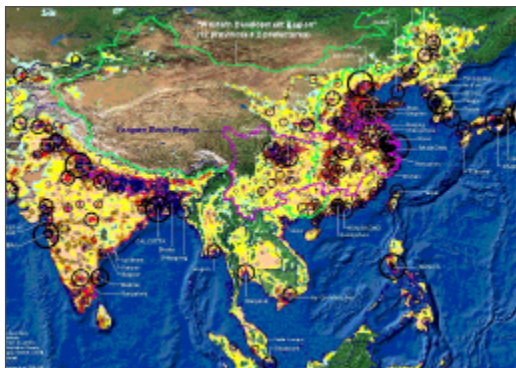


Urbanizing Regions in China's Yangtze Basin

Development Trends and Key Priorities



Summary Report

prepared for East Asia Urban Sector Unit
The World Bank

March 2001



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1 Purpose of this Study

The Yangtze Basin is China's longest river. With a watershed area of 1.8 million km², it is the 11th largest river basin in the world, covering over twice the territory of both the Danube and the Mekong River Basins. Although 30% of the area of the Amazon Basin (the world's largest), the Yangtze Basin is the second largest river basin within a single country. The Yangtze watershed traverses all or parts of nine provinces (Zhejiang, Jiangsu, Anhui, Jiangxi, Hunan, Hubei, Sichuan, Guizhou, Yunnan) and two provincial-level municipalities (Shanghai and Chongqing), stretching from the East China Sea to the border of Myanmar and the upper Tibetan plateau.

China will cross the 50% urbanization threshold in the next 10-15 years. It is now 40% urbanized (using broader, international definitions).

China became the world's largest urban nation during the mid 1970s. Although only 20% of the population was urbanized at that time, the pace of urbanization has increased dramatically, particularly over the last 15 years. China is now experiencing a process of urban growth that, over the next 10-15 years, will result in over half of its population living and working in urbanizing areas. This fundamental social and economic shift took 50 years to occur in the United States and 25 years in Japan during the last century. The strains associated with such changes on both urban and rural economies, social systems, cultural values, governments' fiscal and governance capacities, the agricultural land base, and the natural environment have historically been severe in other countries. Given the unprecedented volume and speed of urban growth expected over the next decade or so in the world's most populated country, urbanization will invariably stretch China's capacity to manage change perhaps more than ever before in its long and rich history.

This study was designed to assist China and the World Bank in setting priorities for more integrated urban investment in the Yangtze Basin.

This report describes the findings of a two-year assessment of the speed, characteristics, and implications of the shifting pattern of human settlement within China's Yangtze River Basin. The purpose of this inquiry was to analyze urban and regional development trends in the Basin as background for the possible development by the Government of China (GOC) and the World Bank of a coordinated program of cooperation within the Yangtze Basin over the next ten years. The objectives of this study were to: a) identify cities and urban systems in which the Bank and GOC could focus collaboration over the medium term, given urban and economic development growth prospects, demand for environmental infrastructure, and the institutional and fiscal capacities of cities to support investment; b) define likely demand for urban environmental infrastructure in the Yangtze Basin over the next decade, and estimate potential infrastructure financing levels; c) identify and define strategic objectives for the urban environment sector in the Yangtze; d) and identify and assess sectors for Bank/GOC support, recommend priorities among them, and propose an urban investment framework to guide continued Bank and GOC collaboration in this sector in the Yangtze Basin.

Over 900 cities and counties were analysed; 21 cities were visited during fieldwork.

The approach followed in the study consisted of statistical and spatial analysis of demographic and economic data on all 910 counties and cities within the basin, and transportation and geographic data, using GIS technology. The base year was 1996 with 1990 as a comparator; projections of key parameters were made to 2005. All of the data were obtained from central, provincial, and municipal government sources; these were validated – and gaps filled, where necessary – using approaches described in Volume 3 of this report. While it was hoped that a longer period of time could be analysed, reliable and consistent

data at the county and city level are not available across the Basin before 1990. To test key hypotheses, field visits were held to 21 cities in the Basin, and extensive consultations were conducted with central government ministries and Bank staff in Washington and Beijing.

A final review workshop was held in Shanghai in March, 2001, co-sponsored by the Shanghai Municipal Finance Bureau and the World Bank. Officials from the Ministry of Finance, State Development Planning Commission's Macroeconomy Research Institute, State Council's Development Research Center, Ministry of Construction, Ministry of Lands and Resources, Ministry of Communications, Tsinghua University, and Renmin University, and senior officials from governments of Shanghai, Zhejiang, Jiangsu, Anhui, Hunan, Hubei, Chongqing, Sichuan, Guizhou, and Yunnan provinces provided useful comments, many of which have been incorporated into this Final Report.

The findings, conclusions and recommendations in this report are strictly those of the Consultant, and do not necessarily reflect the views of the World Bank, any Government of China agency, or CIDA which co-financed the study.

2 Urbanization in China: Methodological Issues

Major challenges to identifying and defining urban and regional development trends in China are: 1) the current administrative definition of "urban" residents which is still based on household registration (at least attitudinally) and therefore does not include a rapidly-growing number of supposedly rural households (and enterprises) that have entered urban economies over the last 15 years; 2) administrative conventions for designating statutory "towns" and "cities" that have not been consistent over the last 50 years, and that do not include settlements which in many countries would be considered urban; and 3) the definition of spatial boundaries at the sub-municipal scale which leaves many rapidly-urbanizing suburban and peri urban areas outside the territory that most municipal governments consider their primary responsibility for service delivery. Despite the major shift from farming to non-farming occupations in towns and villages in suburban and peri urban areas of China's cities over the last decade, municipal governments responsible for the provision of urban infrastructure and other public services continue to treat the traditional built-up "city proper" – populated mainly by households with non-agricultural household registration – as the spatial territory under their daily operational mandates.

In China, households and enterprises until recently faced numerous constraints to mobility into (and out of) inner urban areas that severely limited locational choices. Aside from *hukou* (household registration) which limits residential mobility, the dominant enterprise structure of vertically-integrated SOEs means that many supply chains are extremely localized within cities. Inner city land and housing tenure also affect mobility. Heavy subsidization of residential units by state-owned and government work units in urban areas has only recently been discontinued, and secondary markets in formerly state-owned residential units are only now beginning haltingly in a few cities. The decades-old administrative allocation of inner urban land to state-controlled enterprises at no cost means that, up until last year, there has been no economic incentive for these firms to relocate to low cost suburban sites.

Study findings were reviewed in March, 2001, at a summary workshop in Shanghai. Key comments have been incorporated into the Final Report.

China has defined "urban", "towns" and "cities" in different ways over the past 50 years, making inter-temporal and international comparisons difficult.

The built-up "city proper" is still viewed by all levels of government as China's only "urban" space.

This partial view is based on decades of administrative controls on the mobility of labour, enterprises, and capital.

In suburban and peri-urban areas, constraints were far less onerous during the last 20 years.

China's cities are growing largely through internal growth and transformation of non-farming households and enterprises in suburban and peri-urban areas, a 'centripetal' pattern different from cities in western countries.

In suburban and peri urban areas where arable land is collectively-owned and far less regulated, informal shifts from farming to small-scale industrial land uses have been relatively simple, particularly when firms are owned, at least in part, by town/township and village administrations. Similarly, residential and labour mobility among rural residents in suburban and peri urban areas, including from other towns and townships, is far less constrained. The residential growth in many suburban towns and villages is supported by informal rental markets that have evolved over the last fifteen years. Therefore, while household mobility and enterprise formation have been tightly constrained within inner urban areas over the last two decades, under market reforms the reverse has been true in suburban towns, townships and their constituent villages.

China's urban growth, at least over the past 15 years, has largely been **centripetal** through locational decisions by households and firms that circumvent administrative constraints to residency, employment, enterprise formation and land tenure in urban districts. Given the high population densities in suburban and peri urban areas, and the relative ease of industrial enterprise formation, it has not taken much for farming areas on the outskirts of urban districts to be rapidly transformed into semi-formal suburban precincts.

