# Urbanizing regions in China's Yangtze River Basin


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## Foreword

This article 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 conducted by Chreod Ltd for the World Bank. 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 author was the Project Manager of the study.

## Purpose of the study

China became the world's largest urban nation during the mid-1970s. Although only 20 percent of the population was urbanized at that time, the pace of urbanization has increased dramatically, particularly over the last 15 years. China is now going through a process of urban growth that, over the next 10 to 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.

The Yangtze Basin contains China's longest river. With a watershed area of 1.8 million sq.km, 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 percent 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.

## Urbanization in China: Methodological issues

Major challenges to identifying and defining urban and regional development trends in China are:

- the current administrative definition of "urban" residents which is still based on mandatory 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;
- 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,

• 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 suburban and peri-urban areas where arable land is collectively-owned and far less regulated than in central urban areas, 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 labor 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 (fig. 1). 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.

The trend towards suburban and peri-urban growth is likely to continue well into the next decade. 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 even without the loosening of *hukou*-based mobility constraints.

The study was based on the need to define the full demand and impact areas of urbanizing settlements. This required identifying households – both permanent and migrant – in counties and statutory cities that rely on the non-farming sector for their incomes. Concentrations of these households that reached a minimum population threshold representing a critical mass of settlement that would suggest potential consumer demand for urban infrastructure services are considered "urbanizing" settlements in the study. Counties and statutory cities are defined as "urbanizing" if:

• 80 percent or more of GDP in 1996 was in the secondary and tertiary sectors;
• 40 percent or more of the registered workforce was employed in secondary and tertiary employment; and,
• 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 Township and Village Enterprises

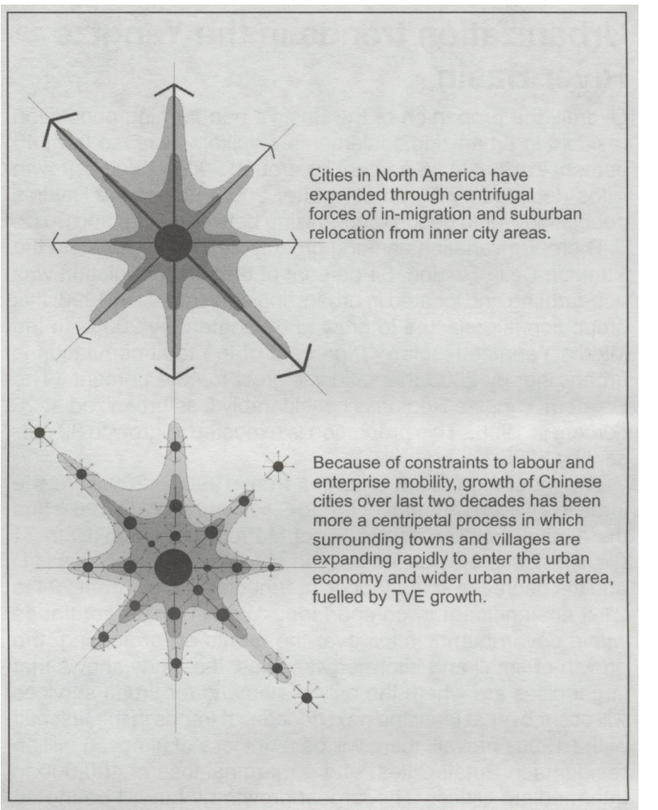


**Fig. 1:** Centripetal and centrifugal growth patterns.

(TVEs) and non-state developments in counties are "rural" phenomena, over 70 percent 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 the 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 percent of total GDP; instead of an official "urbanization" rate of 20 percent, the Basin could have as high as 40 percent 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.

The study used 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 (table 1).

