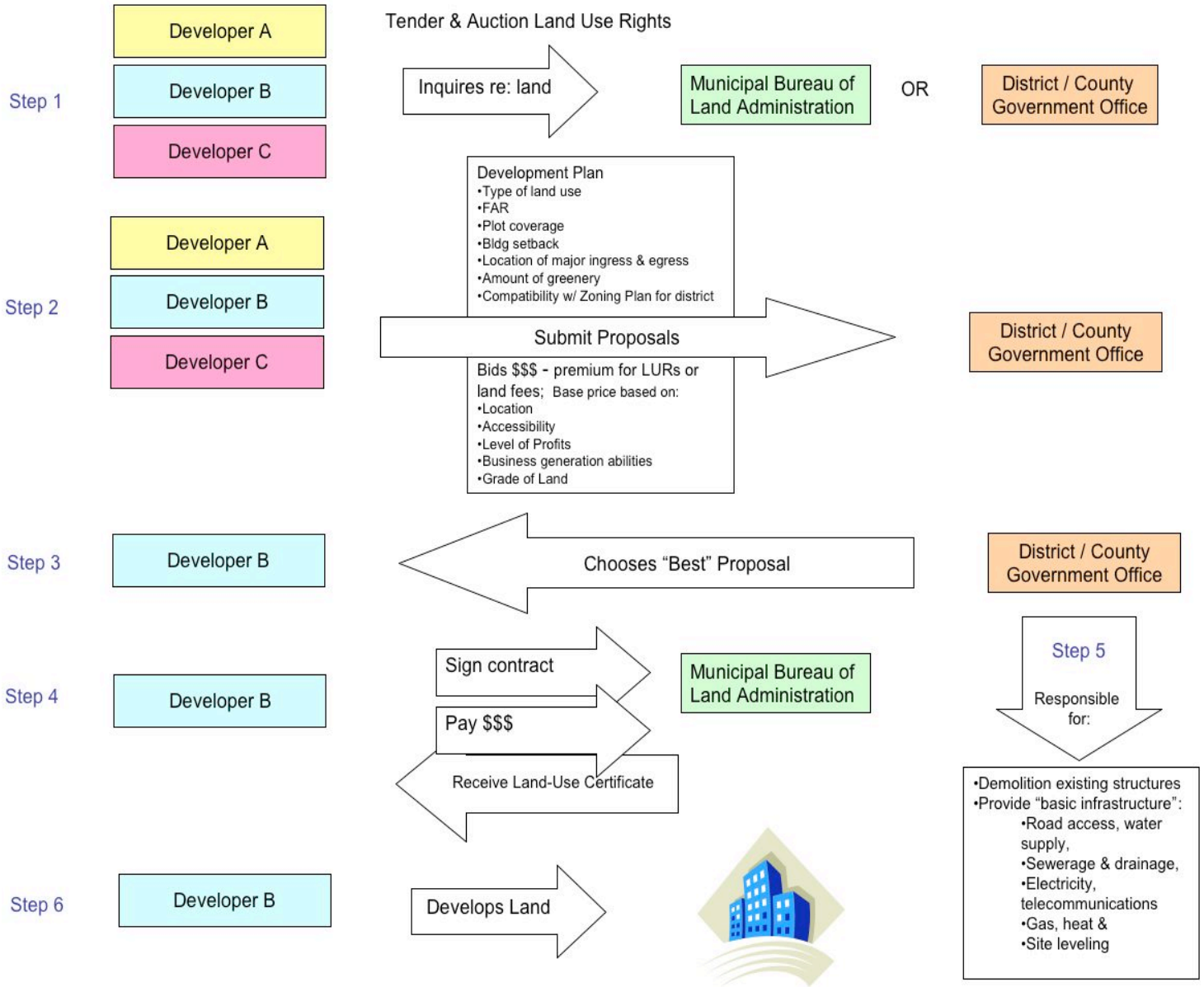


Fig. 3.6. *Acquisition of Land Use Rights through Public Tender and Auction Diagram.*

3.9. *The Black Market for Land*

LURs can also be transferred to another land user on the black market (since such transfers are illegal or to avoid paying the high government premium). Due to the confusion regarding land ownership and the lack of enforcement, the land occupiers of administratively allocated land can sublet their land to other users in the guise of joint ventures. Exchanging land for housing and/or cash is common in the cities, where land leased at "market prices" through negotiation, tender or auction, is substantially higher than that being offered on the black market

The impacts of the black market on the lease-hold system are enormous. The Chinese government loses an estimated 10 million RMB (US $1.6 billion) annually in land rent and bears the cost of infrastructure needed to support the higher intensity uses. The transactions on the black market hinder the formation of a competitive land market system, where cheaply obtained land distorts the value of land and impedes its location-efficient. In the rural fringes of cities, farmers and villages with collectively-owned land are renting out the use of their land to private investors, where they can obtain higher prices than through government compensation for rural land acquisition. This has led to chaotic and uncontrolled development of urban fringes that is increasing the amount of agricultural land conversion, the rate of urbanization and the demand for infrastructure. [16]

[16] Yeh, Anthony Gar-On. "The Dual Land Market and Urban Development" Emerging Land & Housing Markets in China, Lincoln Land Institute: Cambridge, 2005. This provides a detailed description of the types of transactions between users and land owners as well as an analysis of the black market for land.

3.10. *Overall Land Use Planning and Existing Spatial Form*

The 1988 LAL mandated higher-level approval of land use plans. China's metropolitan areas have been experiencing chaotic, centripetal growth, where locational decisions by households and firms circumvent administrative constraints to residency, employment, enterprise formation and land tenure in urban areas.[17]

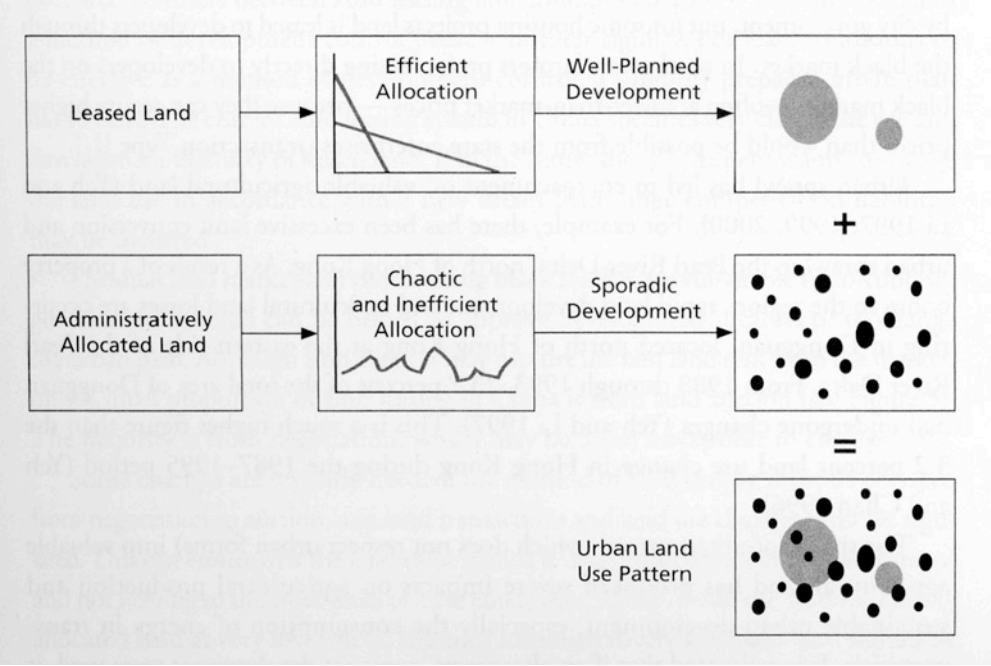


Figure 3.7. *Dual Land Markets and Urban Form in Chinese Cities. Source: Yeh, 2005.*

Unregulated land use changes occur primarily on administratively allocated land, where planning permission and developmental control is readily avoided. Multiple and overlapping stake-holders (work units and various levels of governments) compete for control and development of land, creating confusion in planning and control and increasing possibilities of incompatible land uses. (see Fig. 3.7, Dual Land Market and Urban Form in Chinese Cities).

Moreover, the two-tier planning structure (master planning and detailed layout planning) in China falls short in implementation and oversight.

Such uncontrolled growth throughout China's metropolitan regions has resulted in a multi-nodal centripetal urban form that contrasts with the centrifugal urban form characteristic of North American and European cities.

[17] Leman, Edward. "*China Issues Note #4: Metropolitan Regions: New Challenges for an Urbanizing China", April 2005, Chreod, Ltd.* Available for download at http://www.chreod.com/issuenotes.php.

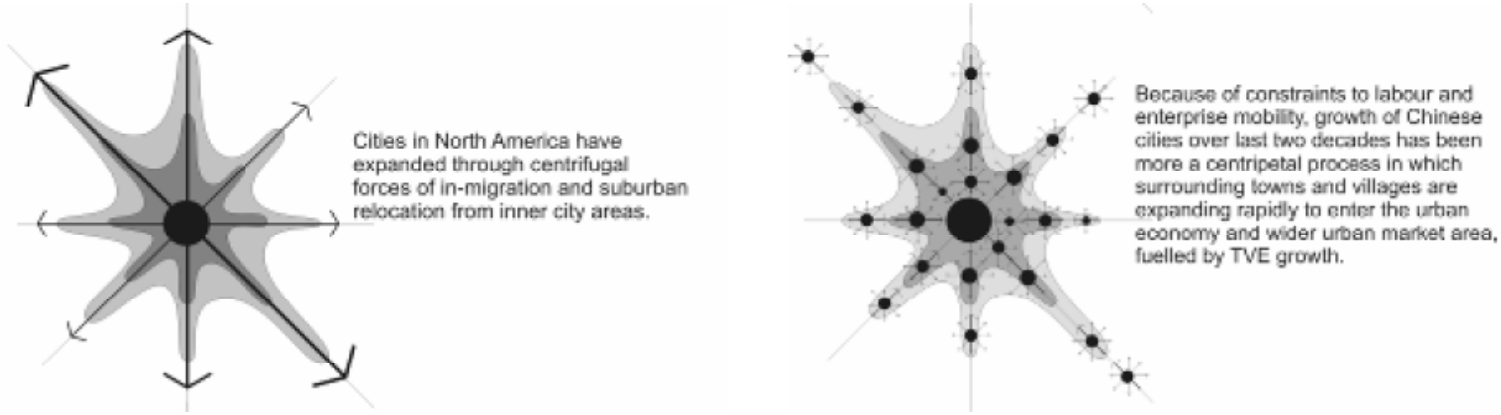


Figure 3.8. *Contrasting Growth Dynamics in Metropolitan Regions. Source: Chreod, 2005.*

Indeed, one can see from comparison of the Guangzhou Metropolitan Region with other cities in North America and Europe that the urban spatial form is remarkably different. Research by Chreod Ltd. suggests that "agglomeration benefits experienced in many city regions in more advanced economies are accruing haltingly and only in limited ways in China." Moreover, "un-managed metropolitan regional growth is having negative impacts both in suburban and central areas, including pollution, congestion, and distortion of land and labour (sp) markets." If metropolitan regions in China want to compete effectively with other cities and economies, "the structure and form of urban and suburban development need to be better managed."[18]

Gaoming is one of many Metropolitan Sub-Centers within the 40-70 km radius of Guangzhou. It has an urban core of residential densities between 5,000-15,000 pph/km^2 (50 – 150 pph/hectare) and a suburban ring of residential densities between 3,500- 5,000 inh/ km^2 (35-50 pph/hectare) (see map and density cross-section, Fig. 3.9 and 3.10). As it grows in population and industry over the next 20-30 years, it is unclear how its development will coincide with the development of neighboring districts, the Foshan Prefecture and the provincial capital of Guangzhou City.