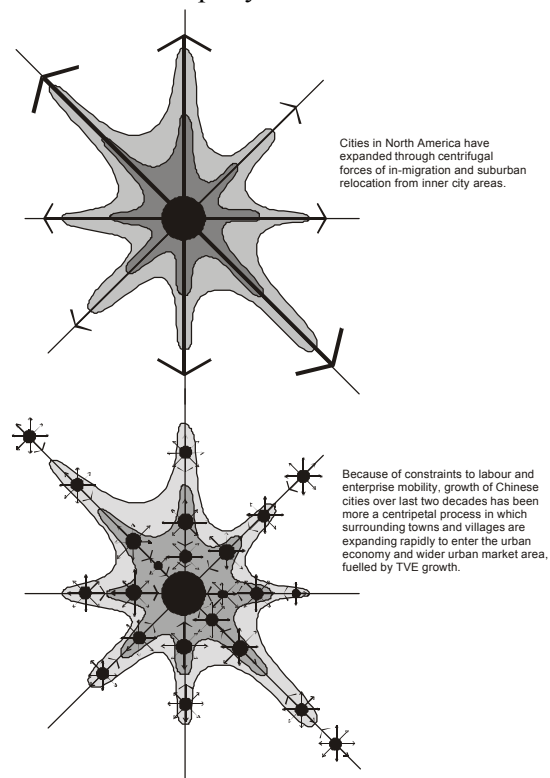
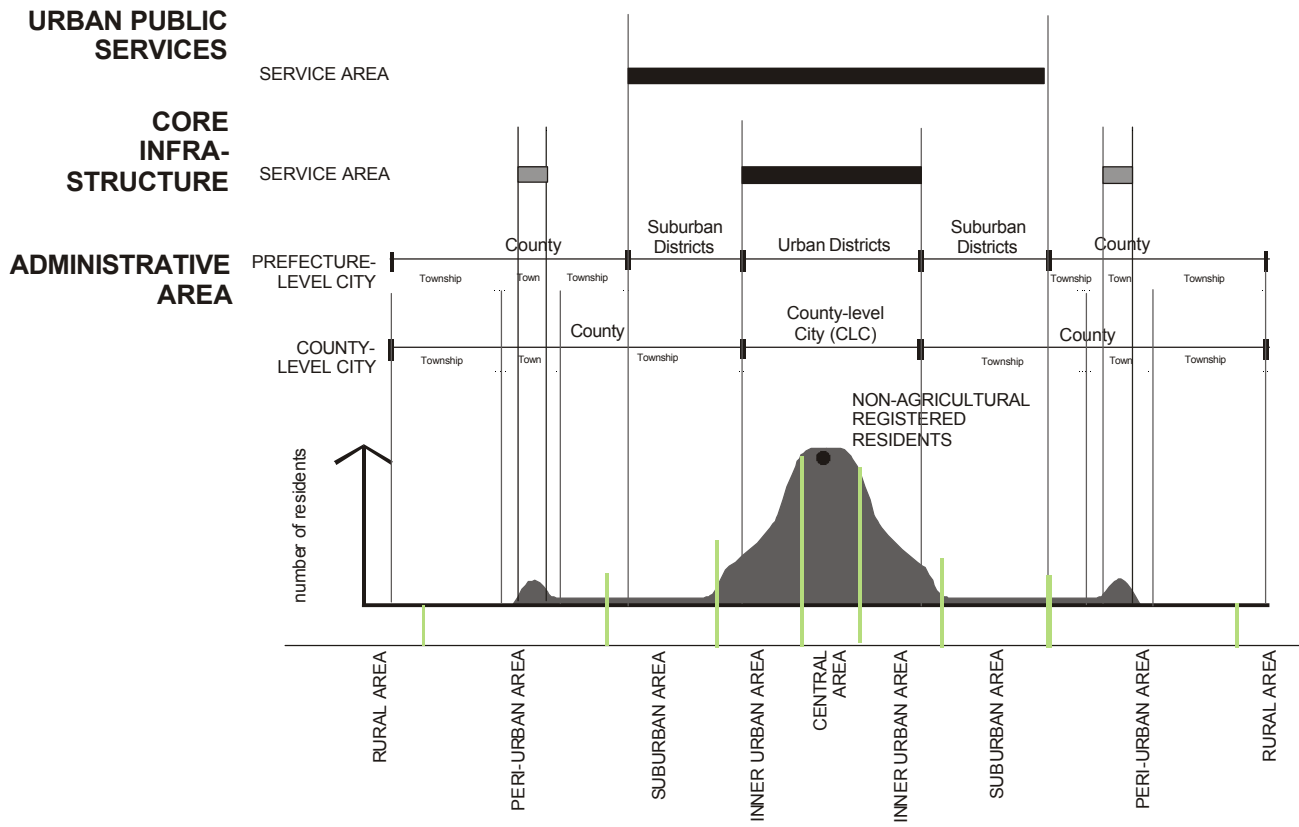


Figure 1: Centripetal and Centrifugal Urban Growth Patterns

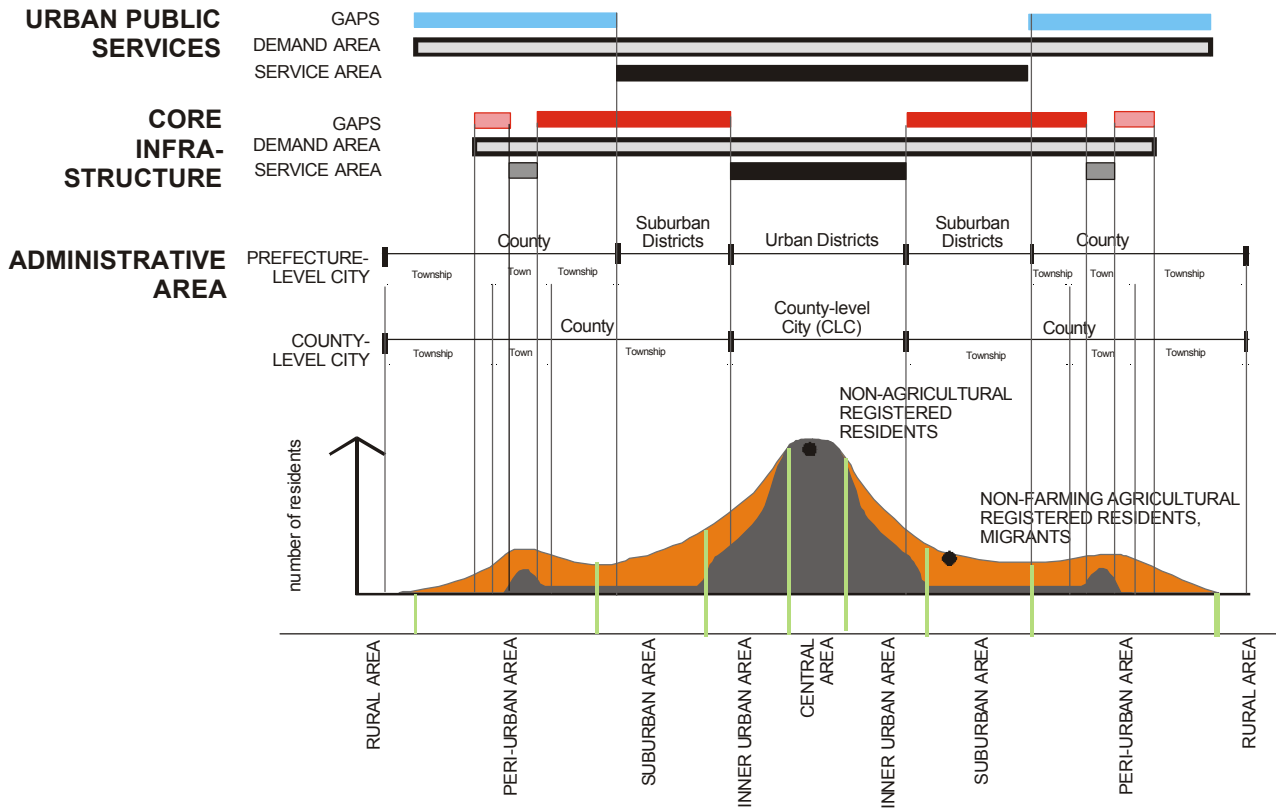
Mobility constraints in urban areas are now easing. This will push suburban growth even faster during this decade in a 'centrifugal' pattern.

The trend towards suburban and peri urban growth is likely to continue well into the next decade even without the loosening of *hukou*-based mobility constraints. Marketization of state-built housing, the gradual evolution of secondary residential markets, massive redevelopment of substandard inner city housing areas (causing large-scale resettlement in many cities), the increase in inner city land leasing, the gradual decrease in administrative allocation of land to enterprises, improvements to urban transportation networks and public transport, and the trend towards new enterprise formation outside of the state sector all will likely push suburban development.



approximately 20-30 km. radius

Figure 2: Traditional Perception of a Typical Chinese City (section)



approximately 20-30 km. radius

Figure 3: Emerging Service Gaps in Suburban and Peri-Urban Areas

Infrastructure service gaps are growing. They are not being quantified in demand assessments by cash-strapped municipal governments. This compounds environmental problems and is creating mounting consumer dissatisfaction.

Quantification of this unmet demand required the development of a new definition of “urbanizing” population in this study.

Over 40% of the Basin’s population is “urbanizing” - either fully urban or in a rapid transition from farming to permanent non-farming lifestyles in urban, suburban and peri-urban areas.

While “urban space” can be defined in many different ways, including urban economic areas, from the perspective of investment, settlements need to be defined in terms of the markets for infrastructure services that exist today, and that will likely emerge during the life cycle of the infrastructure asset. All potential consumers exerting demand need to be counted over the full territory of the demand area, regardless of their administrative status.

To inform the Bank and GOC on the location, scope and volume of likely future investment requirements in the urban sector, this study is based on the need to define the full demand and impact areas of urbanizing settlements. This required the identification of households – both permanent and migrant – in counties and statutory cities that rely on the non-farming sector for their incomes. For the purposes of this study, “urbanizing” settlements are defined as concentrations of non-farming households beyond a minimum population threshold that represent potential consumer demand for urban infrastructure services.