**Table 1**
**Scales of urbanizing settlements**

| Type of settlement | Non-farming Population |
|---|---|
| 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 |

## Urbanization trends in the Yangtze River Basin

Overall, the proportion of the Basin's non-farming population resident in urbanizing settlements will likely increase from 40 percent in 1996 to 46 percent by around 2005. Even if growth rates declined by 50 percent 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 percent of the total population was non-farming and located in urbanizing settlements in 1996; this proportion is projected to grow to 62 percent by 2005. In the Middle Yangtze Region 40 percent of the total population is urbanizing; by 2005 this ratio will grow to 43.4 percent. The Western Yangtze Region is considerably less urbanized at 26 percent in 1996. This proportion is expected to grow to 32 percent by 2005.

The most significant changes 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 (fig. 2). 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, the 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 percent of the expected change will occur from an increase in the population of settlements that already were Large Cities in 1996, but at the lower end of population range for this city size; 37 percent will occur from growth in settlements that were Intermediate Cities in 1996 but will have reached the size of Large Cities by 2005. For Metropolises, internal growth will account for 65 percent of the 18 million additional metropolitan residents while growth of Large Cities into Metropolises by 2005 will comprise 35 percent.

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 share many characteristics: both have average urbanizing population rates of 41 percent, and rural-urban dynamics are likely similar. However, Large Cities in the Basin average an urbanizing population ratio of 64 percent and Metropolises step up to an average of 90 percent. 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.

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), Yunnan (1.5 million) and Shanghai (less than 0.5 million). However, shifts in provincial urbanization levels are projected

