

SHANGHAI: POPULATION PLANNING AND URBAN SUSTAINABILITY

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Summary

Complex interactions among the population, environmental, social, and economic challenges affect the sustainability of Shanghai in pursuing its development goals. By focusing on population and urban sustainability issues, this article will first discuss the dynamics and implications of population change in Shanghai, and then examine a range of environmental, economic, and social implications of urban population growth in Shanghai. This is followed by indicating the necessity for urban sustainable development in Shanghai. Under the tremendous pressure of population growth, energy consumption, and environmental pollution, Shanghai needs to develop strategies to ensure its urban sustainability. This can be assisted by introducing an integrated approach to identify the important role that population factors play in achieving Shanghai's sustainability.

The integrated evaluation approach will provide mechanisms to reconcile environmental, social, and economic concerns in measuring urban sustainability. As part of the integrated

approach, a systematic method to developing urban sustainability indicators for Shanghai will be discussed. A case study will be presented to illustrate the application of the method to identify priority rank ordering of sustainability indicators. Indicators can further be used as standards against which to measure and report performances of population and/or development policies in the context of urban sustainability.

1. Introduction

As we move into the twenty-first century, our societies are now facing a range of environmental, economic, and social challenges. These include population expansion, rapid economic growth, dramatic environmental degradation, and increasing social instability. These challenges are interconnected in ways that influence societal sustainability.

Rapid economic growth has brought considerable benefits to Shanghai people. Since 1978, the household income in Shanghai has been increasing steadily and poverty has fallen. While the rapid economic growth in Shanghai can be seen as a development miracle that has lifted living standards significantly, new problems have begun to emerge. For example, the economic reforms have not been equally beneficial to all residents. The unevenness in the rise of living standards for different households, and the challenges that poses for families that are left behind, are becoming of increasing concern in Shanghai.

Another important concern in current development is that labor-displacing productivity growth in the manufacturing sector has generated a very large pool of surplus labor. In Shanghai, the free market system, industrial modernization, and foreign investment have resulted in changes in economic structure. The new government policy of state owned enterprise (SOE) reform is giving an extra boost to Shanghai's urban unemployment or under-employment. The reform brings less job security and lower wages, which increase the number of people with inadequate incomes. The number of Shanghai dwellers living in relative poverty is expected to rise with higher levels of unemployment. What remains uncertain is whether the economic structural change through SOE reform will promote economic growth and thus reduce the number of people living below the poverty line.

The more productive agricultural sector has generated a large volume of surplus labor in rural areas. Increasingly liberal government policies in China, such as the household-registration system, have facilitated rural-to-urban migration. Millions of rural residents have migrated to Shanghai in search of better jobs. In the process, the rural migrants have not only increased the pressure on urban employment, but also increased the urban informal sector (slums), with significant numbers of urban poor. These concerns show that the current economic growth may be unsustainable.

Environmentally, it is also clear that urban housing development, industrial sectors, and use of natural resources are not always sustainable. The environmental damage associated with rapid development is another major concern of the Shanghai government. Given a limited natural resource base, dramatic population growth, urban expansion, and industrialization are increasing the pressure on the land base. Economic growth has caused a series of environmental problems including arable land loss, urban congestion,

flooding, health hazards of toxic materials, water and air pollution, and inadequate sewerage and garbage disposal facilities.

The continued rapid urban growth, which appears to be an inevitable consequence of Shanghai's economic and industrial development, is greatly expanding Shanghai's consumption of energy and its release of environmental pollutants. If the rapidly growing economy and urban population in Shanghai do not develop in a sustainable manner, then the entire country will feel the economic and environmental consequences.

Socially, there is distrust of and even distaste for the system of governance because of severe corruption. This is coupled with a series of social problems such as crime, drugs, poverty, and unemployment. Social cohesion is declining in Shanghai and is endangering the existence of many good Chinese cultural traditions including respecting the elders and caring for the young. These are indications of social unsustainability.

These development problems are examples of some of the main reasons for uncertainty concerning the sustainability of Shanghai. It is now clear that three forms of unsustainability—environmental, social and economic—are interconnected and mutually reinforcing. The complex interactions among the environmental, social and economic challenges indicate that none of these three types of problems can be resolved in isolation.