[18] *Ibid.*

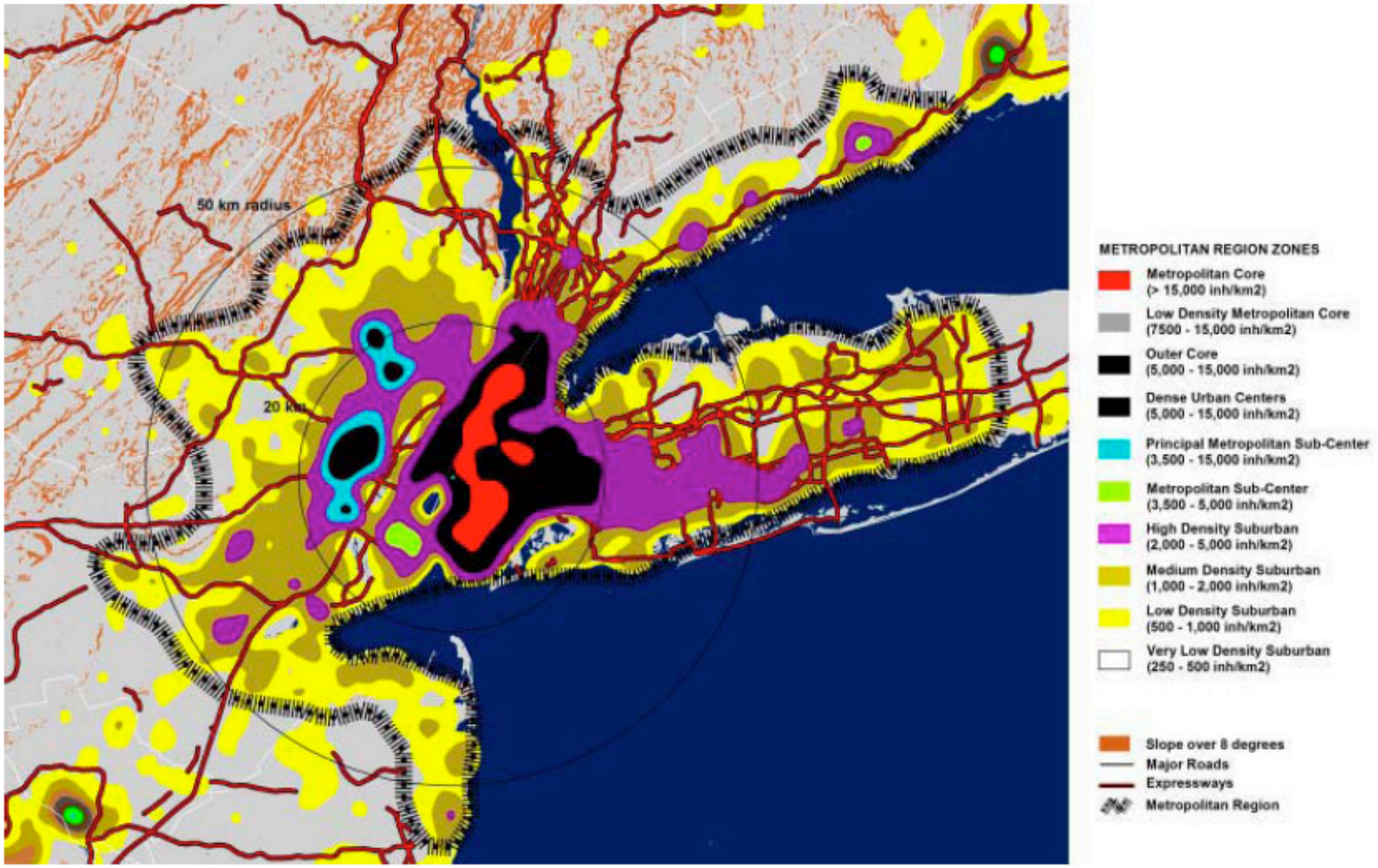


Figure 3.9. *Spatial pattern of New York Metropolitan Area, population 16.2 million, with high densities in central areas and very dispersed suburban areas. Source: Leman, 2005.*

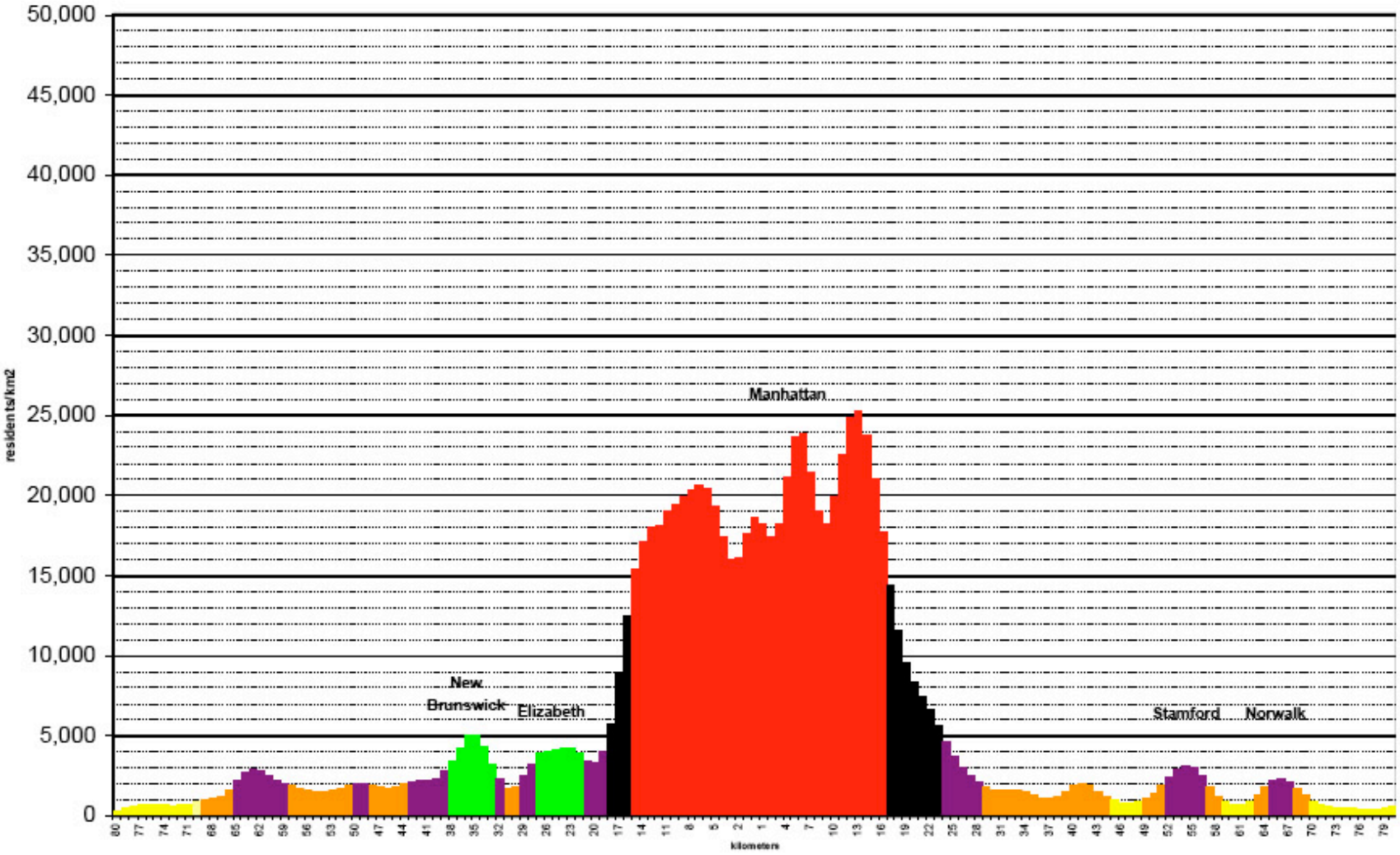


Figure 3.10. *Cross Section of Population Densities in the New York Metropolitan Area with high densities in central areas and very dispersed suburban areas. Source: Leman, 2005.*

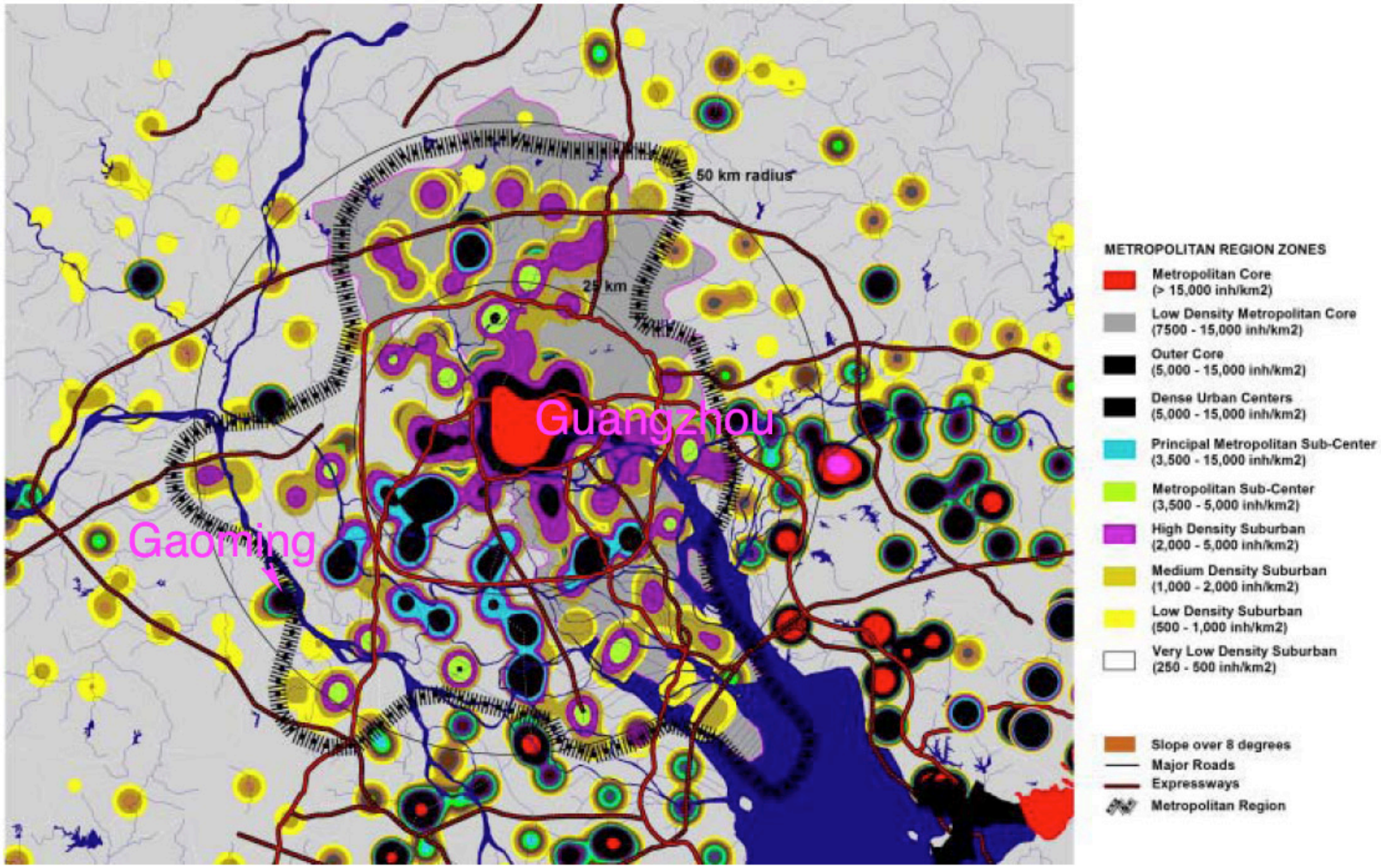


Figure 3.11. *Spatial pattern of Guangzhou Metropolitan Area, population 13.8 million, with high densities in central areas and very dispersed suburban areas. Source: Leman, 2005.*

