CHINESE GEOGRAPHICAL SCIENCE
Volume 11, Number 1, pp. 11 - 16, 2001
Science Press, Beijing, China

STUDY ON URBAN LAND SAVING IN THE ECONOMIC DEVELOPED COASTAL REGION OF CHINA

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ABSTRACT: In the initial period of industrialization a great deal of land is needed for Chinese industry development as well as land resource per person of China is much lower than the average value in the world, thus it is necessary to save land in Chinese urban construction. This paper mainly discussed the features of urban land use in economic developed coastal cities: one is that the index of urban land per person in middle-small cities was higher than in large cities; another is that urban land has not been used highly and strongly; the third is that the industrial land occupied an irrationally large percentage of whole urban land; the final is that rural enterprises took up a quantity of land. Thereafter, this paper put forward five land-saving measures: first, to adopt the idea of saving land; next, to adjust the land-use structure when redeveloping the old city and alternate some land use when adjusting the industry structure of the city; the third, to develop the system of payment for using land and the management of urban planning; finally to enhance the effective regional plan and the urban landuse plan.

KEY WORDS: cities; land saving; measures; the coastal region of China

CLC number: F293.2 Document code: A Article ID: 1002-0063(2001)01-0011-06

In China, the land resource per person is poor with regard to the huge number of population. According to the recent data from the National Land Bureau, the average land per person is 0.11 ha, much less than 0.25 ha, the average land per person in the world (FAN, 1997). On the other hand, a large scale of rural land is to be transmitted into urban land upon the fast proceeding of urbanization. At present, the urban population occupies about 30% of the total in China. If the percent become 50% (the percent in developed countries is 70% - 80%), there would be about 2.5 billion rural people moving in the city, hence the city would further expand to accommodate them. Considering this distance between the land need and land support, we should pay more attention on the measures of saving land in the progress of urban development.

1 IRRATIONAL URBAN LAND USES

1.1 Higher Average Land Per Person in Middle-small Cities

In order to study the index of average land per person in cities with different size, we grouped the

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cities into three types: the large city with population more than 1 000 000, the big city with population between 500 000 and 1 000 000, and the middle-small city with population less than 500 000. After calculating valued of the index in each city type, we found that it varied with the city sizes. According to Table 1, for all the cities in China the average land per person in the type of middle-small cities is the highest one. It is much higher than that of the other two city types. For the cities in the southeast coastal region, this variation with the city size is much significant. Generally speaking, in the middle-small cities the land has been developed in lower density than in the large and big cities, especially for some newly built cities and small towns, a big portion of urban land has become leisure for the inflation of their urban municipal scope in recent years.

1.2 The Jumping Development of Urban Area and the "Hollow City"

In general, Chinese cities expand in three models as shown in Fig. 1.

Table 1 Urban construction land area per person in big, middle-small cities in the southeast coastal region or in China (m^2)*

Non-rural population in urban area		Cities in China			Cities in the southeast coastal region**		
		More than 1000000	500000 – 1000000	Less than 500000	More than 1000000	500000 – 1000000	Less than 500000
1991	No. of cities	31	30	418	4	7	78
	Land per person	66	97	108	47	71	110
1998	No. of cities	32	43	565	4	9	137
	Land per person	72	96	125	60	92	143

*: The data comes from the Chinese Urban Statistic Yearbook, 1992, 1996.