Focusing on population and urban sustainability issues, this article will first discuss the dynamics and implications of population change in Shanghai, and examine a range of environmental, economic, and social implications of urban population growth in Shanghai. This is followed by indicating the necessity for urban sustainable development in Shanghai. Under the tremendous pressure of population growth, energy consumption, and pollution, Shanghai needs to develop strategies to ensure its urban sustainability. This can be assisted by introducing an integrated approach to identify the important role that population factors play in achieving Shanghai's sustainability.

The integrated evaluation approach will provide mechanisms to reconcile environmental, social, and economic concerns in measuring urban sustainability. As part of the integrated approach, a systematic method to developing urban sustainability indicators for Shanghai will be discussed. Indicators are used as standards against which to measure and report performances of population and/or development policies in the context of urban sustainability.

2. Population Growth and Urbanization in Shanghai

Shanghai's population had already reached 5.73 million in 1952. By 1995, however, Chinese statistics recorded a population of 13.01 million for Shanghai. With the restrictive one-child family program and the increasing awareness of the population problem in urban areas, Shanghai's population growth rate dropped significantly after 1978 (see Figure 1). Shanghai experienced a sharp drop in annual birthrate from 1.02% in 1990 to about half that, 0.55% in 1995, and further down to 0.49% in 1997. In 1998, Shanghai's natural population growth rate was negative (-0.18%). Shanghai is an example of a Chinese city that has an effective population policy aimed at controlling its

population growth. Compared with other regions in China which have higher population growth rates, Shanghai can be considered as a success in population growth control.

Although Shanghai's population policy has succeeded in checking natural population growth since 1959, population control in Shanghai is facing new challenges. Between 1980 and 1997, the average life expectancy in Shanghai increased from 73.3 years to 77.2 years, resulting from the better living standard and health care system. While the rapid growth of the aging population in Shanghai can be seen as a form of social progress, new problems have begun to emerge as a result of the increase of the old population. For example, the larger number of old people has affected the labor force structure, productivity, and the economy as a whole. The rise in the elderly population poses significant pressure and challenges for families and society. This is becoming an increasing concern in Shanghai.