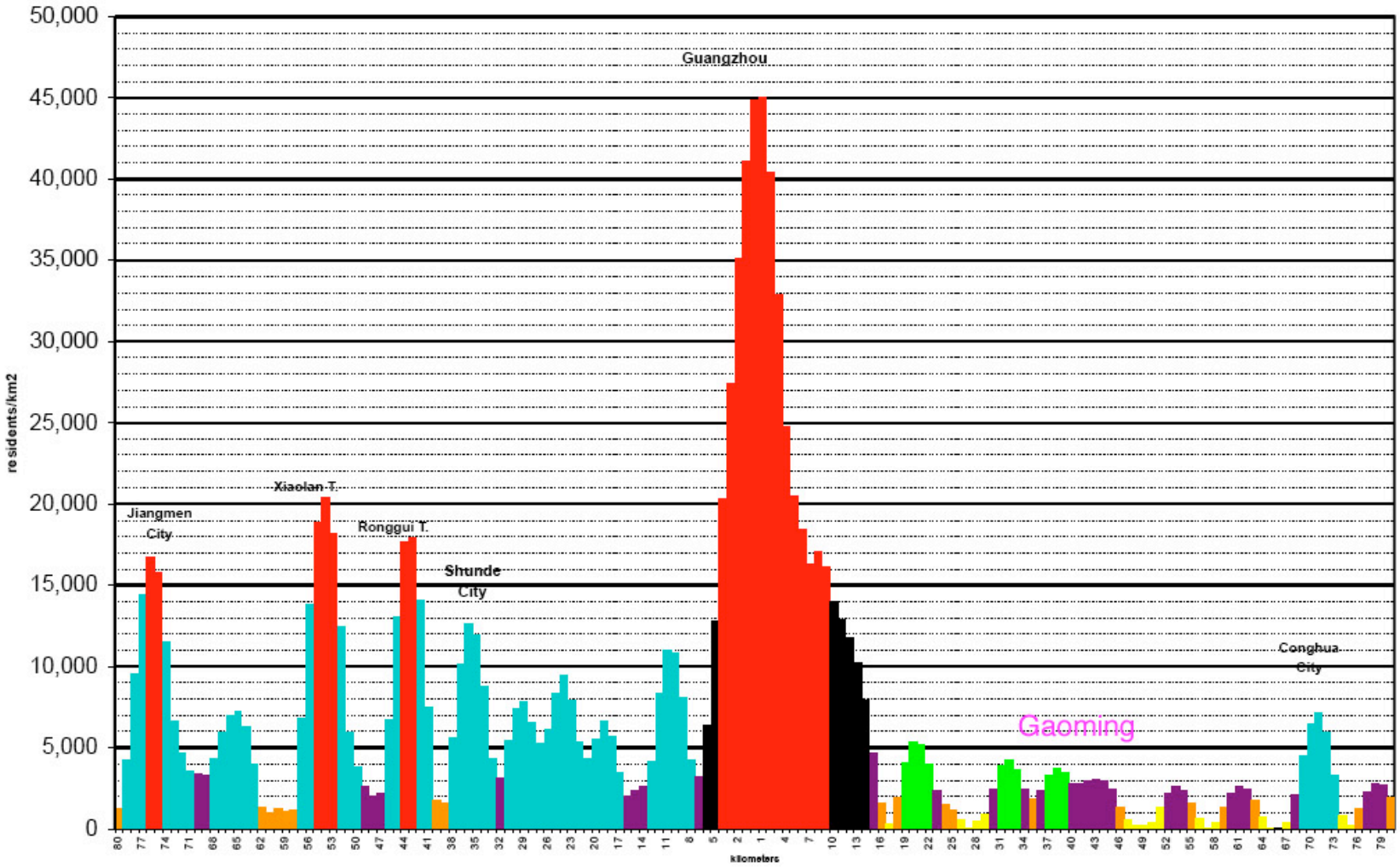
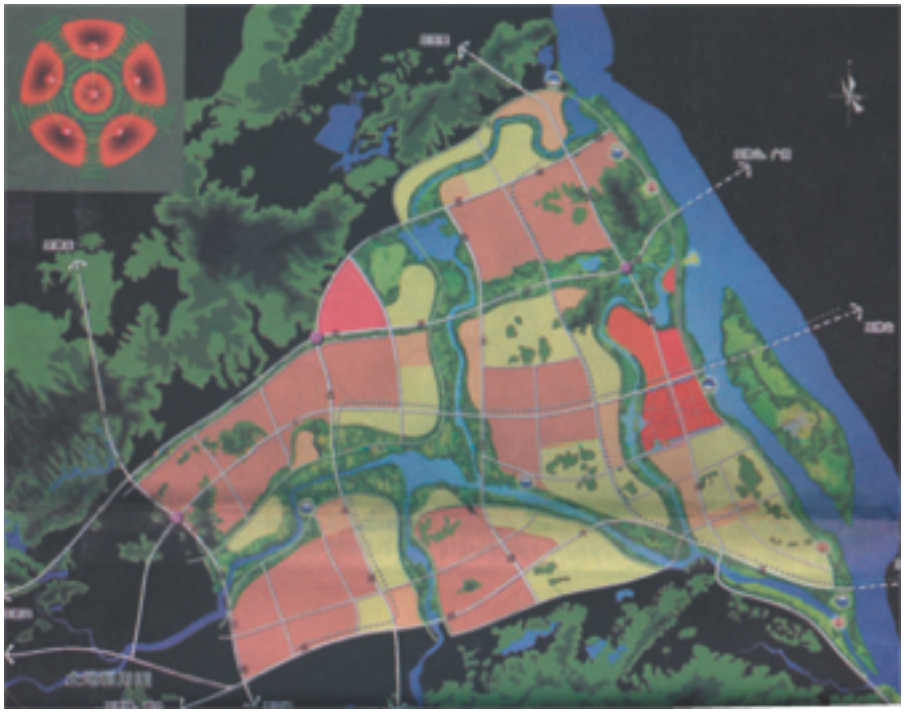


Figure 3.12. *Cross Section of Population Densities in the Guangzhou Metropolitan Area with high densities in central areas and very dispersed suburban areas. Source: Leman, 2005.*

3.11. *Gaoming's Existing Master Plan and Potential Directions for Growth*

To begin the thinking about how Gaoming's development and urbanization will occur, one must first look at Gaoming's current Master Plan, as it was presented to the MIT Gaoming Studio in January 2005. It shows the development of a new Central Business District (CBD) northward from the existing downtown, with new plans for building a new bridge across the Xi Jiang River and a public transportation corridor connecting points east such as Shunde across the Xi Jiang River, Foshan, Guangzhou and beyond to points west. Other public transportation corridors connecting Gaoming along the north-south axes have not yet been planned, although it is fairly certain they will be necessarily from the steady westward expansion of the urban center as depicted on the Master Plan. Moreover, with the Kowloon-Macau-Zhuhai Bridge, offering the first, direct road connection across the entire PRD in advance planning stages, an extensive regional road network in the Western PRD is highly likely to support and nurture the anticipated manufacturing growth in Districts like Gaoming.



Discussions about specific public transportation modes are only in its preliminary stages, although existing intra and inter-city bus routes are available. I have based the scenarios for Gaoming's build-out on the assumption that such a Master Plan will be implemented.

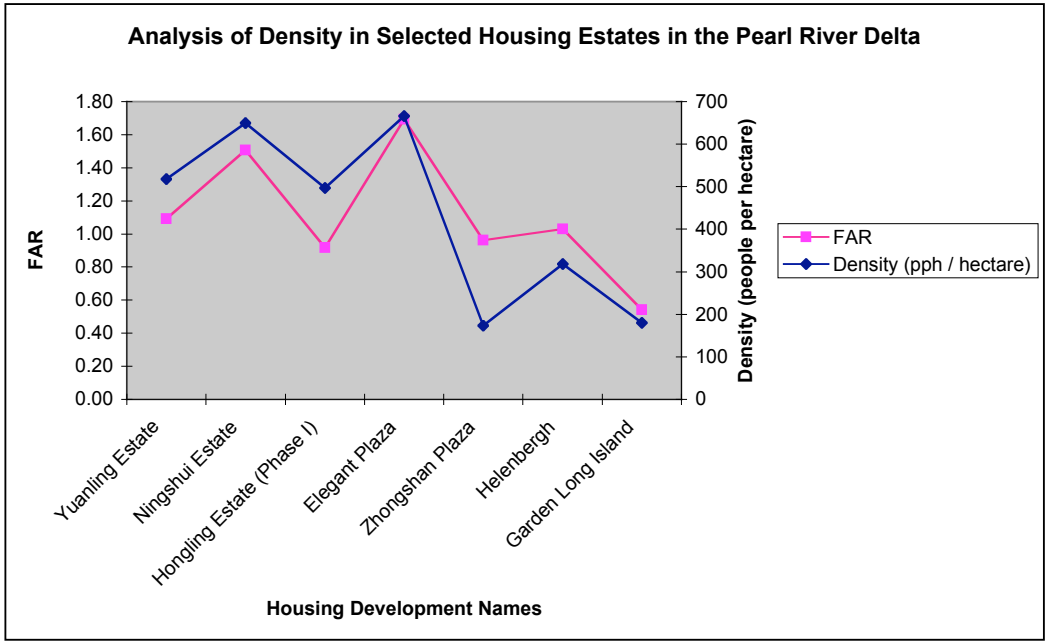
Figure 3.13. Gaoming Master Plan. Source: Guangdong Urban Planning Institute, 2004.

3.12. *Gaoming's Housing Stock and Residential Densities: Existing and New*

City/Area	Proj. Name	FAR	Density (pph / hectare)	Year Built	Type
Shenzhen	Yuanling Estate	1.09	518	1988	Affordable
Shenzhen	Ningshui Estate	1.51	650	1991	Affordable
Guangzhou	Hongling Estate (Phase I)	0.92	497	1995	Low-end Luxury
Gaoming	Elegant Plaza	1.69	666	2004	Low-end Luxury
Panyu	Zhongshan Plaza	0.96	173	2005	Low-end Luxury
Panyu	Helenbergh	1.03	318	2005	High-end Luxury
Guangzhou	Garden Long Island	0.54	180	2004	High-end Luxury

Figure 3.14 and **Figure 3.15.** *Analysis of Selected Housing Estates in the PRD. Sources: Field Research, January and March 2005.*

The residential densities of affordable housing built in the last 10-15 years are much higher than the newly built residential developments in the last 2-3 years. Characterized by much larger unit sizes, multi-story layouts, high-end finishes, ample open space within gated compounds, these multi-family condominium buildings and villas are selling for over 3000 RMB/m^2, well beyond the range of the majority of citizens. Developers are marketing the new housing toward the emerging upper-middle and



upper classes, many of whom are trading in the old stock to live in and for investment purposes.