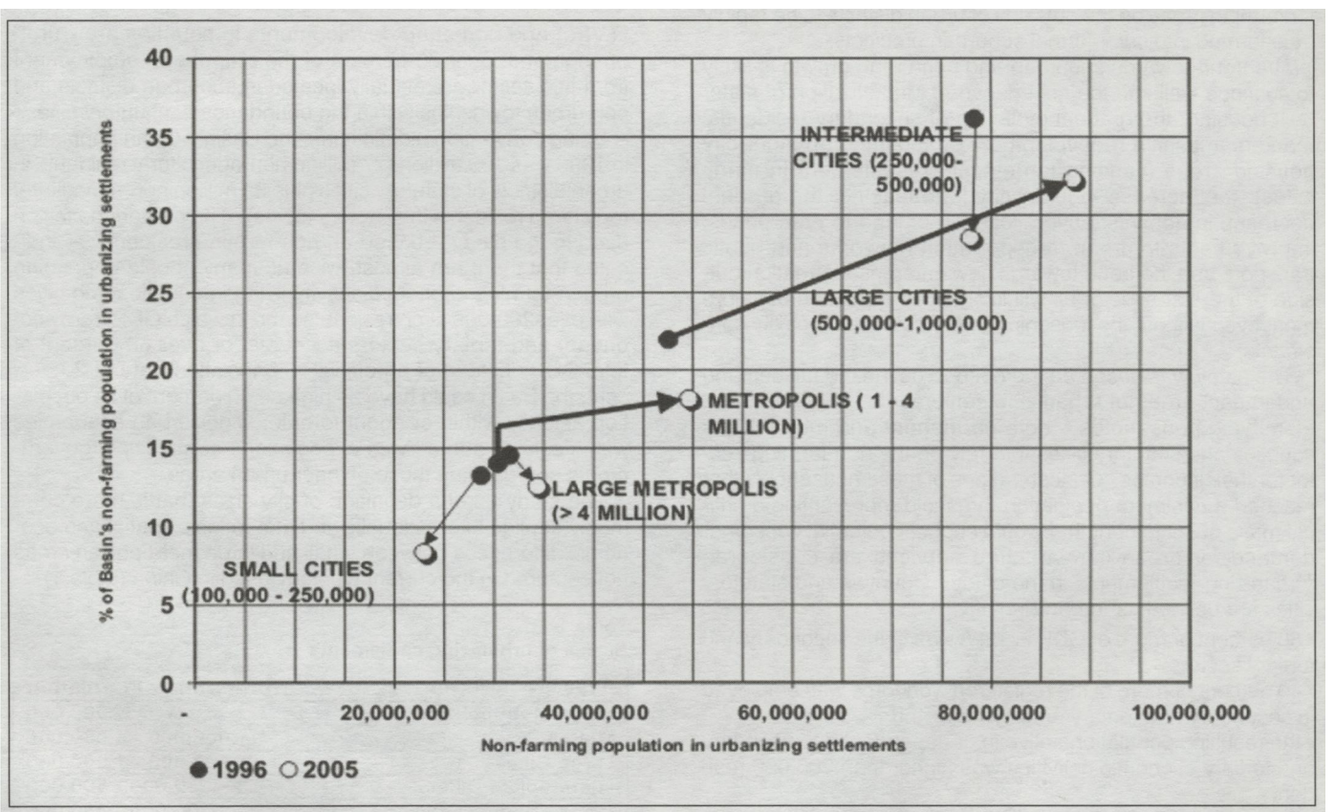


**Fig. 2:** Broad structural shifts in city sizes in the Yangtze River Basin, 1996-2005.

to be most pronounced in Anhui where the urbanized population's share will increase another 15 percent, Chongqing (9.3 percent), Jiangxi (9.3 percent), Sichuan (8.3 percent), and Zhejiang (8 percent). 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 the assessment of different kinds of urban needs over the next decade.

## The Basin's urbanizing economies

The Yangtze Basin's urbanizing settlements produced 93 percent of the entire Basin's GDP in 1996, and 42 percent of China's. Contributions to secondary and tertiary sector output within settlements (which accounted for 86 percent of GDP in the Basin's cities) were: Intermediate Cities (28 percent), Large Metropolises (24 percent), Large Cities (22 percent), Metropolises (20 percent), and Small Cities (8 percent). Cities with populations over 1 million (Metropolises and Large Metropolises) therefore accounted for 44 percent of urban output in 1996. On average:

- the economies of Intermediate Cities are twice the size of Small Cities;
- Large Cities are twice those of Intermediate Cities;
- Metropolises are over three times the size of Large Cities; and,
- 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 quite dramatically. However, when these figures are disaggregated into GDP from the secondary and tertiary sectors per non-farming resident (i.e. "urban" GDP per "urban" resident), the spread between cities diminishes quite markedly. Apart from the coastal Delta cities in Shanghai, Jiangsu, and Zhejiang which have the highest levels, GDPST (Gross Domestic Product from Secondary and Tertiary Sectors) per non-farming resident in all other provinces fluctuates 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.

What does appear to matter in level of income is size of city. There does not seem to be a Basin-wide improvement in per capita GDP until cities reach the size of Metropolis, whereupon there is a dramatic increase of 70 percent (fig. 3). Per capita GDP and GDPST at the Large Metropolis level are, on average, twice those of Large Cities, and almost 30 percent higher than in Metropolises. Except for several cities in the Delta, the location of Small Cities seems to have relatively little bearing