**: Some cities without data have been excluded.

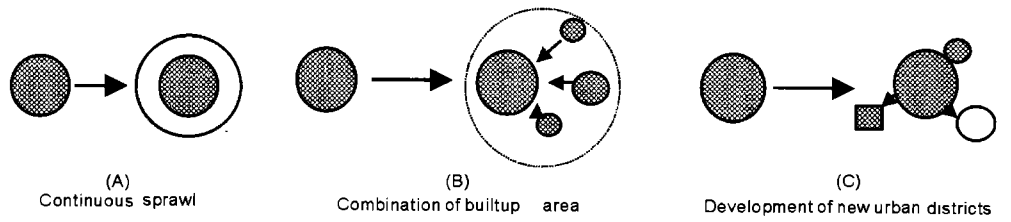

Fig. 1 Modes of urban area expansion

Model A means the urban area sprawl outward continuously from the fringe of the original city. Model B means the urban area extends by engulfing small towns, development areas and industrial areas around the city. Model C refers that the urban area extended jumpily by building new urban districts, development areas and industrial areas. For the model A, it is common in the urban spatial extension and appears mostly in large and big cities. For the other models, B and C, they appear much frequently in urban development of middle-small cities. For example, Wenzhou of Zhejiang Province, its built-up area was 28km^2 in 1991, after engulfing the Ouhai town in 1994 it expanded to 56km^2, increasing by 100%, however, at the same period the non-rural population had only increased by 11%. Similarly, Taizhou of Zhejiang Province is the combination of Huangyan and Jiajiang, Zhangjiagang of Jiangsu province expanded by the Zhangjiagang Port area. Between 1991 – 1992 when the development area was hotly built around the country, almost each city had largely expanded through setting economic and technological development areas.

This jumping development of urban area resulted in some "hollow cities". In middle-small cities, the population density was low than the big cities and the urban land was developed in low-density. The land development in large scale outside of the city would mostly prevent the urban center area from being redeveloped and further decrease the population density, leading to the "hollow cities". Some small towns with good geographic location much more tend to it. For instance, the Luxu town of Jiangsu province is a scenic town near to Shanghai. Its non-rural population was 8600 in 1996, adding the workers and the students who leaving the town at night the total urban population was about 16 000. With regard to its urban area, it was 2.32 km^2, so in average each person occupied 145 square meters land, excluding about 7.52km^2 leisure land in its planning urban scope.

1.3 The Unbalanced Structure of Urban Land Uses in the Middle-small Cities

In most of middle-small cities, the living environment is bad although the development density is low. The major reason is the unbalanced structure of urban land uses (Table 2). It has actually led to some land used inefficiently, leisure and wasted.

Table 2 Contrast of land-use structure ofmain middle-small cities in the southeast coastal area to foreign cities

Cities	Construction land per person (m^2)	Residential land		Industrial land		Green land	
		Percent of construction land (%)	Land per person(m^2)	Percent of construction land(%)	Land per person(m^2)	Percent of construction land (%)	Land per person(m^2)
Nantong	130	22.43	29.19	35.19	45.79	4.21	5.48
Wujiang	141	35.12	49.59	28.13	39.73	2.78	3.92
Jiangyin	178	30.47	54.33	27.21	48.51	9.71	17.31
Zhangjiagang	231	34.88	55.48	22.48	35.76	7.75	12.3
Wenzhou	151	35.48	44.90	25.81	32.65	6.45	8.16
Jiaxing	125	29.13	36.37	30.96	38.65	2.16	2.69
Shaoxing	126	37.90	32.56	28.37	24.37	1.9	1.67
Xiamen	124	26.44	32.66	24.96	30.84	7.22	8.93
Fuqing	103	32.22	33.33	33.33	34.48	4.44	4.60
Foshan	84	30.33	25.41	26.9	22.51	13.78	11.55
Dongguan	122	36.05	43.97	26.7	32.62	9.3	11.35
Zhongshan	123	28.81	35.50	23.25	28.64	7.65	9.42
Variation	84 - 231	22 - 38	25 - 55	22 - 35	22 - 48	1.9 - 13	2.6 - 17
London(1971)	156	36.5	56.9	2.7	4.2		
NewYork(1988)	113	23.2	26.2	5.6	6.3		

Data source: (1) Construction Ministry, The Reference of Urban Land Use Structure in 1996; (2)LIN Zhi-qun, Analysis on Statistic Data of Chinese Urban Land Uses in 1991, The Center of Academic Information of Chinese Urban Planning and Design Institute, 1993, 5.

1.4 The Land Wasting Related with the Scattered Rural Industry

According to the report from National Land Bureau (FAN, 1997), the acreage of the town-village land has ever occupied 87.31% of the total urban and rural settlement land in China, being about 16 000 000 ha. A big portion of the town-village land was used in developing the rural industry as shown in Table 3. The industrial land, in average, occupied 34% of the total land of these small towns, and the highest percent was 45.2 in Meiyan town.