This new style of development is the fastest (and seemingly the only) growing portion of the market in cities across the PRD and China. However, they only make up a small percentage of the housing stock in China, which is still largely made up of affordable housing built in the 1970s and 1980s by work-units and local governments. (See Figure 3.16, Living Standards of Local Residents in Major Cities of the Pearl River Delta, 2001, RMB).

City	Disposable income	Annual consumption per capita	Food consumption expenditure / total consumption expenditure (%)	Annual accommodation expenses (including rent, and utilities)
Shenzhen	23,544	17,809	27.1	2,335
Dongguan	**16,938**	**14,669**	**31.2**	**1,173**
Zhuhai	**15,870**	**11,562**	**37.1**	**1,823**
Guangzhou	14,694	11,467	40.0	1,540
Foshan	**13,600**	**10,327**	**34.5**	**1,191**
Zhongshan	**12,803**	**10,626**	**39.6**	**1082**
Huizhou	**10,551**	**8,878**	**37.3**	**1,175**

Note: The bold figures provide data for the urban area instead of the whole city. For Dongguan, Zhuhai, Foshan, Zhongshan, and Huizhou in the respective surveys of household living conditions, they report urban and rural areas separately. No average of the whole city is available in the respective statistical yearbooks.

Sources: *Shenzhen Statistical Yearbook 2002, Dongguan Statistical Yearbook 2002, Zhuhai Statistical Yearbook 2002, Guangzhou Statistical Yearbook 2002, Foshan Statistical*

Figure 3.16. *Living Standards of Local Residents in Major Cities of the Pearl River Delta, 2001, RMB. Source: Hong Kong 2030.*

The following is a brief study of the existing typologies and housing stock found in Gaoming and throughout China.

Anzhi or Temporary Housing[19]

Temporary housing built in suburban area using simple materials and structures, does not provide community facilities.

- Meant to be demolished after tenants move out to new housing
- However, often reused by other households due to shortage in housing
- Includes housing for people with special needs, such as newly-married couples, dormitory-type of housing young couples who are waiting to move into single family flats

Figure 3.17. *Temporary Housing in Gaoming, off Canjiang Road. Source: Field Research, January 2005.*

[19] Ge, Chen, "Urban housing in China: an introductory study of Year 2000 Urban & Rural Xiaokang Housing Scientific & Technological Industrial Project." Shatin, New Territories, Hong Kong: Dept. of Architecture, Chinese University of Hong Kong, 1997.

Shiyong or Affordable Housing

Constitutes major housing stock

- Built by municipal housing bureau, enterprises or work-units in accordance with general housing standards set by

Figure 3.18. *Affordable Housing in Gaoming, Canjiang Road and Wenchang Road. Source: Field Research, January 2005.*

the central government.

- Two major types: large housing estates in suburbs by municipal housing bureau or infill housing by enterprises or work-units on small sites in urban areas
- Both 4-6 story walk-up building blocks
- Flat size ~ 55 m^2 of floor area for 2 bedroom units; ~ 65 m^2 for 3-bedroom units

- Mainly built for public rental, although some are home ownership
- Residential Densities: 500-650 pph/ hectare

Shushi or Comfortable Housing

- Only makes up small percentage of housing stock
- Built as full commodity housing scheme or as part of experimental housing projects conducted by government on small scale
- As of 1997, can only be afforded by small segment of population (although this is percentage is undoubtedly grown since then with China's economic growth).
- More spacious than Shiyong type: average floor area: 3-bedroom 85 m^2 or larger
- Overall planning and design principles, very similar to Shiyong
- Residential Densities: 450-600 pph/ hectare

Figure 3.19. *Luxury Housing in Gaoming. Source: Field Research, January 2005.*

Haohua or Luxury Housing

Luxurious apartments and villas built for "nouveau riche" households or western businessmen.

- Anticipated will be built on a larger and larger scale for many years to come
- Average unit size can be very big, at least 100 m^2 for 3-bedroom, sometimes higher

CHAPTER IV: SCENARIOS FOR THE GAOMING'S FUTURE DEVELOPMENT

"Scenarios are not predictions, forecasts or projections. Rather, they are stories about the future with a logical plot and narrative governing the manner in which events unfold. Scenarios usually include images of the future - snapshots of the major features of interest at various points of time - and an account of the flow of events leading to such future conditions." -- Gallopin, et. al. 1998 (Project 2022)

4.1. *Introduction*

This chapter builds upon my knowledge and research on the existing geographic, demographic, economic and political situation in Gaoming to imagine the development and urbanization of Gaoming for the next 20-30 years. Integral to the practice of city planning is the process of visioning the physical development of urban spaces, of how the city and landscape will change with the projected doubling of the population from the current 250,000 to 500,000 people. To this end, I have drawn up three scenarios and provided instructions to build an economic model (see Chapter 2.4.3) to illustrate how different policy interventions can result in markedly different land use intensities.

4.2. *Why Scenarios?*

If time, resources and access to reliable data were all readily available, future forecasting and modeling will give a much more precise prediction for how different forces can shape the future. Unfortunately, for this writer, the time and resources needed to gather this data is unavailable. One can argue that this is the general case for the rapidly changing situation in China. Yet one cannot wait for data and research to become available to begin planning for Gaoming's future. Planning and local officials are already looking for answers to how Gaoming's natural resources, its mountain scenery and abundant water resources, can be maintained while simultaneously improving the economy and its citizens' lives.[1]

[1] Presentation on Gaoming, Shenzhen Planning Exhibition Hall, Shenzhen, China, January 17, 2005.

Scenarios are meant to help planners and officials order their perceptions about alternative future environments in which today's decisions might be played out. Scenarios are meant to help clarify how different decisions can shape the future in different directions. "Scenario planning is an intuitive act rather than a 'linear, mechanistic, numbers-driven process," an exercise which involves 'creative foresight in contexts of accelerated change, greater complexity and genuine uncertainty."[2] Taking into consideration complex interactions between economic, political, and social forces, the scenarios offer a range of outcomes that reflect specific policy and planning actions that planners and officials can take. These scenarios are meant to help planners think through how they can pursue the sustainable development of Gaoming.

4.3. *Assumptions and Goals*

I have based all three scenarios on one premise - the population within the District will double from its current 250,000 residents to 500,000 over the next 20-30 years.[3] Otherwise, I have varied the scenarios based on different assumptions about future patterns of growth, consumer preferences, the degree of public transportation investments and the effectiveness of political and local leadership. Some of these assumptions have their basis on the *observed* patterns of existing growth and operations in Gaoming and elsewhere in China and Asia. Other assumptions can be characterized as an idealistic view of how planning and sustainable development can and should be done. Most importantly, I have tried to vary the different scenarios based on those factors that local government officials and planners can directly or indirectly influence and control. In this respect, the scenarios focus less on macroeconomic factors, such as variations in GDP growth and the amount of foreign investment, and more on planning and policy interventions regarding the *supply* of land.

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[2] Project 2022 http://www.cityu.edu.hk/p2022/scenario/sctext.htm (accessed 5/20/05)

[3] Based on conversations with the planners in Foshan and Gaoming, the doubling of Gaoming District's population (counting both permanent residents with a *hukou* and migrants) is a conservative estimate. Economic growth and political conditions, such as the reorganization of Prefectures and Districts, are constantly changing, making predictions difficult to attempt.

The ownership and land use structure in China is unique in that local officials and planners can have a great deal more influence and control of the supply of land than in other economies. By placing thoughtful planning controls on the use and build-out of urban land and conversion of agricultural land, planners can radically change the amount of land needed to build enough residential units to accommodate the doubling of Gaoming's population.

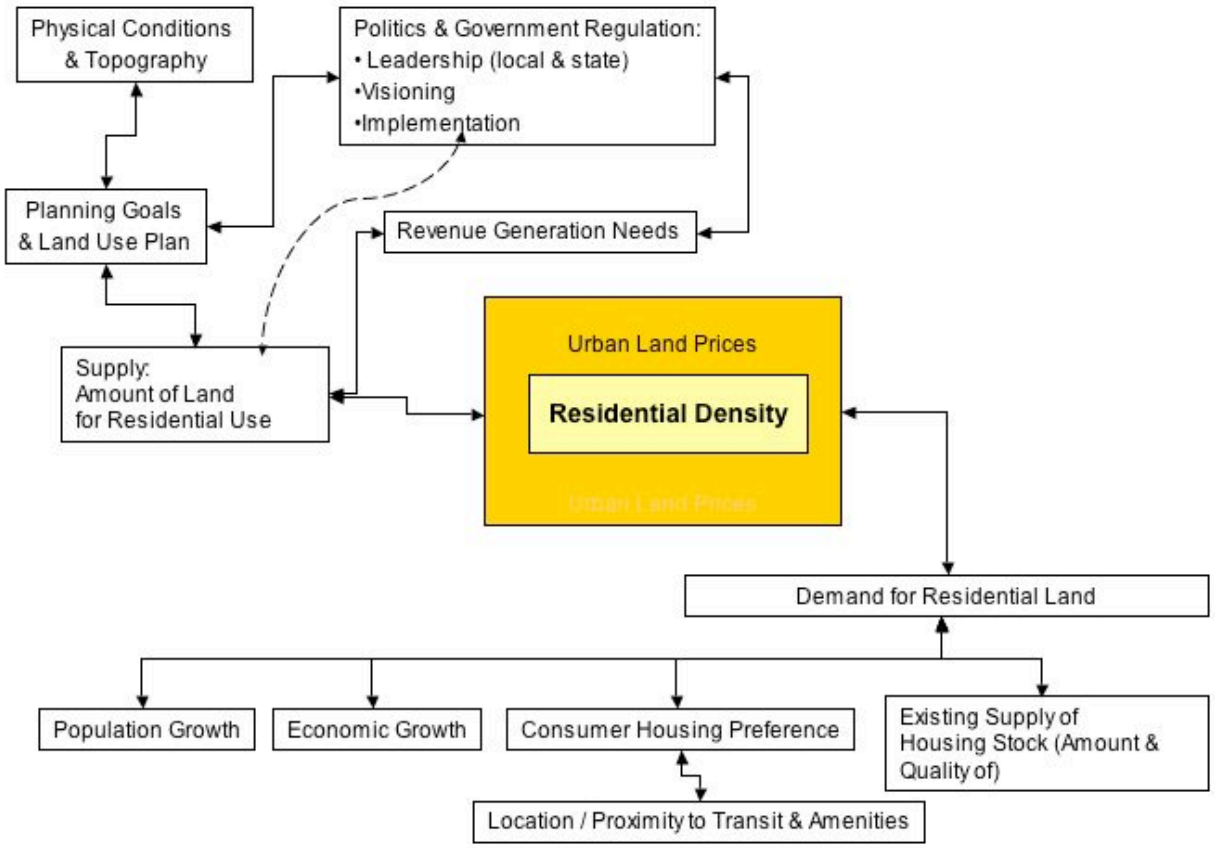

Figure 4.1. *The Interactions of Demand and Supply to Affect Land Pricing and Residential Density.*

As a preliminary exercise, I chose to model the development of Gaoming on the examples of the three cities studied in Chapter 2, Hong Kong, Singapore and Bangkok. If all of Gaoming's anticipated 500,000 people are to be distributed throughout with the same breakdown of land-uses as Singapore in 1990, Hong Kong in 1970 and Bangkok in 1970, one can see following the Hong Kong model would require the smallest amount of land. At the same time, the Singapore model would use almost the same amount of land as the Bangkok model, yet would dedicate a much higher percentage of it to recreational use and infrastructure, and much lower percentage to residential use. These models are a crude illustration of the impact of planning on the amount and the quality of land use.