Counties and statutory cities are defined as “urbanizing” if: 1) 80% or more of GDP in 1996 was in the secondary and tertiary sectors; 2) 40% or more of the registered workforce was employed in secondary and tertiary employment; and 3) if the resulting population active in or dependent on secondary and tertiary economic activities was higher than 200,000 residents. The rationale for this definition is principally that, despite the widespread notion that TVE and non-state developments in counties are “rural” phenomena, over 70% of the output and employment from this sector are actually located in suburban districts and peri urban townships within the boundaries of statutory cities.

Using conventional definitions, the Basin’s urban population in 1996 was 109 million (77 million non-agricultural residents in urban districts of statutory cities plus 32 million non-agricultural registered residents in statutory towns). The broader definition used in this study – based on non-farming residents — indicates that there are almost twice as many people depending on non-farming economic activity living in counties and cities with over 200,000 such residents, and in which GDP from secondary and tertiary sectors accounts for over 80% of total GDP; instead of an official “urbanization” rate of 20%, the Basin could have as high as 40% of its population actually within or about to enter wider urban economies with lifestyles and service expectations of municipal governments approaching those of inner urban areas.

This study also uses a definition of city sizes that is more commonly applied internationally and that reflects spatial and economic differences between small and large metropolitan areas not captured in the current typology used in China. The size scale employed in this study uses non-farming population as its quantifier since: 1) using total population, including of farming households, would indicate numerous large cities in China and distort comparisons with many other countries where rural densities with urban areas are much lower; and 2) since the underlying objective of this study was to identify potential infrastructure needs in the Basin’s urbanizing settlements, investment estimates would be distorted by including farming populations in urban areas.

"2nd Definition" Population (NBS)	
Superbig Cities	> 1,000,000
Big Cities	500,000 - 1,000,000
Medium-sized Cities	200,000 - 500,000
Small Cities	<200,000
Non-farming Population (used in this study)	
Large Metropolis	> 4,000,000
Metropolis	1,000,000 - 4,000,000
Large Cities	500,000 - 1,000,000
Intermediate Cities	250,000 - 500,000
Small Cities	100,000 - 250,000
Towns	< 100,000

Figure 4: Size Scale of Urbanizing Settlements used in this Study

3 Urbanization Trends in the Yangtze Basin

Overall, the proportion of the Basin's non-farming population resident in urbanizing settlements will likely increase from 40% in 1996 to 46% by around 2005. Even if growth rates declined by 50% after 2005, half of the Basin's population would become urbanizing between 2010 and 2012.

There are variations among broadly-defined regions. In the Yangtze Delta Region, 54% of the total population was non-farming and located in urbanizing settlements in 1996; this proportion is projected to grow to 62% by 2005. In the Middle Yangtze Region 40% of the total population is urbanizing; by 2005 this ratio will grow to 43.4%. The Western Yangtze Region is considerably less urbanized at 26% in 1996. This proportion is expected to grow to 32% by 2005.

The most significant changes expected to occur from 1996 to 2005 are the large increase in number of Large Cities – from 72 to 126 – and the almost doubling in number of Metropolises from 19 to 34. The projected increase in number of Small Cities (11) and the decrease in number of Intermediate Cities (from 224 to 212) is significant in comparison. While debate continues within government circles over the merits of “promoting” the growth of small and intermediate cities, this study shows that larger cities are where the bulk of demand for urban services will occur over at least the next decade. If trends in the first half of the 1990s prevail, there will be a net loss of almost 6 million residents in Small Cities, and a marginal loss of 400,000 in Intermediate Cities. The largest growth by far will be the 40 million increase at the Large Cities scale, and the 18 million increase in Metropolises. For Large Cities, 63% of the expected change will occur from an increase in the population of settlements that already were Large Cities in 1996; 37% will occur from growth in settlements that were Intermediate Cities in 1996 but have reached the size of

Regional urbanization rates range from 54% in the Yangtze Delta to 26% in the Western Yangtze Region. Provincial variations are greater.

In the next decade, most urban growth will occur in Large Cities (500,000 - 1 million residents) and Metropolises (2-4 million), not in Small and Intermediate Cities, and not in the Basin's four Large Metropolises (Shanghai, Wuhan, Chongqing, Chengdu).

Large Cities by 2005. For Metropolises, internal growth will account for 65% of the 18 million additional metropolitan residents while growth of Large Cities into Metropolises by 2005 will comprise 35%. From a policy perspective, the projected large increase in both numbers and aggregate populations of Large Cities and Metropolises will severely test conventional paradigms of urban management. Small and Intermediate Cities in the Basin both have average urbanizing population ratios of 41%, and rural-urban dynamics are likely similar. However, Large Cities in the Basin average an urbanizing population ratio of 64% and Metropolises rise to an average of 90%. Not only are the quantitative differences significant, but the structure of demand for urban public services, including infrastructure, differs markedly as large agglomeration economies emerge. Cities assume new regional economic roles and pass through thresholds that result in new types and scales of demand.

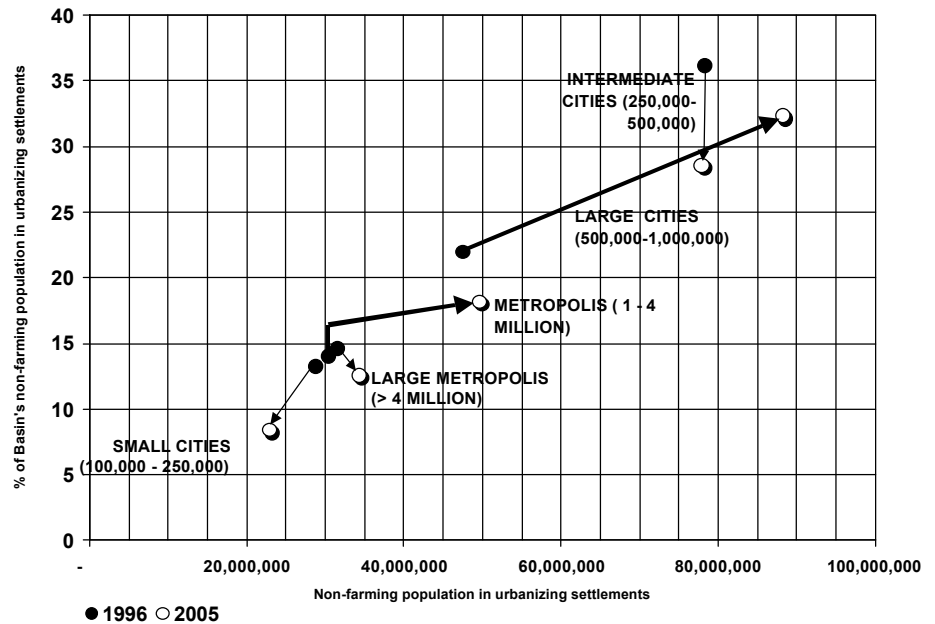


Figure 5: Broad Structural Shifts in City Sizes in the Yangtze Basin, 1996 - 2005

Anhui and Sichuan will experience the most profound urban changes during this decade, but other provinces will also undergo rapid shifts in size of urbanizing populations, and in the roles performed by cities of different size classes.

Characteristics of urban change differ by province: policy and investment must respond to local variations in the speed and spatial pattern of urbanization.

The largest net increases in non-farming populations in urbanizing settlements will be in Anhui (almost 13 million), Sichuan (10 million), Jiangsu (7 million), and Jiangxi (5.6 million). Zhejiang will increase by around 4.6 million, Chongqing by 4.3 million, Hubei by 4.4 million, and Hunan by 3 million. The smallest net increases will likely be in Guizhou (2.6 million) and Yunnan (1.5 million), although town populations are expected to grow significantly in these provinces. Shanghai, already almost fully urbanized, with grow by less than 500,000. Shifts in provincial urbanization levels will be most pronounced in Anhui where the urbanized population's share will increase another 15%, Chongqing (9.3%), Jiangxi (9.3%), Sichuan (8.3%), and Zhejiang (8%). Overall, the most pronounced urban changes will likely be in Anhui and Sichuan.

The projected shifts within provinces by type of urbanizing settlements will differ considerably. Some provinces will experience major transformations of Intermediate Cities to Large Cities, while others will see increases in populations of Small Cities. These changes are important as they underline the need for policy reforms tailored to provincial circumstances, and for the assessment of different kinds of urban infrastructure needs over the next decade.

4 The Basin's Urbanizing Economies

The Yangtze Basin's urbanizing settlements produced 93% of the entire Basin's GDP in 1996, and 42% of China's. Contributions to secondary and tertiary sector output within settlements (which accounted for 86% of GDP in the Basin's cities) were: Intermediate Cities (28%), Large Metropolises (24%), Large Cities (22%), Metropolises (20%), and Small Cities (8%). *Cities with populations over 1 million (Metropolises and Large Metropolises) therefore accounted for 44% of urban output in 1996.* On average: 1) the economies of Intermediate Cities are twice the size of Small Cities; 2) Large Cities are twice those of Intermediate Cities; 3) Metropolises are over three times the size of Large Cities; and 4) Large Metropolises are almost six times larger than the economies of Metropolises.