The rough production management and scattered location of the rural enterprises contributed to inefficient land uses. By our survey in Wujiang and Gaochun of Jiangsu province, it was found that most rural enterprises had only tens employees while occupying over 10 000 square meters land. Especially for the joint investment factories and foreign investment factories, the buildings only occupied less than a quarter of the whole

Table 3 The percentage of industrial land area in urban land of some little towns in jiangsu Province

	Area of construction land (ha)	Industrial land per person (m^2)	Percent of industrial land in construction land (%)	Variation in the plan for 2010
Luxu	233	108	41.2	-13.6%
Meiyan	128	122	45.2	0.0%
Wanping	59	43	33.7	-18.2%
Xuebu	131	28	26	-18.8%
Jiangfua	92	32	29	-11.4%
Yaowang	24	15	35.8	-31.3%
Diaopu	181	40	27.7	-46.9%
Variation	24 - 233	15 - 122	26 - 45	-46% -0%

Data source: relevant Town Master Plan (1995).

factory area. Furthermore, these factories were scattered over many towns and villages. In each town and even each village, one or several industrial areas were demarcated, where a lot of zones of land became leisure for the bankrupted factories (CHEN, 1997). The scatter location can be regarded as the result of the present land policies. The rural enterprise can get land without payment in the scope of the town or village which it belong to but not in other towns or villages, thus no one would like to locate in some area outside of their town or village.

2 MEASURES OF SAVING LAND

2.1 The Strategy of Saving Land

The lost of rural land also resulted from the low profit of agricultural land. According to our survey in 10 counties of Zhangzhou in Fujian province, such as Longhai, Changtai, Yunxiao, the peasant could earn 6 750 yuan per hectare land if he planted rice, 37 500 - 52 500 yuan per hectare land if planting vegetables or fruit trees, 75 000 yuan if planting flowers. If the land was developed as industrial area the profit in each hectare lan would be as more as 3 000 000 - 4 500 000 yuan. This profit difference threatens the arable land (YAO, 1995). By contrast, if too much arable land was lost, the agriculture could not grow, the food need of urban residents could not be met and the peasant lost land would probably be a social problem. Therefore, it is urgent to practice the primary national policy of saving arable land through educating people, regulating the land management and setting up a monitor system.

2.2 Adjustment of the Land-use Structure in Cities

First, we can adjust the land-use structure when redeveloping the old city. For cities in the southeast coastal region, most of them are crowd with high resident-density and narrow streets. Because most of the buildings are one or two stories the volume ratio is low, hence there are usually 40 000 - 50 000 persons per square km in the old city. If we raise the volume ratio in rebuilding the old city, not only the residents can return to their original area but also some land can be used as green spaces to improve the living environment. For the instance of Shanghai, in the urban core a large square, the People Square was built in 1994 when redeveloping the old city. Furthermore, an over 20-hectare urban forest area near the People Square has been planed aiming to largely raise the green spaces, improve the urban environment to some high degree.

Next, we can alternate some land uses when adjusting the industry structure of the city. In China, the commerce, banking, real estate are developing quickly in the coastal region. The factories, warehouses are being exchanged by agencies of these industries in the urban core for the large rent difference between the urban center land and the urban fringe. In Nanjing, for example, 235 hectares industrial land in the urban core has been alternated from 1995 to 1998. Out of them 56 % was changed into commercial land, 23 % was used to widen the street, 15 % became green land (SHEN, 1999). For the industrial land not in the urban core, it can be redeveloped into residential land or

commercial residential area.

2.3 Comprehensive Development of Urban Land

The comprehensive development of urban land means that an area should be developed as a whole. It is similar to the Planned Unitary Development (PUD) of the U. S. A. PUD required the private developer to comprehensively develop the land under the supervision of the government in the following aspects: 1) the conformability to the urban plan; 2) the public benefit; 3) sufficient public facilities and public spaces; 4) the continuous management. By this, the government can either get the aid of private capital or control the urban development. In the coastal region of China this model has been adopted in building the development area, such as the Suzhou-Singapore Industrial Park. In most cities, however, the government usually acted as the primary developer to construct the infrastructure in the development area, then the second developers (non-governmental developers) to build and manage the area according to the urban plan. This model has also been used in redeveloping the old city, developing the new urban district, widening the road and building the green space system.