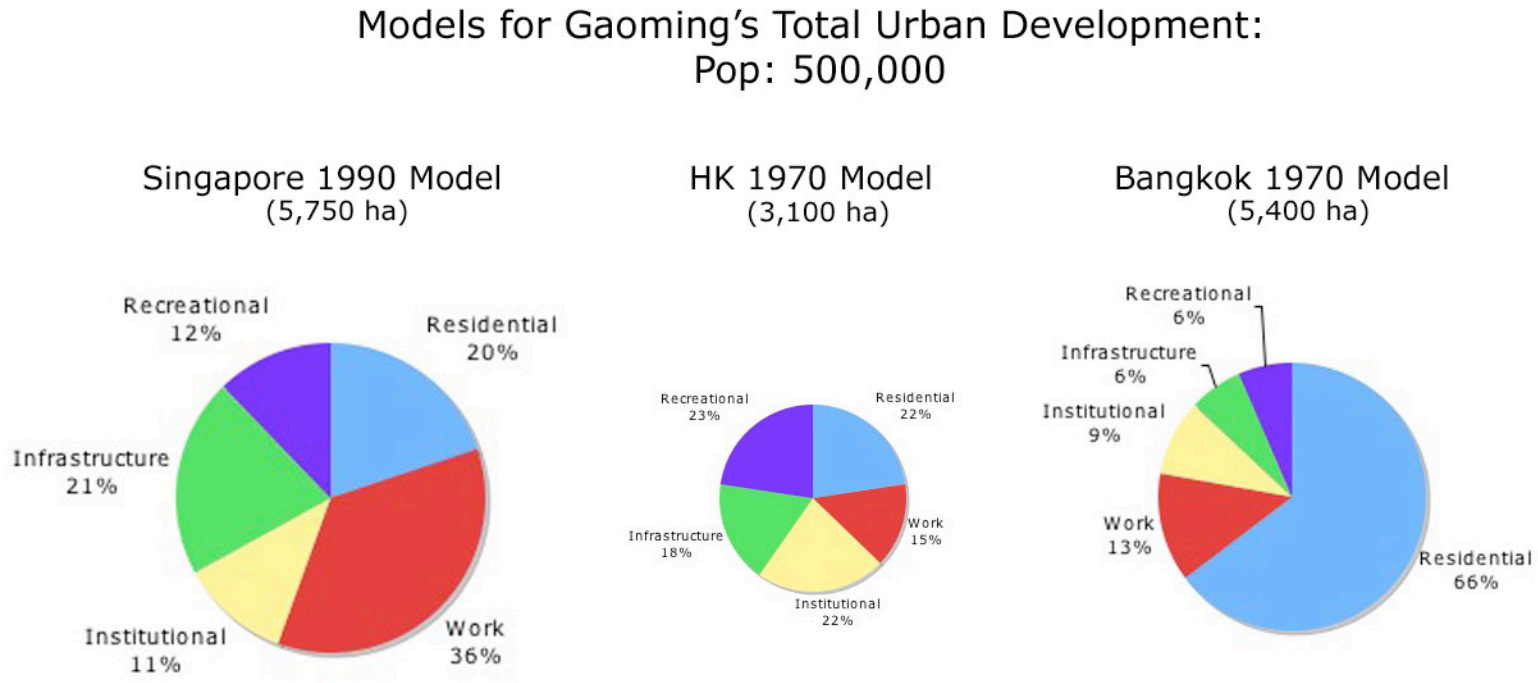

Figure 4.2. *Models for Gaoming's Total Urban Development. Data Source: Gani, 2000.*

The physical variables that affect how much land is suitable for building upon includes the physical conditions and topography of the District. Land with hilly grade is much less desirable for building than land with flat terrain due to the higher construction costs associated with building on hillsides. Parcels of arable land with rich soil conditions close to water sources are often highly desirable for agricultural use but are often converted to higher-value commercial or residential uses. For this reason, the state government has passed laws, such as Article 34 of the 1998 LAL, mandating no net loss of agricultural land. Articles 17-26 give guidelines and principles for planning and implementing overall plans for land utilization (see Chapter 3.7). The master plan for the District is therefore the most direct tool of control planners have at their disposal to regulate the pace and types of development (see Chapter 3.11).

Other factors have an outsized influence on how land is development. Due to the lack of oversight and decentralization of land use decisions, local officials who hold positions of decision-making power can ignore or circumvent the best-intentioned master plans in return for favors and incentives from developers. The unscrupulous practices of China's real estate developers are often compared to that of the robber barons of the United States' golden age of industrialization. Cases of abuse of power and influence are so legion and have so penetrated the popular consciousness that recently, a popular television series have been created to show how rampant development have ruined a picturesque old town in Central China.[4]

Beyond corruption, the structure of local government financing force even well-intentioned officials to make decisions that undermine the most efficient use of land to generate needed revenue to fill operational budget gaps. All of these factors impact the pricing of land and therefore, the densities at which residential development occur.

Building on the one premise of the population doubling over the next several decades, I hope to demonstrate with these scenarios that Gaoming's population growth can have very different impacts on its urbanization and spatial growth.

[4] The show is called "The Winter Solstice" and it is mentioned in a profile of the SOHO China, the most visible real estate development company in China. Zha, Jianying. "The Turtles" *The New Yorker*, July 14, 2005.

4.4. *Scenario #1: Gaoming Develops under the Status Quo*

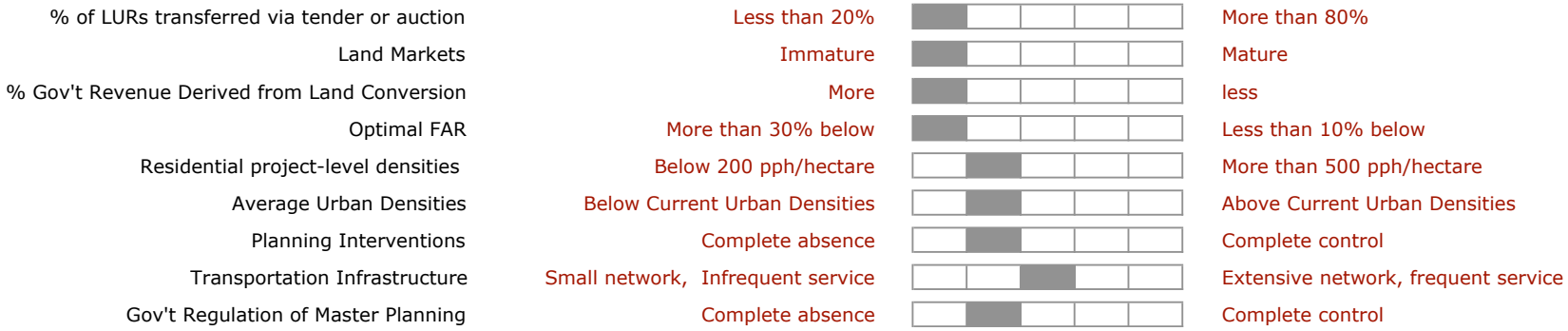

Figure 4.3. *Scenario #1 Characteristics.*

Under this scenario, the transfer of land use rights occur mostly through private negotiation, as is the case today in most of China. Due to the lack of transparency, these transactions are marked by corruption, where unscrupulous officials accept bribes from developers. Where public auctions and tender have been used to sell LURs, collusion is rampant; sometimes, only one bid is submitted in response to requests for proposals because developers have made private deals with each other not to challenge bids and keep prices artificially low. The land market remains "immature" due to high barriers to entry for competitors (the building of relationships with officials, or *guanxi*, takes time and money), the value of land is artificially dampened, and true transactional costs are kept hidden.

In addition, revenue generation needs spur hastily made-decisions to transfer LURs to developers who are well aware of the government's position and act in collusion to take advantage of the situation.

Residential densities are kept low because consumer preferences remain unchecked and unchallenged by pricing constraints and governmental intervention. The increasing purchasing power of growing portions of the population continues to drive demand for Western-style luxury homes, often located in gated communities with landscaped open-spaces and ample amounts of active and passive recreational areas. Examples of luxury housing are Guangzhou's Garden Long Island project and Panyu's Helenbergh (see Fig. 4.3, Panyu's Helenbergh Development Project), with project-level densities of 180 and 318 pph/hectare, respectively. Affordable housing continues to be built by municipal governments but increasingly by private developers. These average project densities are still lower than that of the existing stock due to generally higher standards for average unit sizes. Lower-end housing, lacking modern amenities and open space, are demolished and filtered out of the existing stock, especially in central urban locations. Average residential densities for the entire District decrease.

Figure 4.4. *Panyu's Helenbergh Development Project. Source: Field Research, January 2005.*

Land conversion rates are highest at the outskirts of urbanized areas, where large tracts of agricultural land owned collectively by villages are leased to developers seeking vast tracts of green fields to build low-density, land-intensive residential projects. Villagers can generate much higher incomes from leasing their land than from continued agricultural use. Local government lack the jurisdiction and enforcement capabilities, especially in a country as vast and populous as China, to regulate the development of collectively-owned land.

Moreover, incompatible land uses such as manufacturing built by village-owned enterprises dating from the 1990s dot the ever-growing urban landscape, alongside residential developments. Again, local governments lack the enforcement capabilities and the capital to buy out the village land to force the conversion of manufacturing land to higher value use. Due to the immature land markets and lacking the economic incentives to move, the factories stay put, causing much consternation with their residential neighbors.

Increasing rates of private automobile ownership is driven by increasing consumer economic power and the building of more and more residential homes in the outskirts of town. Despite increasing negative externalities, such as traffic congestion and pollution, middle-class consumer demand for status-symbol cars and housing remains high. Lack of government foresight delayed the planning and building of an extensive public transportation network. Low-density

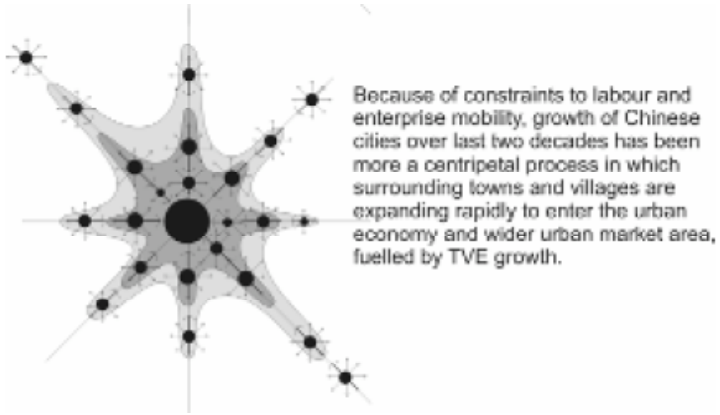

Figure 4.5. *Example of Centripetal Sprawling Urban Form. Source: Chreod, 2005*

residential development has occurred over an area too large to justify the huge upfront costs of building an extensive network (note the Bangkok development example in Chapter 2.3.1). Instead, governmental officials must devote an increasingly larger portion of the operational budget to building and maintaining roads and redundant infrastructure.