In comparing cities, per capita GDP – which includes outputs from the primary sector – varies dramatically. However, when these figures are disaggregated into GDP from the secondary and tertiary sectors per non-farming resident (ie. “urban” GDP per “urban” resident), the spread between cities diminishes markedly. Apart from the coastal Delta cities in Shanghai, Jiangsu, and Zhejiang which have the highest levels, GDPST per non-farming resident in all other provinces fluctuate within a very similar range. It is also significant that there are a few cities even in the coastal Delta with GDPST per non-farming resident levels as low as many in both the Middle and Western Yangtze Regions. Furthermore, there are cities in all Western and Middle provinces with urban per capita GDP rates that are comparable to the lower and middle ranges in the Delta. These findings disprove the notion that “all coastal cities are rich” and “all inland cities are poor”. While coastal cities are by and large better off than central and western cities, there are many exceptions. Policymakers need to be aware of them and not generalize redistribution policies on a provincial basis: this would penalize poorer cities in the east, and unfairly reward richer cities in the central and western provinces.

The size of city was found to be an important determinant of income level. Basin-wide, improvement in per capita GDP does not occur until cities reach the size of Metropolis, whereupon there is a dramatic increase of 70%. Per capita GDP and GDPST at the Large Metropolis level are, on average, twice those of Large Cities, and almost 30% higher than in Metropolises. Except for several cities in the Delta, the location of Small Cities has relatively little bearing on income level; they are generally low throughout the Basin. A similar pattern exists for Intermediate Cities.

Although Large Cities with the highest income levels are in the Taihu Basin, moderate incomes were also attained in cities of this size class in the Middle Yangtze Region, the Sichuan Plain, and as far west as Yunnan. At the Metropolis scale, the highest income levels are in Kunming in the west and in the Taihu Basin. For Large Metropolises, Shanghai clearly ranks highest, followed by Wuhan, Chengdu, and Chongqing.

The study subjected economic growth variables to cross-sectional statistical analysis covering all regions, provinces, cities and counties in the Basin. The statistical analysis underlined the major role played by the size and growth of the secondary sector and of industrial output in determining the 1990-96 growth performance of the Basin cities and counties. Growth in the total Basin was positively related to the importance of TVEs to the city or county economy,

Cities are the Basin's economic engines: they produced 93% of GDP in 1996. Cities over 1 million produced 44% of the Basin's output.

While the Delta's cities generally have the highest income levels, there are several middle and low income cities in this region. Beyond the Delta, from Anhui to Yunnan, urban income levels have a very similar pattern. Not all coastal cities are rich, and not all inland cities are poor.

Income levels are directly tied to size of cities: Metropolises and Large Metropolises are generally well ahead of smaller cities, regardless of location in the Basin.

Urban economic growth is positively correlated to the strength of TVEs and non-state enterprises, and negatively correlated with SOE output and employment.

and negatively related to the importance of SOEs to total output. Newer enterprise forms such as TVEs are a stimulus to economic growth, while SOEs have become a drag on many areas' economic growth performance and prospects.

The study found that economic conditions in 1990 were not strongly correlated with subsequent growth. Continuing disparities between cities are not inevitable.

The values in the base year (1990) for GDP/capita, population, and aggregate GDP appear to be statistically less important in determining growth performance. This indicates that further widening in the gaps in income and growth performance is not inevitable in the Basin. Given trends from 1990 to 1996, the data do not suggest that the major cities with large populations and high per capita incomes in the base year will continue to get richer at the expense of the surrounding suburban and rural areas. Rather, analysis indicates a more complex explanation of growth performance and the potential for most parts of the Basin to grow and prosper by diversifying their economies, strengthening local human resources, and attracting and productively employing foreign and domestic investment.

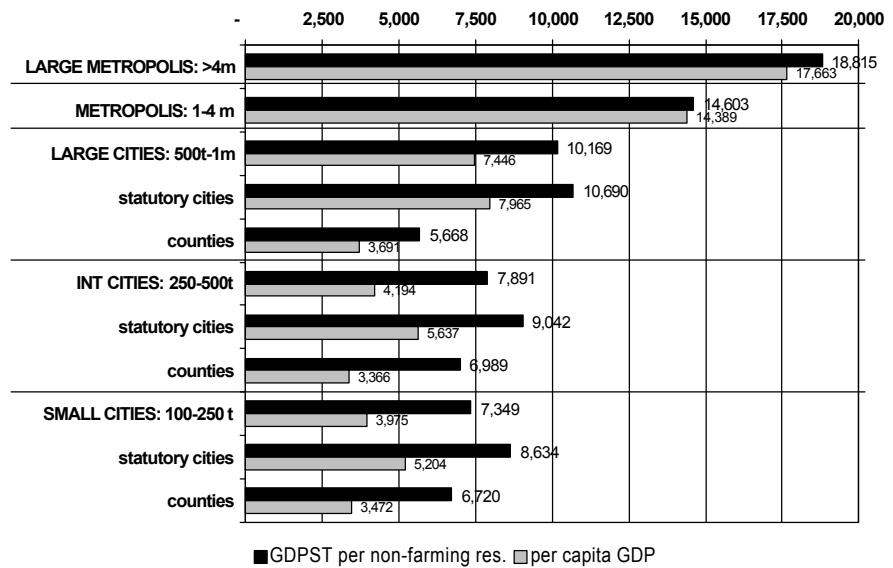


Figure 6: per Capita GDP and Secondary and Tertiary GDP by Size of City, 1996 (Y)

5 Urban Environment and Infrastructure

Environmental conditions in the Basin's cities are generally poor but appear to be improving for some parameters.

Urban environmental conditions in the Basin are generally problematic. For many indicators urban pollution levels exceed the national standards by several times. Ambient concentrations of TSP and SO₂ are, for many cities, 3-4 times WHO standards. Levels of COD in industrial wastewater are very high. Concentrations of COD and BOD in surface water are generally below Chinese Class III standards. Very little domestic wastewater is treated. In most cities solid waste is collected, but disposal and treatment is frequently ineffective. However, on some measures environmental conditions in Basin cities are improving or remaining steady, even in the face of rapid economic growth. Total wastewater discharges are increasing at a much lower rate than industrial growth. COD discharges and COD intensity (discharges per unit of output) have decreased considerably. In regard to air quality, total industrial waste gas emissions and industrial SO₂ emissions are increasing, but SO₂ and TSP ambient concentrations are decreasing in most cities. Industrial smoke and dust emissions are decreasing except in the Western Region.

The initial expectation in this study was that sufficient information would have been available during the 1990s to systematically review the linkages between economic growth and economic development on the one hand, and urban environmental quality and infrastructure demand on the other. *However, data on environmental conditions and infrastructure endowments of cities continue to be sparse, inconsistent, and difficult to compare among municipalities.* This study therefore explores the environment-economy linkages at the scale of urbanizing settlements in a very notional way.

An accurate, Basin-wide assessment of urban environmental conditions was not possible due to continuing problems with data.

SEPA reports concentrations of certain pollutants in surface water only for 19 Basin cities. Cities visited during fieldwork that draw water directly from the Yangtze River report the source as Class II or better. However, some cities that draw from smaller tributaries are experiencing quality problems, and major problems persist in strategic water bodies serving large urbanizing populations, including the Taihu Basin which is straddled by the high-growth corridor stretching from Nanjing to Shanghai, Hangzhou and on to Ningbo. According to the limited SEPA data, total wastewater remained stable over the period 1987-1995, but industrial wastewater volumes declined slightly. The proportion of industrial wastewater meeting standards has increased over the time period. These trends indicate improved industrial standards and increased environmental regulation of large enterprises and SOEs located in districts of municipalities, but they are not a reliable indication of wastewater volumes emitted by industrial enterprises in suburban districts and counties. The percentage of industrial wastewater reportedly meeting SEPA standards was much higher in the Delta (70%) than in the Middle (58%) and the Western Regions (28%, a figure that has not improved since 1987). Perhaps as a result of cleaner processes or improved treatment, industrial COD discharges declined except in Hubei, Sichuan and Yunnan. There was considerable provincial variation, from a decline of 53% in Shanghai to an increase of 49% in Yunnan. COD intensity (tons of COD per unit of output) decreased in all provinces.

Emissions of industrial waste gas increased by an average 28% over the period, and SO₂ as a component of that waste gas, increased in every province except Hubei. Industrial smoke and dust emissions decreased in the Delta and Middle but increased in the Western Region. However, SO₂ intensities declined in all provinces except Guizhou where they remained stable. A consistent database on air pollutant emissions by city does not exist. However, SEPA provides time-series data on ambient concentrations of SO₂, TSP and Nox for 78 cities, of which 30 are in the Basin (though there are not complete data for all). TSP concentrations are many times the WHO standard in all cities, and SO₂ concentrations exceed the standard in many. SO₂ and TSP concentrations are decreasing, however: SO₂ decreases are particularly marked in the Delta (35% from 1990 to 1996), whereas TSP decreases are much more significant in the Middle and Western Regions (30-35%).