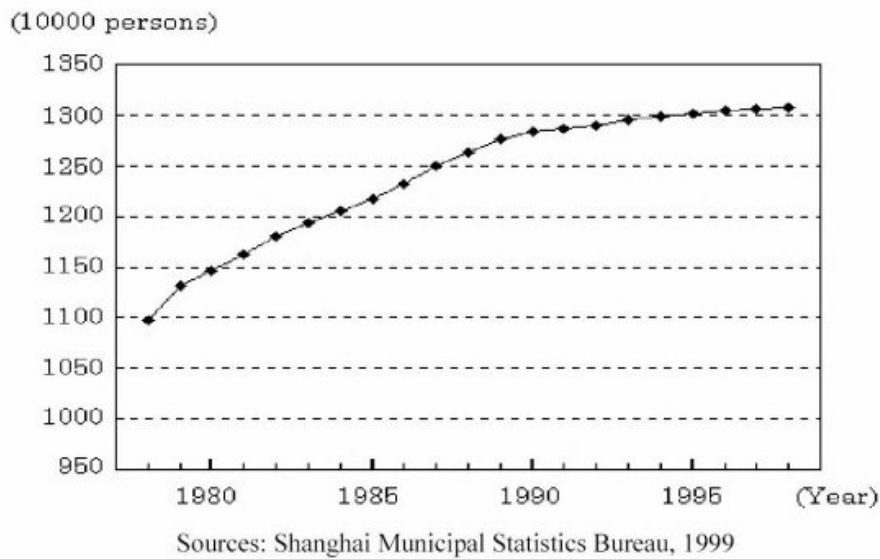


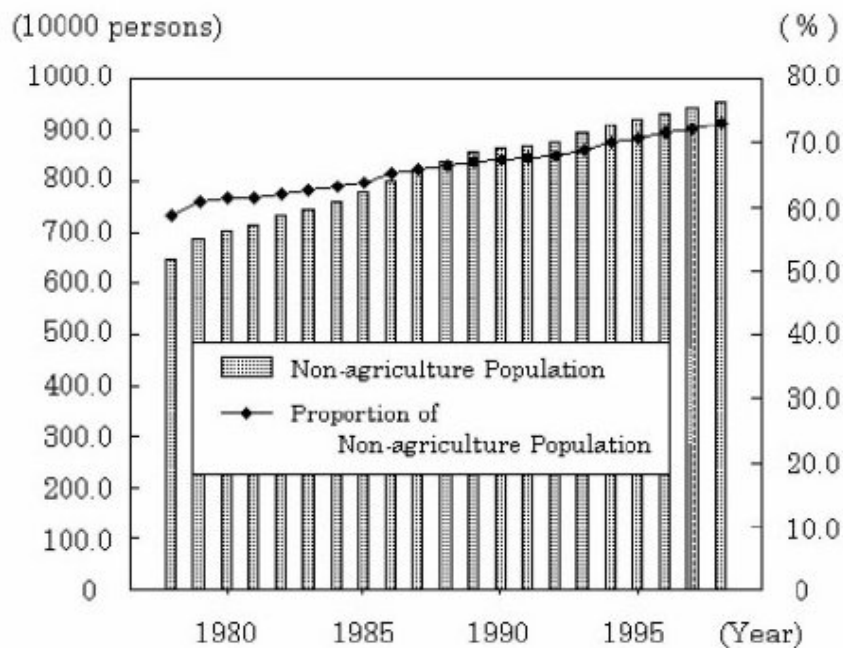
Figure 1. Registered population growth in Shanghai (1978 to 1998)

Based on the authors' projection, the annual rate of increase of Shanghai's old age population (65 years old and over) in the early years of the twenty-first century will be relatively slow at 0.2%. However, in the following decade from 2015 to 2025, the growth rate of the old population will reach 1.47 and 1.71% for the first and the second five-year periods respectively. With this growth rate, the old age population of Shanghai will reach 25% of the total in 2020, and it will be an aging society. Shanghai will experience a further increase in the old population from 2020, to exceed 30% of the total population by 2025. This will create a super-aging society. Shanghai provides an example in China of a rapidly aging society.

Moreover, the continued rapid growth of the aging population, which appears to be an inevitable consequence of Shanghai's economic development, is greatly affecting Shanghai's consumption structure, health care system, social welfare, and many other aspects of the society. If Shanghai does not develop effective policies or strategies to cope with the rapidly growing old population, then the entire society will feel the consequences of non-sustainability.

While the natural population growth in Shanghai is declining, the total number of people living in urban areas is increasing considerably. Since the beginning of economic reform in 1978, Shanghai has been accelerating its urbanization process. Figure 2 illustrates the urban population growth and urbanization trends in Shanghai. Over the period 1978 to 1998, the number of people living in urban districts and towns (classified as non-agriculture) increased steadily from 6.45 million to 9.54 million, or proportionally from 58.75% to 72.99%.

The urban areas are now accommodating a large number of temporary residents (the floating or mobile population). This category of population includes tourists, people on business trips, traders, peasant workers, and others staying in Shanghai without having the city's permanent household registration status. Shanghai's urban population growth has been attributed to a combination of rural-urban migration and urban reclassification.



Source: Shanghai Municipal Statistics Bureau (1999)

Figure 2. Urban population growth and trends in Shanghai (1978 to 1999)

Shanghai is an important economic, financial, commercial, and industrial center in China with a concentration of cultural, social, and educational institutions which are usually not available in rural areas. Many development projects in Shanghai are aimed at putting the modern market system to work and to provide people with higher income and better social services. Economic reform with an ever-expanding private sector and more flexible government policies, are preconditions for a rapid urbanization process. In addition, the open-door policy attracts foreign investment inflow that becomes a new driving force of economic growth and urbanization.

Rapid economic growth in Shanghai has created enormous numbers of new jobs with higher wages in the manufacturing and service sectors. The new opportunities of higher urban wages and the establishment of private enterprises attract people in rural areas. In

rural China, the farming-responsibility system initiated by Deng Xiaoping after 1978 and agricultural modernization have resulted in surges in agricultural productivity. A more productive agricultural sector generates more surplus labor in rural areas. Increasingly liberal government policies in China have further facilitated the rural-to-urban migration. Under the old household-registration system, rural migrants living in cities anywhere unable to secure jobs or a food ration. In 1983, the State Council permitted state-run firms to hire rural labor. Anyone now can buy grain from the free markets and the grain-ration system has gone.