Offering developers incentives to build transit-oriented development[5] and educating the public about the environmental and quality-of-life advantages of public transportation is an uphill battle. Suburban polycentric, centripetal sprawl characterizes scenario #1 (see Figure 4.4, *Example of Centripetal Sprawling Urban Form*).

4.5 Scenario #2: Gaoming Develops with Moderate Government Intervention

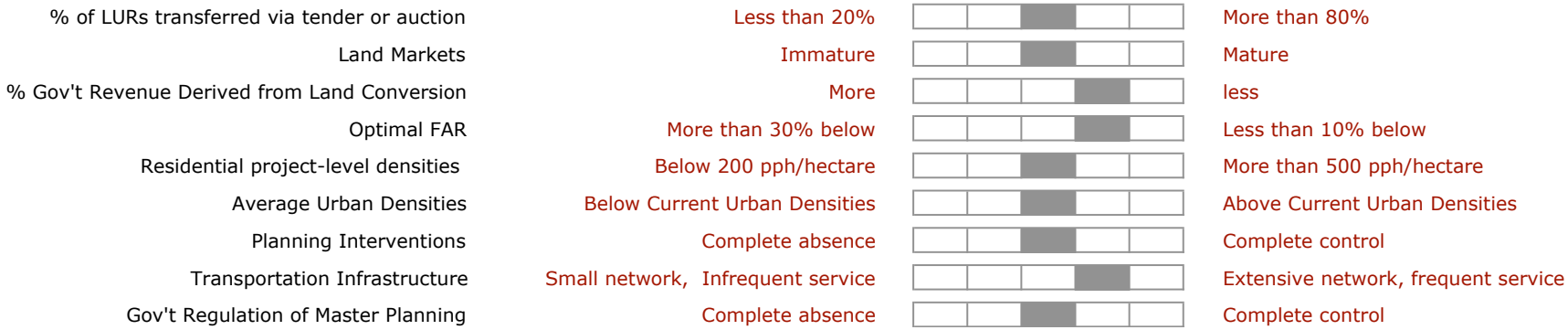

Figure 4.6. *Scenario #2 Characteristics.*

[5] Churchman. Peter Calthorpe was first to advocate for transit-oriented development (TOD), where balanced, mixed-use areas with a simple cluster of housing, retail space and offices are within a one-quarter mile walking system of a light rail system. Motivation of TOD is to improve the ills bought about by dependence on the automobile and the mismatch that exists between old suburban patterns and the postindustrial culture. Goal is to preserve open space and reduce automobile traffic *without* necessarily increasing density. Calthorpe defines average net residential densities or urban transit-oriented developments at 44 dwelling units per hectare, with densities of 62-123 units per hectares for up to three-story apartment buildings. TOD is not necessarily the best model for Gaoming, since the scale of the developments and of the population is different, although its goals and the hope for Gaoming are similar.[5]

In scenario #2, the transfer of LURs through public auctions and tender has become more frequent, accounting for almost half of all LUR transactions. Partly, this is due to the State passing open auction laws throughout the country and increasing vigilance in eradicating corruption.[6] It is also due to increasing media coverage and public scrutiny of deals. The incidence of shady relations between developers and local officials, therefore, has gone down. However, some transactions continue to be conducted through private negotiation, particularly those involving collectively-owned land in villages, where government is less involved. *Guangxi*, or relationships, continue to be important and definitive of the Chinese-way of getting things done; yet, government reforms are lowering barriers to entry and driving down transaction costs. This perception of increased transparency in real estate deals encourages more firms (both domestic and international) to enter the marketplace, increasing the number of competitive bids. The land market in China is maturing, the value of land is increasing due to greater competition and true transactional costs are more readily observed.

Higher values from land transactions have increased local government coffers, reducing pressure to sell LURs to cover operational gaps. Moreover, the state is considering personal and business tax reform to further ease the local governments' reliance on generating revenue from real estate deals.

Profit-driven developers face greater competition from more firms entering the marketplace. Chinese nationals returning to the Mainland after having been educated and/or trained in the West run some of these firms. Other firms are large multinationals who see the government's increasingly hard line on corruption as a positive sign to do more business in China. These firms are setting new standards for business practice, using more sophisticated financial and market analysis to maximize returns on land and building to optimal FARs. These business practices spread quickly through the real estate and planning fields. The Chinese term for developing land towards "highest and best use" becomes part of the popular lexicon, although there is yet to be an accepted means of determining the "highest and best use" of land.

[6] Zha. Open auction law was just passed in 2004 requiring all land use rights transactions in Beijing to be done through open public auctions and tender.

Market and sales data show that proximity to Gaoming's transit system is one of the amenities that most influence the sales and rental prices per square meter in residential properties. Increasing consumer buying power has resulted in even higher demand for cars and larger housing units. However, the negative externalities of congestion and pollution have led people to seek viable alternatives to the automobile for commuting to and from work. The public transit system consists of bus routes providing a network of service to key job centers and residential areas. However, only some lines have dedicated lanes, so buses must also contend with other traffic. Service is not terribly reliable and the lead-times on some routes are long because there are not enough buses. The majority of people still prefer to use their cars when commuting. The government is spending vast amounts of money and resources to build more and more roads in the outskirts to alleviate massive traffic congestion.[7]

Yet, along the north-south and east-west axes, where the majority of the commercial and retail uses have been zoned according to the 2004 Master Plan (which have been regularly updated), the planners were forward-thinking enough to integrate land use with transit planning, building roads wide enough to dedicate specific lanes to public transit. Along these transit-rich axes, public transit is a convenient way to get around. Here the land values are highest in the Gaoming District. Responding to increasing demand from consumers who want to be close to jobs and retail amenities and transit-options, developers are building high-rise residential and mixed-use projects similar to those in Guangzhou and Hong Kong. Project-level densities are high – close to 500 pph/hectare, with little open space and smaller units than that found in projects in the suburbs. Yet, some people, especially the upper-middle classes are willing to make the trade-off between higher prices and smaller units to less commuting time to and from work. Often, they have second, investment homes in the outskirts as well. Land values and density gradients fall with increasing distance from transit stops.

[7] Transportation planners in China have had a hard time estimating and keeping up with demand for public transit and increasing car ownership rates. A classic example is Shanghai where the subway cannot meet demand. French, Howard W., "A City's Traffic Plans Are Snarled by China's Car Culture," *The New York Times*, July 12, 2005.

Average residential densities throughout the urbanized area are still lower than in 2005, because the majority of private developers are still developing projects along the urban fringe much more cheaply and easily than in the urban core. Collectively-owned land still remain outside of the District government's jurisdiction. Villagers are demanding more and more compensation money from the government, making land assembly and coordinated development of the urban fringe costly, time-consuming and difficult. The government does not have the equity or flexibility that private development companies have. Urbanization along the outskirts remains chaotic and agricultural land is being converted at high rates per year.

Western-style luxury homes still make up a large portion of the newly constructed residential units, especially at the outskirts. They are often located in gated communities with landscaped open-spaces and ample amounts of active and passive recreational areas, with project-level densities of 180 and 318 pph/hectare, respectively. Affordable housing continues to be built, by municipal governments but increasingly by private developers. These average project densities are still lower than that of the existing stock due to generally higher standards for average unit sizes. Lower-end housing, lacking modern amenities and open space, are demolished and filtered out of the existing stock, especially in central urban locations. Average residential densities for the entire District decrease.

Suburban polycentric sprawl characterizes scenario #2, although the urban core and land along major transit corridors are increasingly developed and redeveloped at higher residential densities.

4.6. Scenario #3: Gaoming Develops with High-levels of Government Intervention

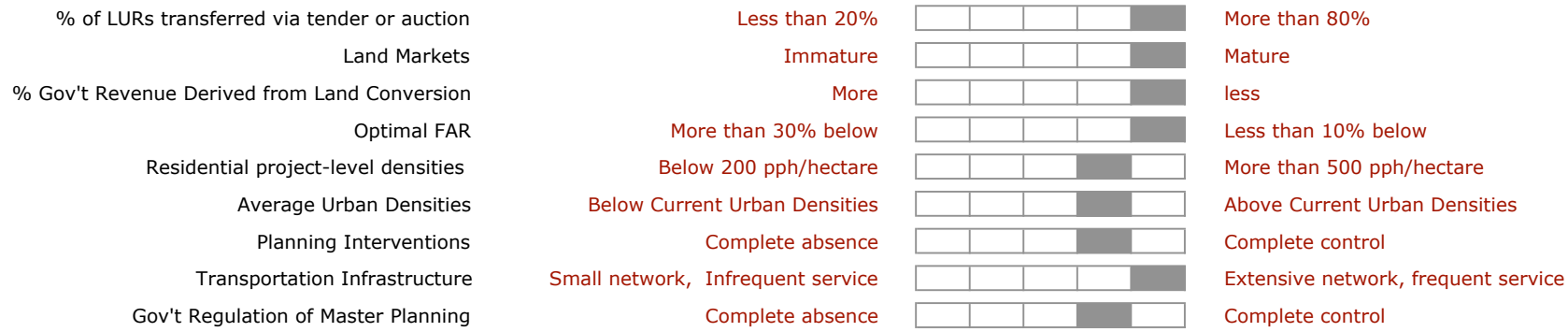

Figure 4.7. *Scenario #3 Characteristics.*

In the last scenario, the transfer of LURs through public auctions and tender has become the dominant process of transactions on the primary market. Largely, this is due to the State passing open auction laws throughout the country and vigilantly enforcing these laws through the creation of a separate regulatory body to eradicate corruption. The State and the regulatory body has been aided in its efforts by media coverage and public scrutiny of deals. Another significant change is the way the performances of local officials are evaluated. Instead of gauging performance of mayors, party officials, and civil servants, with just short-term economic gauges (% change in GDP, % of contribution to state coffers year-over-year), other standards measuring financial independence (% of operating revenue generated within municipal boundaries) and quality of life are also included (such as education, pollution control/reduction, % of population using transportation, etc.). This instills incentives for officials and planners to consider the longer-term impacts of their decisions and encourages different priorities to be set.

The incidence of shady relations between developers and local officials is much more rare. However, the government has still not found an effective solution to regulating development at the outer edges where collectively-owned land in

villages can still be developed without having to comply with zoning and land use regulations as outlined in the Master Plan. There has been some success in getting villages to form cooperate and form partnerships with the government for large-scale developments in exchange for profit-sharing participation.

Guangxi, or relationships, continue to be important and definitive of the Chinese-way of getting things done; yet, government reforms are lowering barriers to entry and driving down transaction costs. Many firms (both domestic and international) are now active in the marketplace. Competition drives the volume of transactions and land values to historic highs. The land market in China is more mature and has many characteristics of a truly free market.

Historic high values from land transactions have increased local government coffers to the point that local officials no longer face pressure to sell LURs to cover operational gaps. Moreover, the state is in the process of changing personal and business tax reform to phase out the local governments' reliance on generating revenue from real estate deals.

Profit-driven developers face great competition in the marketplace. Sophisticated financial and market analysis is the standard for business practice. The days of 20% returns on real estate investments are over; margins of profits are down. The drive to innovate and to build to optimal FARs forces many weaker firms out of the marketplace.