Based on SEPA data, it is clear that SOEs in city districts are becoming more environmentally efficient. Industrial pollution intensities are improving dramatically, and ambient concentrations of some pollutants in cities are decreasing. Many, though not all, cities visited in field work indicated gradual improvement in surface water quality, air quality improvement, and rainfall acidity. Many of the factors theoretically related to environmental improvement are present – increasing numbers of citizen complaints on environmental problems, a regulatory system that has been in place for many years and has made a demonstrable difference, and increasing visibility of environmental

SOEs in urban districts appear to have become more environmentally efficient.

But TVEs in suburban and peri-urban areas - the engines of economic growth in many cities over the past decade - continue to fall outside of consistent monitoring regimes. SOE improvements in urban districts are not an accurate indication of environmental conditions in the Basin's cities.

Urban infrastructure demands are enormous, municipal fiscal capacities are weak, and local governments' abilities to mobilize reliable, long-term financing are seriously constrained.

issues and organizations. However, most TVEs in suburban districts and peri-urban townships continue to operate with inefficient equipment and little regulatory control. Local governments are under pressure from the central government to regulate the TVE sector, and many cities visited in the field work described their efforts to do so. As TVEs come under regulatory control and become more subject to public pressure, it is likely that their environmental performance will improve. In industries with outmoded equipment and manufacturing processes, the first abatement efforts are inexpensive and have a large impact. Over the next ten years, TVEs will likely exhibit progressively lower pollution intensities, as SOEs have done in the past decade.

Development scenarios were prepared to project demands for treated water, wastewater treatment, and solid waste management services. The most likely scenario for domestic water suggests total demand of 14.7 billion tons across the Basin in 2005 and 23 billion tons in 2010 compared to 7.4 billion tons in 1996. Industrial water demand is estimated at 15.4 billion tons in 2005. Domestic wastewater discharges will increase in a similar manner to domestic treated water demand to levels about 20% lower than water demand. Industrial wastewater requiring treatment ranges widely, depending on the scenario and assumptions, from 3.4 to 11.6 billion tons. Total additional demand for solid waste treatment is estimated at 167 million tons by 2005.

Rather than attempting to estimate urban infrastructure investment requirements by sector for each city and urbanizing county across the Basin – an approach requiring data that were simply not available for this study – a top-down approach was followed to provide global estimates. The premise of this approach is that infrastructure demand will continue to grow during this decade to levels that cannot conceivably be satisfied from existing financing vehicles, and that financing gaps will therefore continue to widen. The approach is based on estimating the amount of capital in the national economy that could feasibly be available by 2005 for investment in urban infrastructure. It is therefore a supply-driven approach rather than a demand-driven one. These estimates show that, based on GDP projections and the expected decline in FAI in SOEs, capital available for fixed asset investment in all urban infrastructure – in statutory cities only – in the Basin is likely to grow by almost three times the 1997 level by 2005. The multiple is estimated to be 2.9 times in the Delta, 2.5 times in the Middle Yangtze Region, and 3.3 times in the Western Yangtze Region.

While aggregate availability of capital for FAI in urban infrastructure might reach these levels by 2005, municipal governments face serious constraints to accessing this capital given current fiscal revenue sources, limitations to direct borrowing, and the risk and volatility of short-term commercial borrowing through which an increasing amount of infrastructure has, in the absence of structured long-term credits, been financed by municipal infrastructure delivery agencies over the last three years. China needs to quickly chart new directions through which local governments can channel aggregate savings into long-term capital investment in urban infrastructure.

6 Emerging Regional Urban Systems

Urban economies, settlement patterns, and the movement of people, capital and goods within and between urbanizing settlements in the Basin are a complex web of functional and physical linkages that transcend inner, “built-up” parts of cities of all sizes to encompass suburban and peri-urban areas that are in major transition. These linkages have major environmental impacts and increasingly serious implications for the delivery of public services by local governments.

Transport links are key to fostering economic linkages between urbanizing settlements. While the Three Gorges construction will enable 10,000 ton ships to reach Chongqing, and while some double-tracking of railway lines is anticipated in Hunan Province, the major changes to inter-settlement transport networks to the middle of this decade will occur in the expansion of the National Trunk Highway System (NTHS). Market areas were calculated in travel-times from Large Cities, Metropolises and Large Metropolises in 1996 and 2005. In 1996, there were 300 million people within a one-day return drive from one of these major cities. With the completion of strategic links of the NTHS by 2005, 420 million people will fall within these daily urban market regions, an increase of 38%. Few (if any) countries have so quickly extended access to urban markets for such a sizable proportion of residents, although development of the inter-state freeway system in the US in the 1950s and 1960s likely comes close. These improved linkages will occur during a period that is likely to see major sectoral and locational shifts in investment and enterprises, and reduction of provincial and municipal trade barriers, as China adjusts to WTO.

The impacts of the NTHS on market access in the Basin will be far-reaching, particularly on the spatial structure of regional economies. With the urbanization trends identified earlier, electrification of counties that will contribute to extending locational choices for production, and the expansion of inter-city transportation links, the spatial organization of settlement in the Basin will increasingly be focused on Regional Urban Systems. These are defined as networks of urbanizing settlements of all sizes within which significantly higher concentrations of non-farming populations reside and along which significantly higher levels of daily interaction between settlements occur. They are where factor and output markets and distribution hubs are concentrated.

Five types of Regional Systems were identified in the Basin and a sixth by default - isolated settlements of villages, towns, some small cities, and a few intermediate cities that are not part of any regional system in any obvious way. The five types of regional systems are: 1) town-centered regions comprised of a network of villages and towns, often in a loose hierarchy; 2) city-centered regions in which a single Large City or Metropolis plays a major role in regional production, employment and distribution; these city-centered regions encompass villages, towns/townships, Small Cities and Intermediate Cities, and can cover a radius from the central city of as much as 200 km; 3) Clusters of villages, towns and cities at or below the Metropolis scale across an area of 100-200 km radius; unlike city-centered regions, no single town or city appears to play a dominant economic role; 4) Corridors, which are very similar to Clusters but stretch in a linear form along a major road or rail line; and 5) Megalopolis. A major population size difference exists between megalopolises in the Basin, which have a median population of 26 million, and Corridors, Clusters and City-centered Regions which range from 3 - 12 million.

Large and complex systems of urbanizing settlements are emerging in the Basin. They are far larger than “city regions” which the Bank has recently identified as a scale for future investment.

Transport linkages - particularly the National Trunk Highway System - are improving and will continue to dramatically affect the structure and pace of urban change in the Basin during this decade.

The spatial organization of settlement in the Basin will increasingly be focused on Regional Urban Systems - networks of urbanizing settlements with high levels of economic interaction.

Five types of Regional Urban Systems were identified in the Basin: City-centered Regions, Clusters, Corridors, and Megalopolis. These System types vary significantly in structure, function, and investment needs.