2.4 The System of Payment for Using Land and the Management of Urban Planning

In the market economic system, Chinese people have accepted the concept of payment for using land, but there is not yet a mature management system. The theories and measures of the West to manage the land development are worthy to learn.

For the relationship between the urban land price and the land development, there was a theory about added value and compensation of the land in England in 1942, which has been confirmed widely. It mainly means that the added value of the developed land should be levied as the compensation for the reduced value of the other land. In order to deal with the problem of scattered rural enterprises in China a management system of rural land lease should be set up, and that theory could guide the establishment of the management system.

For the control of land use, the Zoning system in the U. S. A is a good sample. There is a set of new policies about land management in the U. S. A now, such as encourage area, transfer of the development authority, planned unitary development, development of combined land uses. These policies aim to adjust the land price and the land profit using the measures of volume ratio and height control, and hence to lead the urban land uses to a reasonable structure. Out of them, "encourage area" can be used to guide the urban redevelopment to increase the public spaces. For an encourage area, it would be given the permit of bigger volume ratio in order to encourage the private developer to construct public facilities such as small parks. For the development of not-used urban land, there are sorts of relevant management systems in different countries or regions. In Taiwan, the vacant urban land must be levied tax according to the ordinances about detail urban planning. In South Korea's National Land Management Act of 1980 there are also items about the leisure land. In its later Industrial Redisposing Act. In England the land registration system was set up by the Local Administration, Planning and Land Act in 1980. This system regulated that the government would provide the information of leisure urban lands to the developers and give some preferential treatment or support to help them obtain these lands with the aim of redevelopment of the urban center. In China, the above measures should be useful in improving the efficiency of industrial lands and promoting the development of urban leisure lands.

2.5 The Effective Regional Plan and the Urban Land-use Plan

In China there exists the system of regional planning, however it can not guide effectively the development of cities in the region now. For example, the repeated construction in cities near to each other has not been controlled, the urban area has been sprawling without guidelines in the urban fringe and small towns. In order to improve this situation a system of urban land-use management should be set up as well as the

regional plan.

In China there is not a united independent urban land use plan. It is only a section of urban planning or master land use planning. The urban planning system is constituted by master plan, district plan and detail plan. In the master plan there is a special sub-plan of land use. For the master land-use planning started from the 1990s, its study area also includes the urban land. However, neither of the two planning systems can provide a systematic urban land use plan, and the items related with urban land use in the two systems are independent to each other. The land use plan is not powerful enough to control the sprawl of the urban area because the land scope planned by it usually can not be accepted by the urban plan. On the other hand the urban plan usually lag behind the urban development for the shortage of immediate information of land development, and hence can not yet guide the urban land uses well. A comprehensive urban land use plan is needed considering the fast urbanization in China. It should be constituted by several levels such as regional plan, city plan and zone plan, and the lower plan should be made under the guide of the upper plan. The example of Nanjing stated that urban land use plan could improve the efficiency of the urban land. According to The Master Land Use Plan of Nanjing, there would existed about 35.07 km^2 of leisure urban land or the urban land potential for development in 1997 – 2010 if adjusting the land-use structure, enhancing the land using efficiency (Table 4). Therefore, with a systematic urban land use plan the construction land in the urban area and the rural area could be managed as a whole, and the land need from urban growth could also be satisfied by developing the potential land resource.

Table 4 Analysis on the potential urban construction land after adjusting the land-use structure and enhancing the development intensity in Nanjing(km^2)

Planning term	The potential land by adjusting the land-use structure	The potential land by enhancing the development intensity	Other potential land	Total
1997 – 2001	8.0	0.52	2.5	11.2
2001 – 2010	16.73	1.72	5.6	24.05
1997 – 2010	24.73	2.24	8.1	35.07

Data source: Special Topic Studies in Nanjing Master Land-use Planning (1997 – 2010).

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