It has become de rigeur to build multi-family residential developments in proximity to transit. Not only has planners and local leaders show a great deal of foresight in integrating land use and transit planning into the Master Plan, but incentives, such as FAR bonuses are being offered to developers to building within a certain radius of transit stops. Retail, commercial and mixed-use developers also see opportunity to build residential components to their projects, to take advantage of the extensive public transportation network. Distinct density gradients can be seen along transit corridors (see Figure 4.8. *Density and Massing along Transit Corridors*).

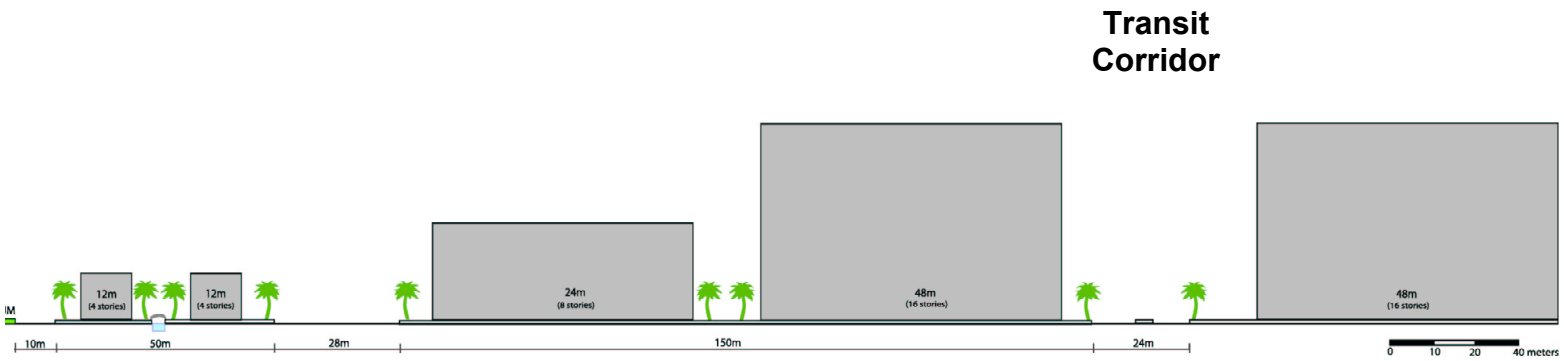

Figure 4.8. *Density and Massing along Transit Corridors. Source: MIT Foshan Studio, 2004*

The network still consist mostly of buses, but residential densities are high enough along certain transit corridors that bus-rapid-transit (BRT) lines are being phased in to provide a permanent, grade-separated mode that can deliver on-time, reliable service. While increasing consumer buying power has resulted in high demand for cars and larger housing units, the reliability and convenience of public transit has led many commuters to abandon their cars during the week. Moreover, the local government has made car registration fees quite high to deter the use of private vehicles. Public transit has become a true alternative to the automobile. Traffic congestion has remained at the same levels for some years and there is little discussion to build more roads to accommodate more traffic. Instead, there is discussion to integrate the BRT network into a regional public transit system that at this point has been planned for the Guangzhou-Foshan metro area, facilitating connections between the two systems to encourage more ridership on the intercity lines.

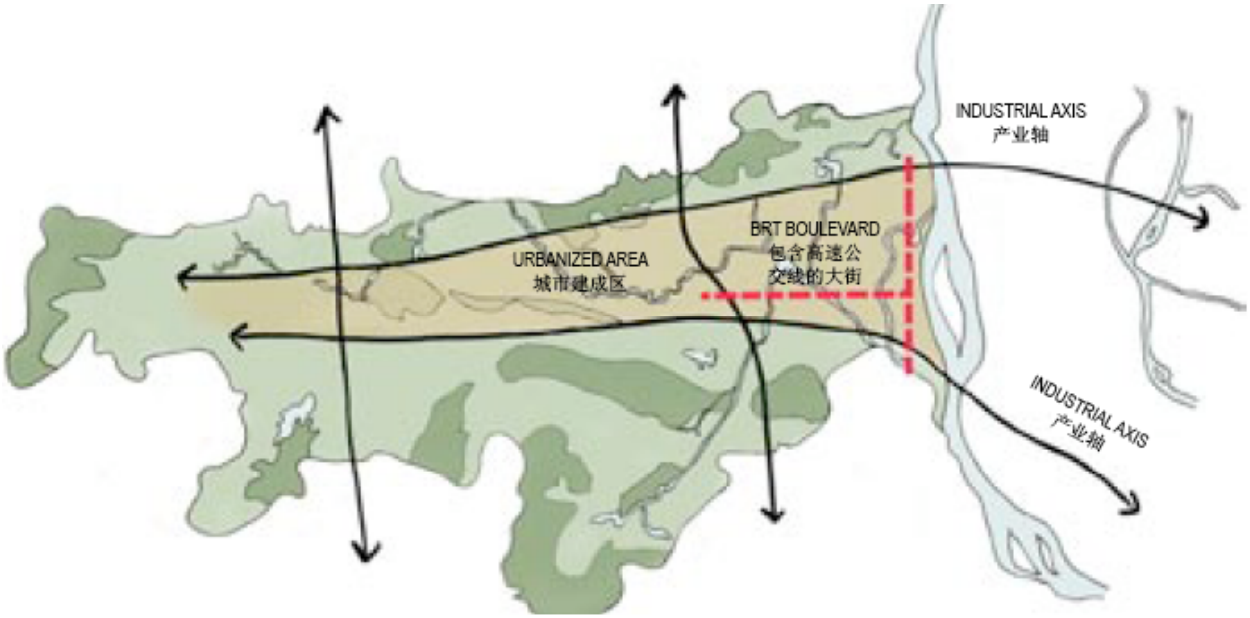

Figure 4.7. *Potential Regional Transportation Connections. Source: MIT Gaoming Studio, 2005.*

The success of the land-use and transportation planning is most evident along the north-south and east-west axes, where the majority of the commercial and retail uses have been built according to the 2004 Master Plan (which have been regularly updated). Along these transit-rich axes, public transit is the quickest and most convenient way to get around. Moreover, the highest land values in Gaoming District are found here, as commercial, residential, recreational and retail uses have been integrated into a vibrant mix-use district. Average FARs are much higher along the transit corridors than the overall urban average, with a concentration of high-rises punctuating the Gaoming skyline. Firms and companies find it advantageous to locate here, to be close to the retail consumer base and to have easy access via public transit to other parts of Gaoming and the PRD. The benefits of agglomeration can truly be felt.

The project-level residential densities are high, with developers are building high-rise residential and mixed-use projects similar to those in Guangzhou and Hong Kong. Project-level densities are high – close to 500 pph/hectare, with little open space and smaller units than that found in projects in the suburbs. There is a lack of affordable housing in the city center, and the government must take aims to build more affordable units on outskirts, where land values are cheaper. Fortunately, the highly convenient public transit system makes commuting from the suburbs to the CBD possible. Land values and density gradients fall with increasing distance from transit stops (see Fig. 4.8, *Density and Massing along Transit Corridors).*

Average residential densities throughout the urbanized area are lower than in 2005, but the gradient is steeper between the city center and the suburbs. Moreover, the actual urbanized area is much smaller than previous scenarios have projected because the Master Plan limits development to specific areas served by public transit. In fact, developers are given incentives to develop close to transit in the form of bonus FARs. Urbanization along the outskirts is occurring at a much lower rate and is constrained by the lack of public transit.

Western-style luxury homes still make up a large portion of the newly constructed residential units, especially at the outskirts. However, they are often in higher-rise buildings. The open space and recreational amenities are still available, but due to the preservation of large swaths of agricultural and “scenic” land, citizens are much more likely to enjoy the countryside and the natural scenery for which Gaoming is famous. Affordable housing continues to be built, by municipal governments but increasingly by private developers. These average project densities are still lower than that of the existing stock due to generally higher standards for average unit sizes. Lower-end housing, lacking modern amenities and open space, are demolished and filtered out of the existing stock, especially in central urban locations.

The urban footprint is more monocentric, with high densities in the core and lower densities along the outskirts. Migration to the suburbs is kept to a minimum by the land use plan and by the need to be proximate to transit. Gaoming’s natural resources can be protected and agricultural land conversion kept to a minimum. Negative environmental impacts,

such as air and water pollution, and quality of life impacts, such as traffic congestion, from uncontrolled urban sprawl can be minimized.

In this scenario, there is a significant reduction in agricultural land conversion from the Gaoming that is imagined in scenario #1 and #2.

CHAPTER V: RECOMMENDATIONS AND CONCLUSIONS

5.1. *Introduction*

This thesis began with the question of how Gaoming's planners and officials can plan for the sustainable build-out of this District in the Pearl River Delta as its population is projected to double over the next 20-30 years. It addressed the Central Government's concerns about the environmental consequences of Chinese cities' record rates of urbanization and the need to preserve agricultural land and natural resources. It then discussed the pressure on local governments to further economic development and generate enough revenue to cover their own operating budgets, which often results in the selling of land use rights for sub-market prices and for sub-optimal uses. Moreover, this thesis discussed the unique aspects of China's dual track land markets and the difficulties in their reform. It becomes obvious even from the limited scope of this thesis the enormous challenges Gaoming's planners and officials face in their work.

Their receptiveness to the work done by the MIT Foshan and Gaoming Studios in the Spring of 2004 and 2005 attests to their willingness to listen and learn from examples of successful and unsuccessful developments elsewhere. Here, I use the physical density of cities as a planning tool to capture the intensity of land use and as a performance indicator of the successes and failures of planning policies. The scenarios presented in Chapter 4 draw upon existing practice in Gaoming, Hong Kong, Singapore and Bangkok and serve as a visioning exercise to help planners learn about how varying changes in governmental policies and reforms in the land leasing market can lead to dramatically different land use intensities. I also present instructions to build an economic model to help planners and local leaders calculate the optimal FAR for parcels of land given certain planning constraints, consumer preferences, market conditions and cost structures. The economic model supports and illustrates how land values and residential densities can change according to various inputs in the different scenarios. Used together, these scenarios and the accompanying economic model present a framework with which planners and local officials can weigh the benefits and costs of their decisions.

5.2. *Summary of Findings*

The following is a summary of my findings from my research, analysis and thinking of Gaoming's development:

Physical Density & Urban Form

- Chinese cities already quite dense. As average incomes rise and urban migration continues in record levels, demand for housing will increasingly put developmental pressure on existing agricultural land at urban edges.
- From examples of other industrialized cities around the world, urban centers in Chinese cities will experience dedensification, as increasing rates of private automobile ownership and improvements in transportation infrastructure increase individual mobility.
- Physical density is an effective performance indicator of planning processes, as exemplified by the development of Hong Kong, Singapore and Bangkok.[1]
- A deficient spatial structure fragments labor and consumer markets into smaller, less efficient markets; it adds to higher transaction costs by unnecessarily increasing distances between people and places. A deficient spatial structure increases the length of the city infrastructure network and therefore increases its capital and operating costs. [2]
- Urban spatial structures have dramatic impacts on the economic efficiency and environmental quality. Viewing the city as a large labor and consumer market, the larger the size of the labor market and the lower the costs of transactions, the more prosperous the economy.[3]

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[1] Chan, 1999.
[2] Bertaud, Alain and Stephen Malpezzi, "The Spatial Distribution of Population in 48 World Cities: Implications for Economies in Transition." December 17, 2003. Accessed from http://alain-bertaud.com/ (accessed 7/14/05).
[3] *Ibid.*

- Firms want to locate near their workers, to offset the increases in salaries that they will have to pay out to compensate for longer transit times.[4]
- Studies of China's cities in comparison to other cities in the world also suggest that these cities have not gained the agglomeration benefits of urbanization but have started to suffer the negative externalities from traffic congestion and environmental degradation.[5]
- Integrated land use and transport planning is essential to minimizing travel time between residences and job centers and to maximizing public transit investment.
- Efficient land use allocation and planning leads to better quality of urban environment, allowing for the preservation of natural resources, segregation of uses and raising government revenues.