Both state-run and private firms are now taking advantage of cheap rural labor to improve their competitiveness. These temporary workers from the countryside usually do not have any benefits and may lose their jobs at any time. Millions of Chinese rural peasants have migrated to cities in search of better incomes. Based on data from a mini-census in October 1995 by the State Statistical Bureau, China's "floating population" can be estimated at 75 to 90 million people. In major cities such as Shanghai, the "floating population" have created many *de facto* ghettos. It has been recognized that the implementation of family planning measures and population control become extremely difficult in the newly created "floating population".

3. Urbanization and Rising Consumption

The continued rapid urban growth is greatly expanding Shanghai's consumption of natural resources and energy, and its contribution of environmental pollutants. The World Commission on Environment and Development suggests that, on a per capita basis, cities account for a much higher share of resource use, energy consumption, and environmental pollution than rural areas. Big cities usually have a long reach and draw their natural resources and energy supply from distant rural areas, with considerable impacts on ecosystem sustainability. Given its population pressure and the relatively low consumption levels in China, political imperative to achieve western-style modernization or to grow fast is inevitable. Recently in Shanghai, it has become clear that city planners, decision makers, and the public are aspiring after western urban styles: highways, low density single dwellings, cars, color TV, air conditioning, and profligate water use.

Dramatic population growth and urban expansion in Shanghai are increasing pressure on the limited resource base and the environment for more supplies of food, housing, highways, and landfill sites. Due to lack of space, in an area of about 6340 square kilometers Shanghai sustains more than 13 million residents plus several million visitors and rural migrants. There is increasing concern on how to manage the scarce resources to meet ever growing demands.

Two fundamental questions in relation to Shanghai's urbanization and sustainability are: 1) Can the government set appropriate development strategies to provide all people living in Shanghai with adequate housing, decent jobs, hospitals, schools, libraries, clean water and air, sanitation, sewer system, roads and highways, energy supply systems, and other forms of infrastructure? 2) How significant will Shanghai's ever rising material expectations, associated with a growing population living in urban districts and towns, affect the natural resource base and the environmental assimilation capacity in the wider regional, national, and even international context?

It is obvious that the total environmental impacts of a city will be proportional to both population size and *per capita* consumption level. To date, most studies on population-resources-environment indicate that population expansion is the main cause of ecological depletion and unsustainability. Rapid population growth in China has been considered as a threat to the Earth's life-support systems. While unchecked population growth is now viewed by Chinese government as a fundamental problem to societal sustainability, the increasing consumption level, however, is seen as good. Raising *per capita* consumption level or living standard is set as the primary goal of the economic reform.

Since 1978, household income in Shanghai has been increasing steadily. The annual *per capita* living income of urban residents was 6822.24 yuan in 1995, up 12.26% from the year 1994. Rapidly rising income is creating a middle-class and even a consumer class in Shanghai. With high standards of living, people in urban areas demand more housing space which often translates into sprawling urban development and costly services. In addition, city residents desire more open space for recreation and public parks.

Table 1 shows the differences in per capita income and consumption between urban and rural households from 1990, and 1993-1998 in Shanghai. The strong income-consumption relationship is clearly illustrated. The income effect on consumption level is pronounced. It is obvious that urban households with much higher income consume more. Research result suggests that not only does the accelerated economic growth in China increase the total demand for consumer goods, the improved living standards also substantially change the composition of consumer expenditures. Using data provided by the Statistical Yearbooks of China, a joint study by staff of the Chinese Academy of Social Sciences and the World Bank calculated the income elasticities for various consumer goods. The study results indicated that a rise in per capita income would significantly change the consumption patterns in China. In particular, the share of expenditure on non-staple food such as meat or wine, and housing would increase.

	1990	1993	1994	1995	1996	1997	1998
Urban income	2198.28	4297.44	5889.6	7196.4	8191.44	8475.5	8825.26
Rural income	1989.73	3148.64	4030.75	4860.55	5506	5932.65	5965
Urban consumption	1936.2	3530.04	4668.96	5868.12	NA	NA	NA
Rural consumption	1591.81	2659.95	3319.9	4041.33	NA	NA	NA

Table 1. Household income and consumption change in Shanghai

Even though most urban residents in Shanghai still eat a large amount of starchy staple such as rice, and travel by buses or bicycles, they are now moving up the consumption ladder at a remarkable rate, consuming more meat, eggs, milk, butter, and ice cream. A large proportion of urban households now have washing machines, refrigerators, air conditioning, and other durable goods. More and more people can afford to buy private automobiles and travel in airplanes. Table 2 indicates that an increasing number of people

in Shanghai are now joining the ranks of western consumers. In Shanghai, spending on electronic equipment and motorcycles increased significantly from 1990 to 1998.