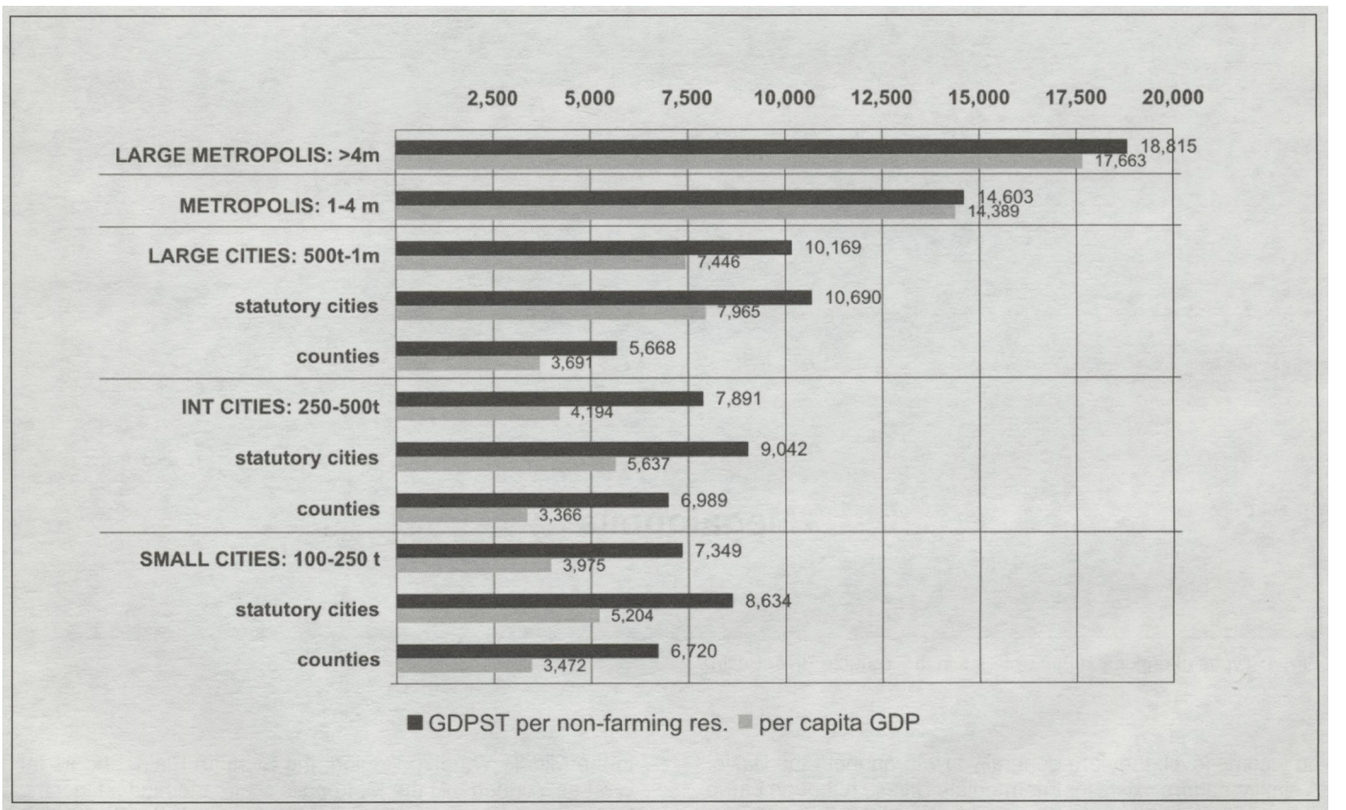


**Fig. 3:** Per capita GDP and secondary and tertiary GDP by size of city, 1996 (in Yuan).

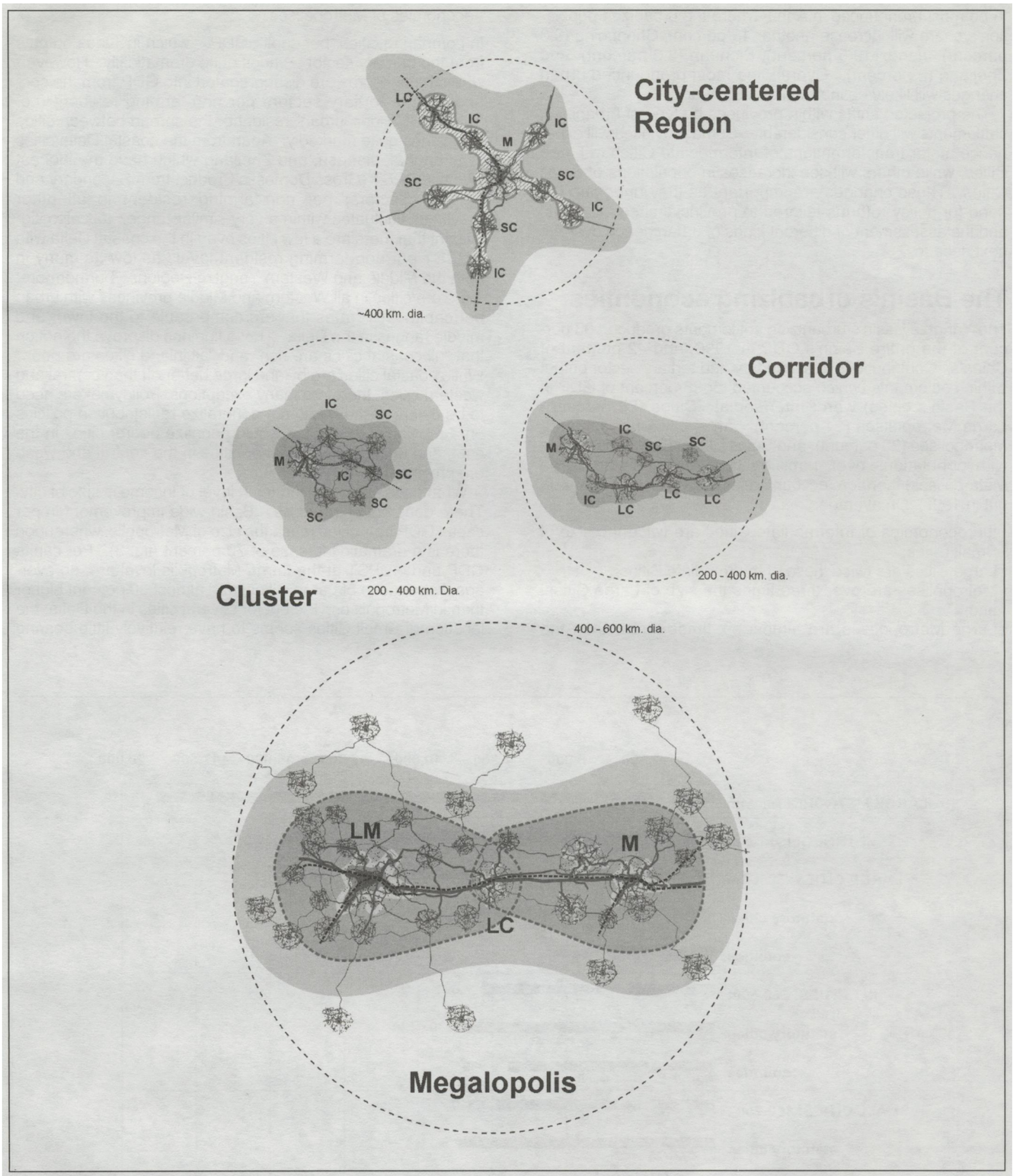


**Fig. 4:** Types of regional urban systems in the Yangtze River Basin.

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.

Economic growth variables were subjected 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 1990-1996 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, and negatively related to the importance of State Owned Enterprises (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.

## Emerging regional urban systems

Urban economies, settlement patterns, and the movement of people, capital and goods within urbanizing settlements in the Basin are a complex web of functional and physical linkages that go beyond the 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 percent. 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 begins to adjust to WTO.

The impacts of the NTHS on market access in the Basin are likely to be far-reaching, including 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 appear to be occurring. 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 (figs. 4 and 5):