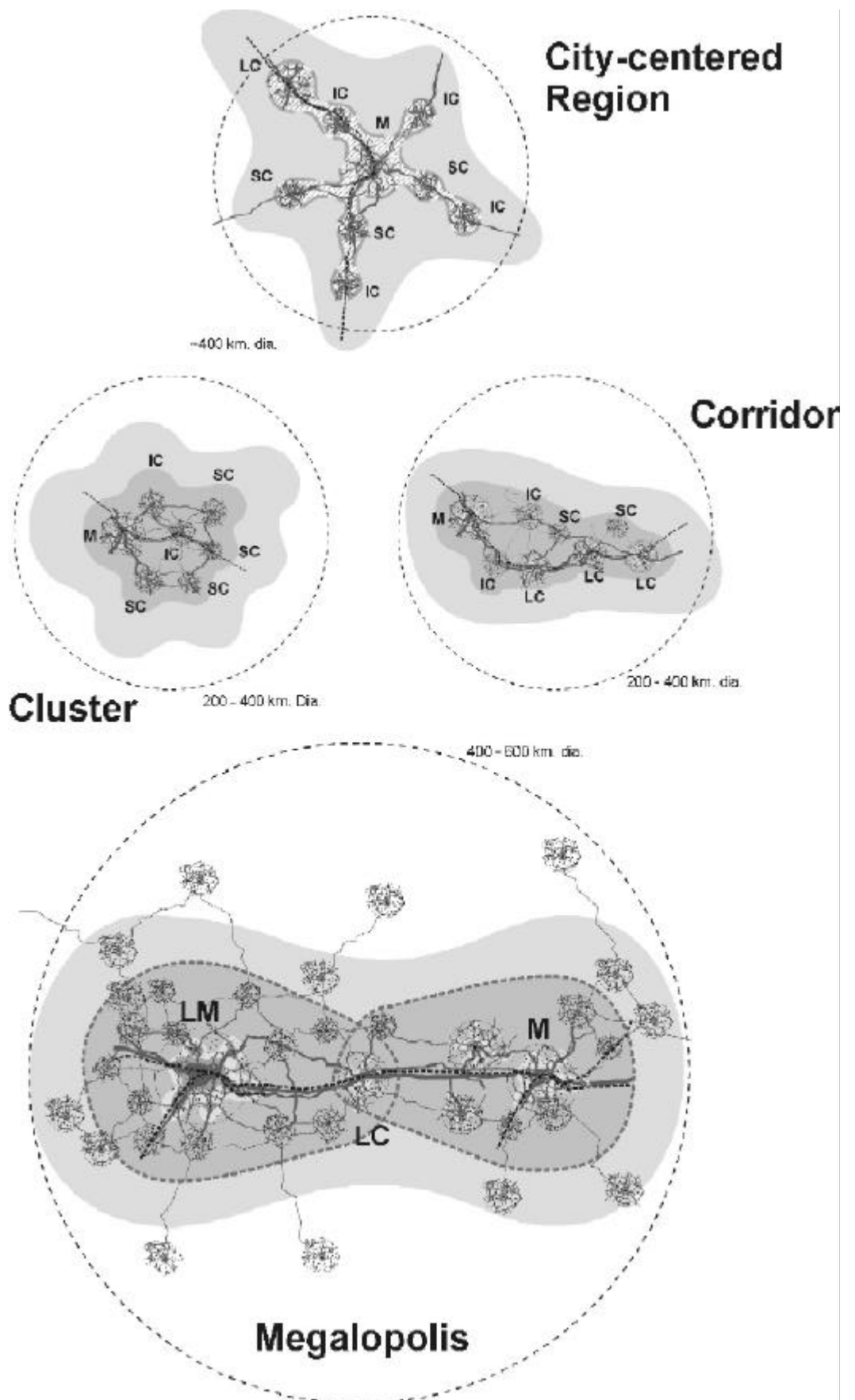


Figure 7: Types of Regional Urban Systems in China's Yangtze River Basin

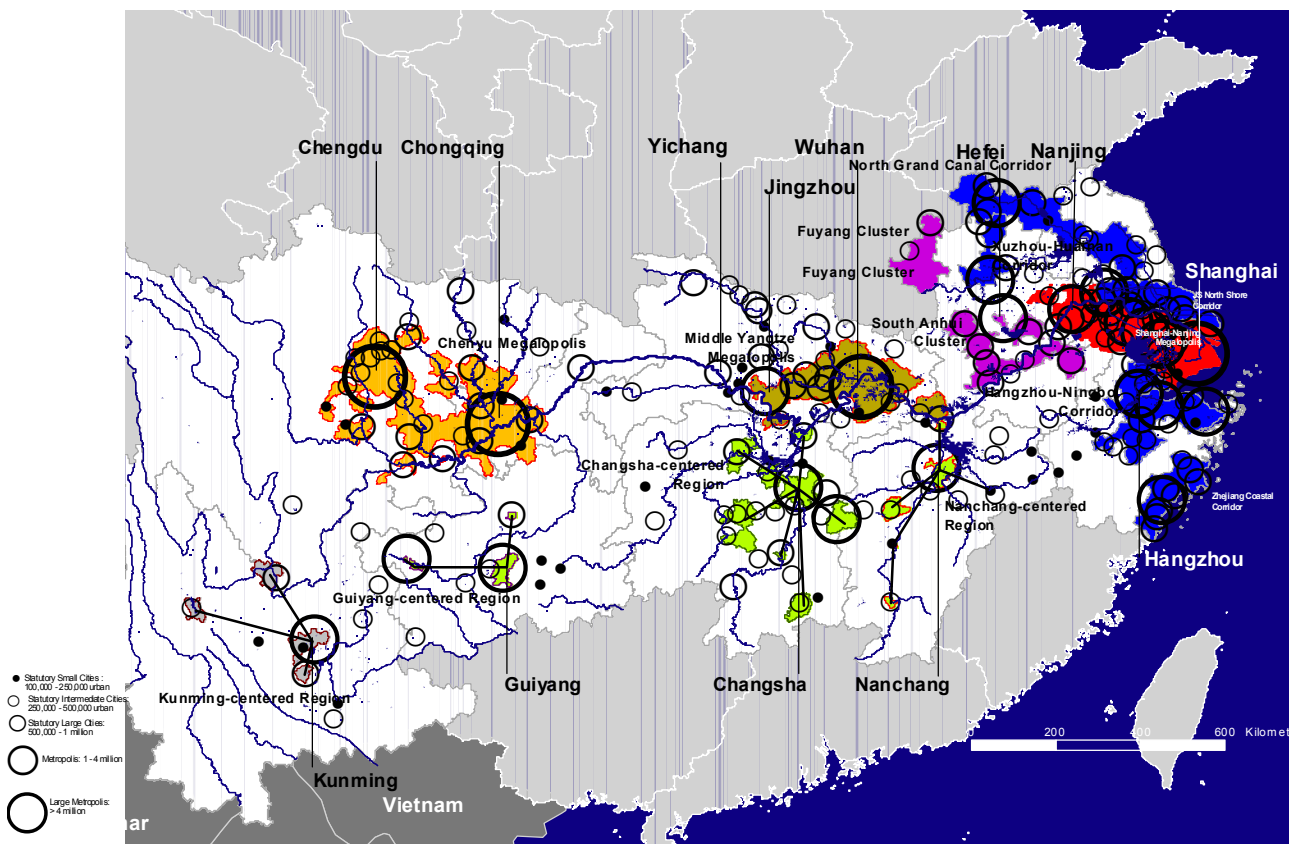


Figure 8: Regional Urban Systems in the Yangtze Basin, 1996

This study identified three **megalopolises** in the Basin: one stretching from Shanghai to Nanjing; a second in the Middle Yangtze stretching from Wuhan to Jingzhou; and a third between Chengdu and Chongqing in the Western Region. A megalopolis fundamentally differs from a “mega-city” which is a very large, mono-centric urban settlement rooted in a metropolis but extending into a constellation of smaller cities and towns (Large Metropolis, as used in this study). A megalopolis is a cohesive network of numerous cities and towns stretching in a band at least 200 km long and 50 km wide, holding a population of more than 20 million people. There are usually at least two large metropolitan poles anchoring either side of a megalopolis, linked by strong transportation and communications networks such as expressways and railways. What makes a megalopolis unique and of major significance is that it is usually the principal economic powerhouse of a country or region – a concentration of consumers, purchasing power, and production that incubates new and higher forms of economic development and growth. As transportation and communications networks improve between multiple centers, “urban-rural” boundaries disappear in a rapidly-changing web of economic linkages. People live and work in different cities; manufacturers are able to source competitive inputs from multiple suppliers over a much broader area; cities and towns develop specializations; and higher level services begin to concentrate within those key metropolitan areas which best provide for regional, national and international market transactions.

Five **Corridors** were identified in the Yangtze Basin: the Suzhou-Huainan Corridor in Anhui; the North Grand Canal Corridor and the Jiangsu North Shore Corridor in Jiangsu Province; and the Hangzhou-Ningbo Corridor and

Three megalopolises were identified: a medium-size system in the Yangtze Delta; a newer and comparatively undeveloped system in the Middle Yangtze anchored on Wuhan; and the incipient Chengdu-Chongqing Megalopolis in the western region.

Five, much smaller Corridors were identified; all are in the Delta.

Zhejiang Coastal Corridor in Zhejiang Province. Corridors hold far smaller populations than a megalopolis, do not have major metropolitan poles as polar anchors, and have considerably less economic importance at the national scale. They typically consist of at least one small Metropolis and several Large, Intermediate and Small Cities. As the term implies, corridors stretch in a linear band anchored on a central spine formed by major railways, navigable waterways (including coastlines), and good quality roads. In a corridor, no single city is a central economic node.

Two Clusters were found, both in Anhui Province. They will merge with other Regional Urban Systems during this decade.

Four City-centered Regions were found: two are in the Middle Yangtze Region, and two are in the West.

These 14 Regional Urban Systems hold 65% of the Basin's non-farming population, and create 66% of its secondary and tertiary GDP.

Regional economic development appears to be tied to the degree of integration of settlements into Regional Urban Systems. Physical links are being developed, but functional linkages remain constrained by low factor mobility and high trade barriers.

Two **Clusters** were identified in the Basin, both in Anhui: the Fuyang Cluster in the west, and the South Anhui Cluster along the Yangtze. Clusters are very similar in size and structure to Corridors but, as the term suggests, are not linear in form. While anchored on a railway line or major navigable waterway, the road network is both looped and radial, providing for greater interconnection between cities. Clusters have at least one Metropolis or Large City, and several Intermediate and Small Cities. However, as in Corridors, no single city has as yet become a principal economic node.

Four **City-centered Regions** were found: the Kunming-centered Region in Yunnan; the Guiyang-centered Region in Guizhou; the Changsha-centered Region in Hunan; and the Nanchang-centered Region in Jiangxi. Unlike the other types of Regional Urban Systems identified in the Basin, City-centered Regions (CCRs) are dominated both in share of population and economic activity by a single Metropolis. They exhibit the traditional central place hierarchical relationship with surrounding Large, Intermediate and Small Cities, usually connected through radial networks of roads. Because of the dominance of the central Metropolis, the area of influence in a City-centered Region can be as wide as 200 km.