Durable Item	1990	1990	1993	1993	1994	1994	1995	1995	1996	1996	1997	1997	1998	1998
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Color TV	77	25	94	36	101	44	109	49	113	53	119	62	128	74
Refrigerator	88	29	92	42	95	50	98	56	101	65	102	68	103	72
Washing machine	72	45	76	54	73	57	78	63	82	67	87	67	91.6	66
Air conditioning	NA	NA	5	NA	20	NA	33	1	50	3	62	4	68.6	7
Heater	NA	NA	44	NA	51	NA	58	NA	NA	NA	NA	NA	NA	NA
Hot water shower	NA	NA	15	NA	29	NA	37	NA	42	NA	51	NA	53.8	29

Table 2. Year-end possession of durable goods in Shanghai per 100 households

4. Urbanization, Resource Depletion and Environmental Pollution

As indicated in Table 1, an average urban household consumes much more than a rural household. Wackernagel and Rees use a concept “ecological footprint” to estimate the resource consumption and waste assimilation requirements of a defined human population (e.g. a city) in terms of a corresponding productive land area. They calculated the ecological footprints for both developed and developing countries.

Their study suggests that the total area of the natural resource base that is essential to sustain the city is its *de facto* ecological footprint on the Earth. The results of their calculation show for modern cities the ecosystem area required for sustainability is orders of magnitude larger than the area defined by their political boundaries.

Clearly, the influence of urbanization and industrial development is felt in many rural regions of China. Shanghai’s production and consumption rely on resources, energy, and other ecological goods and services drawn from distant places through natural flows and commercial trade. For example, the fruits in a Shanghai supermarket are likely to have come from farms located in Guangdong, Fujian, or even Xinjiang. Peasants in rural China provide primary goods and materials produced on their ecological areas to the markets in Shanghai. Since the per capita consumption of energy and resources, and the amount of waste generated in Shanghai are much higher than those in the rural regions, rapid urban growth will cause more environmental degradation and ecosystem damage.

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Biographical Sketches

Yongyuan Yin is an adjunct professor with the Institute of Resources, Environment, and Sustainability at the University of British Columbia, Vancouver, Canada. He is also an environmental scientist with

Adaptation and Impacts Research Group, Environment Canada. Educated both in China and Canada, Dr. Yin has research experience and contacts in both countries. Dr. Yin's research has been focused on developing and applying computer based decision support systems and integrated assessment (IA) methods to assess implications of various environmental problems (e.g. climate change, soil erosion, air and water pollution) and policies for sustainable development. Dr. Yin is currently the PI of an Assessments of Impacts of and Adaptation to Climate Change (AIACC) project in Western China funded by UNEP/GEF. He is also leading the IA within the University of Toronto CIDA project on carbon sequestration in China. He has been coordinating the Pearl River Delta Sustainability project since 1999.

Guixin Wang is a professor and dean of Academic Commission of the Population Research Institute at Fudan University in Shanghai, China. He is also the deputy director of Population Migration Academic Commission, China Academic Commission of Population. Professor Wang's research interests are mainly focused on population migration and urbanization, urban and regional sustainable development, and other fields related to population, resources, and environmental economics. Dr. Wang has authored or co-authored more than 10 books and published more than 60 peer reviewed articles on international journals. He has been granted several awards from Chinese Population Planning Commission, Ministry of Agriculture, and Shanghai Municipal Government for his research achievements. His monograph "Population Distribution and Regional Economic Development in China", won him a first-rate prize in Shanghai's Excellent Achievement of Philosophical and Social Science in 1998. His other book "Research on Population and Sustainable Development in Shanghai", co-authored with Dr. Yongyuan Yin, which systematically studies issues of population and sustainable development in Shanghai, was awarded a second-rate prize in Shanghai's Excellent Achievement of Philosophical and Social Science in 2002.