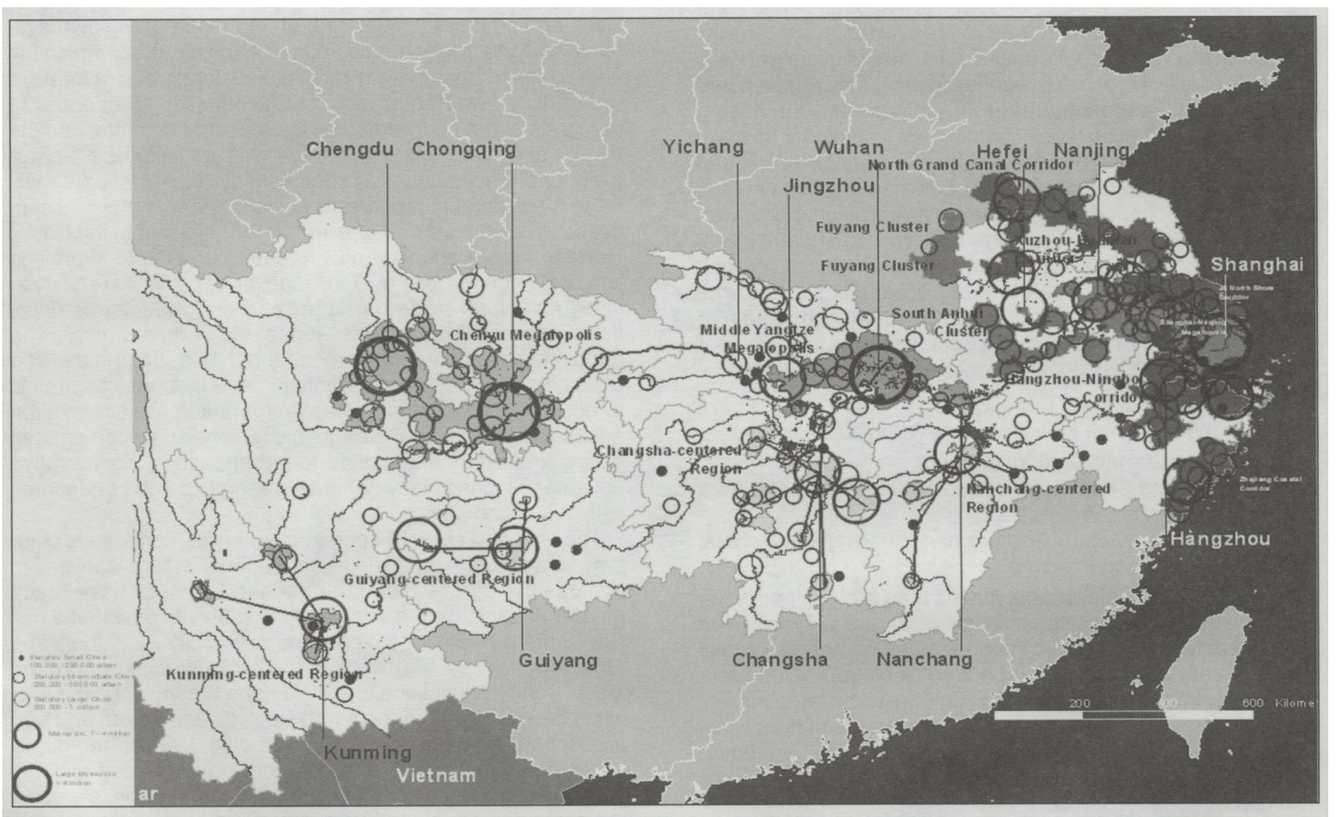


**Fig. 5:** Regional urban systems in the Yangtze River Basin, 1996.

- town-centered regions comprised of a network of villages and towns, often in a loose hierarchy;
- city-centered regions in which a single Large City or Metropolis seems to play 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;
- 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;
- Corridors, which are very similar to Clusters but stretch in a linear form along a major road or rail line; and,
- Megalopolis.

There is a major size difference between megalopolises in the Basin, which have a median population of 26 million, and Corridors, Clusters and City-centered Regions which range from 3 to 12 million.

● Three **megalopolises** were identified in the Basin (fig. 5):

- 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 is fundamentally different 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 the 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;
- the Hanghzhou-Ningbo Corridor and the 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 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 percent of the Basin's non-farming population, and create 66 percent of its secondary and tertiary GDP. Development policies related to fiscal, investment, trade and labor 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. Across all Regional Urban Systems the key issues in economic development appear to be the degree to which the economies of smaller cities and counties are integrated into those of regional systems enjoying agglomeration benefits, 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 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: removing inter-provincial (and even inter-municipal) trade barriers; resolving inequitable fiscal flows and entitlements between levels of government; and removing constraints to the mobility of labor, enterprises, and capital between systems. Similarly, endogenous constraints to economic restructuring, capital formation, and innovation need to 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.

The type and scale of infrastructure investment needs differ 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 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.

## The need for a broader spatial perspective

A key conclusion of the study is that development will increasingly need 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 in far greater depth than is currently the case in China.

Watershed management needs to be conducted within the context of demands from and impacts of Regional Urban Systems. The analytical framework proposed in the World 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. 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.

The study shows 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 labor. 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 a high priority of the Government of China and the World Bank.