Regional Urban Systems are the core economic regions in the Yangtze Basin: the 14 systems described above hold 65% of the Basin's non-farming population, and create 66% of its secondary and tertiary GDP. Development policies related to fiscal, investment, trade and labour mobility issues need to take explicit account of the differences between types and locations of Regional Urban Systems which vary widely in size and economic structure.

However, across all Regional Urban Systems the key issues in economic development appear to be: 1) the degree to which the economies of smaller cities and counties are integrated into those of regional systems enjoying agglomeration benefits; 2) the degree to which the economies of cities have diversified (sectorally and in terms of enterprise ownership) so that production responds to demands of both domestic and international markets; and 3) the degree to which these regional systems are linked, both physically and functionally, with domestic and international markets. Considerable progress is being made with physical connections between most Regional Urban Systems in the Basin. However, more attention now needs to be paid to improving functional connections by: 1) removing inter-provincial (and even inter-municipal) trade barriers; 2) resolving inequitable fiscal flows and entitlements between levels of government; and 3) removing constraints to the mobility of labour, enterprises, and capital between systems. Similarly, endogenous constraints to economic restructuring, capital formation, and innovation should be addressed if sustainable regional development is to occur, and efforts intensified to enhance local comparative advantages, particularly of human resources in less economically-advanced areas.

However, the type and scale of infrastructure investment needs differs among types of Regional Urban Systems. Megalopolises in the Basin – all of which straddle sub-basins – have much greater impacts on the availability and quality of water, while City-centered Regions have comparatively little. Corridors and Megalopolises in the Basin require significantly improved feeder road connections to existing and planned NTHS links, while Clusters and City-centered Regions need more and better secondary roads connecting key cities. Given the differences among Regional Urban Systems in the size of regional economies and their contribution to national economic growth, the costs and benefits of remaining NTHS links will vary dramatically: the phasing of the remaining NTHS needs to be reviewed in light of urban settlement patterns and regional economic development trends that were not foreseen when the highway network was initially planned in the late 1980s.

Urban economies in Megalopolises are much larger and more diverse than those in other types of Regional Urban Systems; their needs for market access, human resources, capital, and more sophisticated financial intermediation are considerably different. Demands for regional coordination, particularly of transport, watershed management, and pollution control, vary markedly by type of Regional Urban System. Urban-rural dynamics also vary by type of system, and therefore have major implications for the alleviation of rural poverty.

A key conclusion of this study is that development needs to be viewed from the perspective of large and complex Regional Urban Systems. The incremental impacts of regional transport investment on urban development, of urban development on environmental quality, of urbanization on sub-basin water resources, and of urbanization on rural development and poverty alleviation, all need to be considered when programming investments. *This suggests that GOC/Bank cooperation needs to go well beyond the “city region” scale to encompass the full territorial extent of Regional Urban Systems.*

7 Key Priorities

Four sets of priority actions by GOC and the Bank are recommended: 1) finetuning definitions and standardizing information to better support policy making and assessment of infrastructure demand; 2) addressing a range of institutional issues so that better policy and more productive investment can be implemented effectively and efficiently; 3) improving cross-sectoral coordination within and between levels of government; and 4) structuring investment programs at the scale of Regional Urban Systems.

• Definitions and Information

GOC should replace its administrative approach to defining “urban” population and adopt a functional definition based on non-farming economic activity to better capture actual sources of demand for urban public services. While the National Bureau of Statistics (NBS) has recently developed a more inclusive “second definition” of urban that includes all registered residents of neighbourhood committees, it still does not capture urbanizing populations in towns and villages in suburban and peri-urban areas. GOC should revise its approach to designating cities as statutory units of governance based on arbitrary criteria whose relevance diminishes over time. Cities should be designated solely on the basis of size of non-farming populations that exert demand for urban services. The same data on infrastructure supply and demand should be

Investment needs are related to type of System: all three Megalopolises straddle sub-basins and have major impacts on water availability and quality; Corridors and Megalopolises need better feeder roads to NTHS segments; Cluster and City-centered Regions need secondary roads to strengthen networks.

Megalopolises need wider market access, better and more human resources, and more sophisticated financing intermediation in delivering affordable investment capital.

Integrated development in the Basin needs to be approached from the perspective of Regional Urban Systems, not “city regions” and not through continued bifurcation of “urban” and “rural” areas.

Highest priority actions are required in: improving key definitions and standardizing information on development trends; institutional reforms to municipal governance, urban and regional management, and infrastructure financing; better cross-sectoral coordination in investment planning (including at the Bank); and investment programming at the Regional Urban System scale.

collected by NBS and the Ministry of Construction in cities and counties so that they can be spatially aggregated to describe actual conditions in urbanizing settlements and regions. MCon should report data on an actual volume or total value basis (e.g. total tons of water consumed), not on a per capita basis that might differ in definition from province to province, or agency to agency. Data coverage on environmental indicators – water effluents, air emissions, and solid waste – remains very weak and should be expanded to cover suburban districts and counties. Comprehensive publication by SEPA of these data at the city/county scale should become mandatory on an annual basis. Much of the environmental and infrastructure-related information that is needed by policy-makers is linked to specific outputs from the manufacturing and tertiary sectors (e.g. water demand). NBS needs to provide data on these outputs for all cities and counties in far greater detail than simply “primary, secondary and tertiary GDP”. Town-specific data from the 1996 National Agricultural Census should be published for each province, and updated on a regular, rolling basis.

• **Addressing Institutional Issues**

Many Bank/GOC projects in the urban sector address institutional issues, but usually within specific sectors and delivery agencies. Wider issues of governance, urban and regional management, and infrastructure finance need to be added in a systematic way both to sector work and the lending program.

Governance structures need to be modified at the city level to better respond to demand for infrastructure services and to capture emerging spillover benefits. Better regional governance is needed to coordinate intra-regional transport improvements, water basin management, and urban growth management.

Governance: The informal distinction made by municipal governments between urban and suburban districts needs to stop as it distorts functional responsibilities and capacities for public service delivery, including infrastructure. In many of the Basin’s cities, the boundaries between districts need adjustment to better capture demand for infrastructure services. The Ministry of Civil Affairs (MCA) should undertake a program of district boundary review to maximize the inclusiveness and efficiency of service delivery. Similarly, many counties within Prefecture-level Cities hold large proportions of non-farm residents that will increasingly demand urban services. MCA should identify these counties and designate them as districts. Spillovers are also beginning to occur from many County-level Cities to adjacent cities and counties, particularly to towns in suburban and peri-urban areas. Boundaries need to be reviewed by MCA to capture benefit and demand areas. There are three options for addressing these: 1) annexation of all or parts of cities and counties; 2) amalgamation into new municipalities; and 3) negotiated inter-municipal service sharing agreements. Which option is more appropriate to a locality will depend on the capacities of municipal governments and their service delivery agencies, provincial government policy (and institutional capacities), and historical precedents rooted in the deep cultures of the Basin’s cities.

MCA should conduct a systematic program of research into international experience with each of these three options to identify their respective benefits and costs. Results of this research could form the basis for systematic experimentation with these options in selected cities in the Basin. While the designation of Prefecture-level and County-level Cities has deep historical and political roots, the absence of two-tiered governance in CLCs will increasingly become problematic as these cities continue to grow. Two-tiered administration (if not governance) needs to be designed by MCA and tested in selected CLCs.

Mechanisms for coordination and improved management at the scale of Regional Urban Systems need to be researched internationally by SDPC. Both successful and unsuccessful experience should be analyzed to identify costs

and benefits as a prelude to experimentation in selected Regional Urban Systems in the Basin. Mechanisms for intra-regional transport planning and service delivery, water basin management, and urban growth management need to be specifically explored by SDPC.

Urban and Regional Management. Some policy makers continue to believe that GOC should be promoting development of certain size classes of settlements, particularly towns and Small Cities. In a market economy, the policy instruments available to government to influence size-based growth are extremely limited. This study has shown that incomes in the Basin rise with city size. GOC should not waste scarce resources to promote particular size classes of cities. Rather, it should apply those resources to maximizing the benefits and minimizing the negative impacts of urbanization in cities of all sizes.

SETC or SDPC should systematically identify and assess lingering inter-municipal and inter-provincial trade barriers throughout the Basin. Their removal needs to be programmed gradually so that cities' access to factor and output markets is increased without major disruptive shocks to local economies.

Existing municipal fiscal capacities clearly cannot meet the huge demand for urban infrastructure in the Basin's cities over the next decade. Municipalities will therefore need to significantly improve how public capital investment priorities are set. Training in international best practices in capital investment planning should be established by SDPC and MCon on a permanent basis in China, perhaps in a university or similar formal training institution. The inadequacy of investment in operations and maintenance of all forms of urban infrastructure in China is widely recognized, including by municipal governments. Training in international best practices in O+M should be structured in parallel with training in capital investment planning, and obligatory O+M programs structured during the preparation of all GOC/Bank urban infrastructure projects.

Functional responsibilities for the delivery of urban infrastructure services are in a state of transition between municipal and district governments that is not uniform across the Basin, or even within Regional Urban Systems. Dysfunctions in the allocation of functional responsibilities result in inefficiencies and gaps in service delivery. A top priority of government should be the clear definition of functional responsibilities at the municipal and sub-municipal levels, tied to revenue assignments. These should be codified in a new Municipal Law.