The Chinese Land Market

- The institutional aspects of the market, such as property rights, entitlement and government regulations, play a large role in shaping land markets in China.
- The distinct differences in the property-rights systems between the Westernized market economies and China requires a multi-prong approach that incorporates aspects of the neoclassical "market" model and an in-depth understanding of the interactive, overlapping roles the State, the representatives of the State, and local institutions, such as work units and villages, play in the land market.
- As China continues to reform its economy towards a free-market system, the government will need to reform the dual track land market system to eradicate the disparities in land use rights prices created by different forms of property rights ownership.

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[4] *Ibid.*
[5] Leman, 2005.

- The prevalence of private negotiations and corruption in land use rights sales have kept the real cost of real estate transactions hidden and have led to the massive losses in government revenue.
- The current system of taxation and revenue generation for the city makes it difficult for long-term physical planning to be carried out. Land use rights are often sold, at sub-market prices for sub-optimal uses, to raise revenue to cover budget deficits and not as part of a planned development process.

5.3. *Recommendations*

The following are a series of recommendations geared towards three distinct levels of organizational and institutional processes. The first set, Perceptions and Planning Process, is aimed towards changing the ways planners and local leaders perceive the parameters and context of their work. The second set, Institutional Change, is aimed towards the way the government operates. Finally, the third set, Policy, offer suggestions for actual policy changes at different levels of the government.

	Perceptions & Planning Process	Institutional	Policy
Local Gov't	• Consider plans and regulations as a dynamic process, one where the complex interaction of land uses, corresponding densities, housing prices and changes in prices need to be understood and rigorously monitored.[6] • Gather as much information about the land, housing and commercial market as possible to understand the interactions between demand and supply and its impacts on prices. • Use the public tender and negotiations process to sell land use rights rather than through private negotiations to encourage transparency in real estate dealings and competition amongst developers.	• Integrate land use and transportation planning to keep public transit a viable attractive option for their travel needs will keep land rents high, keep densities high and have the biggest impact on efficient land use and keep costs down in avoiding the need for expensive, duplicative infrastructure (see Shanghai example). • Encourage dialogue between local planners and villagers to coordinate the development of land on a larger District or regional level. • Develop guidelines where the development plans of villages and other state-owned-enterprises can be reviewed for coordination with District-level Master Plan.	• Develop a consistent transportation policy that goes with provides maximum accessibility to work centers from residential areas. • Build flexibility into the transit system so that capacity can vary with demand to maintain the viability of transit as means of travel within the District and over the metropolitan region. • Coordinate and share the costs and benefits of a regional transit network, spearheaded by a central agency that will look at the needs and growth patterns within the entire Foshan/Guangzhou metropolitan area.
Central Gov't	• See above	• Make active use of the media and local citizens to root out corruption. • Restructure the promotional system of local officials and planners to reflect a longer term view of economic development, environmental preservation and promotion of social equity. • Encourage local leadership to provide innovative ways of resolving land development that can provide a progressive model of rigorous master planning	• Streamline the sale of land use rights in China into a one one-track system where price differentials are realigned to reflect demand for physical and locational attributes rather than reflect different forms of ownership • Review the current revenue generation and budgeting system of local governments that is leading to selling of land use rights for sub-market prices and sub-optimal uses. • Implement a property tax in China, where the fiscal impact and the loss of land value due to poor planning and coordination can be felt.

[6]Bertaud and Malpezzi, 2003.

5.4. *Shortcomings*

This thesis places much weight and focus on the impacts governance and institutions play on the physical form of urban spaces. Considering China's recent history and a fairly thorough literature review of other studies by academics in the planning and economic development field, this focus on the institutional aspects seems fair. Given the limited time and resources I have available to me in this regard, I fully acknowledge the need to expand the scope of inquiry for future research to encompass other major factors, such as political economy, cultural change and more rigorous institutional analyses that can plan a large role in impacting the development of urban form.

Moreover, I have chosen to focus my development scenarios on factors that affect the supply of land, while holding constant the factors that impact demand for land. Certainly, demand factors will have to be included in the scenario exercises and in the building of the economic model.

In addition, I have made assumptions about the Chinese leadership's continued commitment to free-market reform in the Chinese economy. While only a few years ago, this assumption might seem suspect to some, I feel with increasing confidence that the benefits of free-market reforms to the average citizen will outweigh the huge amount of social unrest and negative impacts on society these reforms have produced. I think there are few today who yearn for the days of Communist rule and forced social experimentation. However, that is not to say that free-markets will always produce higher densities and increase land use intensities. Much more research will have to be done to see whether "market conditions" will indeed yield smaller footprints on the land.

5.5. *Questions for Future Research*

The following are a series of further research topics that this thesis cannot address:

Market Conditions

- Gather market information to create the economic model (see Chapter 2.4.3)
    - Definition of the market area, based on walking, transport, or driving times
    - Housing prices (per unit of housing) in different areas of the CBD, broken down by housing characteristics, such as number of bedrooms, bathrooms, amenities such as open space, recreational facilities, location in relation to retail, job centers, transit, etc.
    - Construction costs of local area, which will vary depending on type of construction
    - Survey of net parcel density of residential projects to determine the marginal impact of FAR on house price and construction costs

- Create a database of of more newly constructed residential project densities to include the following:
    - Physical conditions, typology, densities, % open space, tenure choice, etc.
    - Track impact of new units on current urban densities
    - Occupancy and vacancy rates of new residential developments
    - Sale and rental prices
    - Lease-up rates
    - What % is owner-occupied? What % is rental? What % is owned?

Land Use Rights Transfers

- Perform a detail study of rates of land use rights leased through negotiation, and through public tender or auction in primary market to measure the effects of “corruption” on prices

- Create a database of secondary and tertiary market transactions to gauge the increases in land use rights appreciation with a goal of capturing that value towards capital projects and government revenue

- Track of land use rights transactions to see whether and at what rate the associated uses have changed on the secondary and tertiary market

5.6. *Conclusion*

I set out initially in this process to understand why densities vary between cities. As I continued in my research, I saw the potential of using physical density as a tool to measure the effectiveness of planning interventions. It is my hope that my inquiry into the variables that impact density will prove useful to the planners and local leaders of Gaoming in their planning for its development over the next 20-30 years.

Throughout this process, one common theme stands out in importance when thinking about sustainable development. Progressive governance is a crucial component in this complex process - in providing vision to guide the development of what a city should become; in setting forth a rigorous planning process to achieve long-term goals rather than short-term results; and in promoting a transparent system of land use rights transactions that encourages more innovation, ideas and competition to yield more efficient uses of land.

BIBLIOGRAPHY

Data Sources

Field Seminar. MIT Foshan Studio. January 2004.

Field Seminar. MIT Gaoming Studio. January 2005.

Yu-Hung Hong. Researcher. The Lincoln Land Institute. Personal Interview. June 13, 2005.

Literature

Addae-Dapaah, Kwame, "*Utilization of urban residential land: a case study of Singapore*." Cities, Vol. 16, No. 2, pp. 93-101, 1999.

Barboza, David. "*China Acts to Curtail Property Speculation*." The New York Times, May 13, 2005.

Bertaud, Alain. "*Spatial Structure of the Pearl River Delta Metropolitan Region: A Study Proposal.*" Dec. 10, 2001.

Bertaud, Alain and Stephen Malpezzi. "*The Spatial Distribution of Population in 48 World Cities: Implications for Economies in Transition*." December 17, 2003.

Bristow, Roger. Land-use Planning in Hong Kong: History, Policies and Procedures. Hong Kong: Oxford University Press: 1984.

Chan, Claire S. "*Measuring Physical Density: Implications of the Use of Different Measures on Land Use Policy in Singapore*." Master Thesis, MIT, 1999.

Chen, Ge. "*Housing in the special economic zones: a preliminary study of housing provision and conditions in Shenzhen."* Hong Kong: Hong Kong University Press, 1997.

Churchman, Arza. "*Disentangling the Concept of Density*," Journal of Planning Literature, Vol. 13, Issue 4, May 1999.

Ding, Chengri and Gerrit Knaap. "*Urban Land Policy Reform in China's Transitional Economy*." Emerging Land & Housing Markets in China. Cambridge: The Lincoln Land Institute, 2005.

Ding, Chengri and Yan Song, editors. Emerging Land and Housing Markets in China. Cambridge: Lincoln Land Institute, 2005.

DiPasquale, Denise and William C. Wheaton. "Chapter 3: The Urban Land Market: Rents and Prices," Urban Economics and Real Estate Markets. Englewood Cliffs, NJ: Prentice Hall, 1996.

Gani, Sharmin. "*Urban density measures in planning for the Pearl River Delta*." Master Thesis, MIT, 2000.

Ge, Chen. "*Urban housing in China: an introductory study of Year 2000 Urban & Rural Xiaokang Housing Scientific & Technological Industrial Project*." Shatin, New Territories, Hong Kong: Dept. of Architecture, Chinese University of Hong Kong, 1997.

Han, Rongliang. "*Put a Stop to 'Real Estate Corruption' & Advocate 'Five Openness', Economist*." People's Daily Online, July 20, 2003.

Leman, Edward. "*China Issues Notes #4. Metropolitan Regions: New Challenges for an Urbanizing China*." Conference Paper presented at World Bank/IPEA Urban Research Symposium 2005, April 4, 2005, Brasilia, Brazil.

Ng, Mee Kam and Peter Hills. "*World Cities or great cities? A comparative study of five Asian metropolises*." Cities, Vol. 20, No. 3, p. 151-165, 2003.

Singapore Urban Redevelopment Authority. Outram Planning Area Planning Report 1995

Valletta, William. "*The Land Administration Law of 1998 and Its Impact on Urban Development*." Emerging Land and Housing Markets in China. Cambridge: Lincoln Land Institute, 2005.

Yang, Zhizhong, "*Urban Land Market and the Effect of Regulation on Real Estate Development in the PRC: A Case Study of Shanghai*." Master Thesis, MIT, 1994.

Yeh, Anthony Gar-on and Xia Li. "*The Need for Compact Development in the Fast-Growing Areas of China: The Pearl River Delta*," Compact Cities: London, 2000.

Zha, Jianying. "*The Turtles*." The New Yorker, July 11 & 18, 2005..

Zhang, Xing Quan. "*Urban land reform in China*." Land Use Policy, Vol. 14, No. 3, pp. 187-199, 1997.

Websites Resources

Gaoming Investment Network
http://www.gmzs.com/gmzs/english/investment_environment/investment_environment.htm

Hong Kong 2030 Planning Vision and Strategy
http://www.info.gov.hk/hk2030/hk2030content/wpapers/wpaper_18/English/e_table9.htm

The People's Daily Online
http://english.peopledaily.com.cn/

Zoning Glossary Terms, New York City Department of City Planning
http://www.nyc.gov/html/dcp/html/zone/glossary.html

Project 2022: Hong Kong & The Pearl River Delta
http://www.cityu.edu.hk/p2022/scenario/scfm.htm