There is growing experimentation across the Basin in the transfer of some functional responsibilities for infrastructure service delivery from government to the non-government sector. However, this experimentation is patchy and no mechanisms are in place to evaluate actual costs and benefits of resulting institutional arrangements on a comparative basis. A coordinated program of experimentation should be conceived by SDPC for each Regional Urban System, and a structure put in place through which experiences can be shared among municipalities.

Financing Infrastructure. The core infrastructure financing issues facing China's municipalities are: 1) lack of a stable, recurrent revenue base which could be collateralized for debt financing of lumpy infrastructure investments without recourse to sovereign guarantees or creation of contingent liabilities for government; 2) administratively-controlled (by the Price Bureau) tariffs

The continuing pre-occupation with promoting small and intermediate cities needs to be channelled into improving urban conditions at all city scales.

Inter-provincial and inter-municipal trade barriers need to be identified and gradually removed.

Capital investment planning and operations/maintenance practices need improvement in almost all of the Basin's cities.

Functional responsibilities of municipal and sub-municipal governments are in a state of flux: they need to be finalized and codified by State Council.

Ad hoc experimentation with non-government delivery of infrastructure services needs to be organized; lessons need to be shared widely, and regulatory regimes codified for the mechanisms that work best.

The Bank and China need to squarely address non-traditional financing of urban infrastructure during this decade.

Tariff reform to meet full costs of services is again lagging. This study has shown that many cities in the Basin can afford to pay full costs of many services. The next 2-3 years are an important window for raising tariffs.

Without tariff reforms, no amount of tinkering with “urban infrastructure investment corporations” or opaque commercial borrowing will provide the revenue streams that can be collateralized for sustained, long-term infrastructure financing.

Pooled credit mechanisms - such as Bond Banks now used in the US and parts of Canada - and Municipal Development Funds for less creditworthy municipalities, need to be systematically tested in China.

Some infrastructure services - common property and public goods - will continue to be the responsibility of municipal governments. They need a new, stable and recurrent revenue stream to finance capital and O+M investment.

for infrastructure services that usually only cover minimal O+M and administrative overhead costs, and therefore are far below the levels that could be assigned as revenue streams to lenders; and 3) absence of credit instruments to finance urban infrastructure, other than short-term commercial bank lending which carries major risks both for borrowers and lenders.

This study has shown that residents and enterprises in many cities in the Basin – including in western provinces – have the purchasing power to pay the full costs of infrastructure services. The risk of inflation in China is currently low. Current practice of rolling over short-term commercial loans for infrastructure financing is unsustainable and crowds out lending to SMEs that are becoming the major generators of urban and suburban employment. The next two years are likely to be the best period in over a decade for finally raising tariffs on urban water supply, wastewater treatment, and solid waste management to meet the full costs of providing these services. Without a radical move by Price Bureaux to create viable revenue streams, current efforts to corporatize and commercialize urban infrastructure delivery will flounder.

No amount of tinkering by municipalities with new institutions or opaque lending can obviate the need for creating solid assets for infrastructure delivery agencies in the form of positive net revenue streams that can be collateralized. With full cost pricing in place, new credit instruments and intermediary agencies will need to be established to make long term debt financing available and affordable to municipal governments. Given the emerging institutional structure for infrastructure delivery in China’s cities, credit instruments should likely focus on enterprise bonds that can be traded on secondary markets. Constraints to issuance of such bonds by municipal infrastructure enterprises need to be identified by the Ministry of Finance (MOF) and the China Securities Regulatory Commission (CSRC), and systematically removed.

Many smaller municipalities will find the transactions costs for issuing long term enterprise bonds prohibitive, particularly if their credit ratings are low. Pooling among many municipalities has been found in other countries to be an effective measure through which fixed income securities can be issued affordably. Experience in the US and Canada with State Bond Banks – statutory yet independent agencies at the provincial and state levels carrying no sovereign guarantees – should be explored by MOF and CSRC, and similar institutions adapted and tested in China. At the same time, in some poorer provinces government guarantees will continue to be required; the Bank’s experience in other countries with Municipal Development Funds (revolving funds with sovereign guarantees) should be reviewed by MOF and the feasibility explored of selectively introducing similar instruments in parts of the Basin.

Some forms of urban infrastructure will continue to be public goods and common property, including urban roads, public open spaces, public sanitation, and drainage and flood control. These will need to be financed largely by municipal governments. Existing fiscal sources for such expenditures are generally weak, and new, stable sources need to be found. Experience in many other countries has shown that a market value-based property tax on land and buildings provides the strongest and most predictable revenue stream that municipal governments can use to access debt financing for infrastructure investment. The current unit-based land use tax in China is low; if raised, it will become a highly regressive tax. While numerous difficulties with land registration and market valuation will make an *ad valorem* property tax a major

challenge in China's cities, in the long term it is likely to be the only remaining source of revenue that can significantly and equitably improve the fiscal capacity of municipal governments. Planning, design, testing, and fine-tuning of a market-based property tax will take several years; MOF should start the process now.

• Cross Sectoral Coordination

Watershed management needs to be conducted within the context of demands from and impacts of Regional Urban Systems. The analytical framework proposed in the Bank's water resources policy in the early 1990s – considering the “relationships between the ecosystem and socioeconomic activities in river basins” – needs to be taken a step further in the Basin by focusing considerable attention on Regional Urban Systems within the ten sub-basins of the Yangtze. This will require much closer coordination between the Ministry of Water Resources (MWR) and its agencies with SDPC, the Ministry of Construction (MCon) and the Ministry of Communications (MOC). Similarly, in project identification and preparation, closer coordination is required within the Bank between units in the urban, transport, environment and agriculture sectors.

Inter-city transport investments – particularly in roads – will have major impacts on the structure, form and growth of cities and towns in the Basin's Regional Urban Systems. These impacts will not only be felt through development of the National Trunk Highway System but increasingly through the construction and upgrading of feeder roads and secondary connections between urbanizing settlements. The most appropriate mix of investments will vary, depending on conditions particular to each Regional Urban System: a blanket investment focus on the NTHS across the Basin may therefore be inappropriate. Close coordination is required between MOC, SDPC, and MCon in preparing integrated transport investment programs at the Regional Urban System scale. Similarly, close coordination is required in project preparation and appraisal between the Bank's transport and urban sector units.

This study has shown that the distinction between “urban” and “rural” in China is becoming less relevant. Cities of all sizes play an important role in development of farming communities by providing output markets, distribution channels, and employment opportunities for redundant labour. The nature and strength of these linkages are difficult to define, and are consequently not well understood in China (or in other countries). Improving this knowledge base should become part of joint economic sector work of GOC and the Bank. However, at a minimum – and as a step in developing a knowledge base over time – systematic efforts need to be made in both the “urban” and “rural” lending programs to assess the impacts of proposed investments within the context of Regional Urban Systems, including potential impacts on poverty alleviation in towns and townships.

• Pre-Investment Frameworks

In light of this study's findings and the recommendations made above, pre-investment frameworks have been prepared for each of the 14 Regional Urban Systems identified in the Yangtze Basin. These frameworks consist of recommendations on: 1) which city size classes should be accorded the highest

Market based property taxation of land and buildings is the best remaining source for such revenues. MOF should start the preparatory work now for what will invariably be a complex tax.

Watershed management needs to be conducted at the Regional Urban System scale. This will require better coordination between MWR, SDPC, MCon and MOC.

Continued focus on building remaining NTHS links in the Basin needs to be reviewed, particularly in light of the need for better feeder and secondary road connections within many Regional Urban Systems.

The potential role of Regional Urban Systems in alleviating 'rural' poverty needs to be much better understood through focused sector work.

Frameworks for designing investment programs in each of the 14 Regional Urban Systems are outlined in the main report. They describe which city size classes require priority attention in each System, which Systems pose the greatest risks to the Basin's watersheds, and sectoral priorities in water resources, transport, urban infrastructure, governance, finance and possible poverty alleviation.

priority for investment in each System; 2) which Systems should be given particular attention in terms of watershed management, based on potential impacts on water resources in sub-basins; and 3) what should be the key sectoral priorities in each System among water resource management, transport, urban infrastructure, governance, finance, and possible poverty alleviation.

An overall Yangtze Basin investment framework, and frameworks for each of the 14 Regional Urban Systems, are detailed in the main report. GOC and the Bank will continue to decide priorities among regions and sectors based on a broad range of criteria, not only unmet infrastructure demand. This study's contribution largely rests in the identification of Regional Urban Systems through which more effective, multi-sectoral investment could be structured, and in the definition of their key functional and physical characteristics, to better inform the Bank and GOC investment planning process.



This Summary Report can be downloaded from Chreod Ltd.'s website: www.chreod.com on the "Issue Notes" page.

Digital and printed copies of the three-volume Final Report, including 100 maps in tabloid size, have been deposited with the East Asia Urban Sector Unit at the World Bank, with the Bank's Office in Beijing, and with the State Development Planning Commission, Development Research Center of the State Council, and the Ministry of Lands and Resources.

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