Section 3 Formation of Civil Society

Chapter 1 Social Security: Security for the Development of Small and Medium Sized Cities

1.1 Policy Recommendations

With reforms beginning in the 1990s, individuals, enterprises, and the government in urban areas have begun pooling revenue sources, and Chinese social security systems have begun to evolve into broader social systems. But given the current conditions of social security in each city of Jiangsu Province, which are described further below, further reforms and improvements are needed.

This chapter will discuss not only proposed solutions to the problems that China's social security system is currently facing, but the nature of social security systems from a broader perspective, based on issues drawn from case studies of Changzhou, Zhengiang, and Lianyungang in Jiangsu Province, and focusing in particular on social insurance (pensions, medical insurance, and unemployment insurance). Given that the State Council makes all policy decisions in China involving social security systems, it is assumed that the nature of the systems explained below is entirely based on the central government's approach. Future social security system reforms in China should be promoted on the basis of the approach outlined below. Aspects of these issues are discussed in greater detail later in the document.

(1) The nature of social security funding

For the diversification and procurement of funding for future expansion of social security benefits, the most appropriate financial arrangement for different systems and benefit purposes must be adopted, or a combination of such arrangements. Expanding the funding base will require future adjustments and cooperative efforts with similar social security systems in the private sector.

(2) Standard for rate of national burden

The burden of social security on the Chinese people will clearly increase. However, excessive increases must be avoided, due to the harm they may cause.

(3) Refinement of social security for aging society

The ratio of elderly to the working population in China is rapidly increasing. Social security systems need to be refined to meet not only the needs of this aging population, but changes in the relationship of the elderly and families.

(4) Improvements in existing social insurance systems

Existing systems should be improved in the following aspects.

1) Establishment of a basic pension
2) Pension fund investment
3) Measures for the temporarily employed and low-income workers in urban areas
4) Review of pension payment conditions
5) Need for universal medical insurance coverage
6) Review of user payments for medical services
7) Review of the burden for medical insurance upon the elderly
8) Closing of reemployment centers

1.2 Basic Concept and Direction

(1) Social security as the basis for the formation of a civil society: Establishment of universal national insurance systems

Compulsory redistribution of income by the government, including relief for the poor, is also part of social security implementation, including intergenerational redistribution of income. For the poor, the government must collect taxes from wealthier individuals, using these funds to secure a universal minimum living standard. Currently, in China, based on the simple dual structure of urban and agricultural areas, two dual structures have come into existence: the public sector (state enterprises and government organizations) and the non-public sector (sector in which the rate of participation in social security systems is low, including private/foreign affiliated

enterprises and privately managed firms) in urban area, and wealthy area/villages and poor area/villages in the agricultural areas. Both from the perspective of mutual aid and the formation of a more rounded civil society, these dual structures should be eliminated. In the future, attempts should be made to shift from the current systems that cover only those living in urban areas to universal insurance systems (demogrant systems) incorporating public funding and expansion of public aid.

(2) Promotion of mobilization of labor through social security refinements

Attempts for introducing and thoroughly implementing a market economy will fail without the mobilization and redistribution of labor. Enterprises must actively participate in social security systems to attract engineers and skilled workers who will lead future economic development. Inadequate social security will make it difficult to recruit high-quality human resources and impede industrial progress. Furthermore, the mobilization of labor should be promoted by permitting workers to retain pensions and medical security even when they move from company to company, and by broadening social security provisions to cover temporary workers and part-time workers (many of them come from farming villages).

(3) Establishment of social security systems suited to an aging society

The proportion of the elderly to the general population is increasing rapidly, particularly in urban areas, due to China's one-child policy. China is approaching the aging of its population not only with inadequate social security funds, but with a mix of circumstances peculiar to China – the large scale reform of state enterprises and the divisions in cities and farming villages described above. As the numbers of the elderly increase, the establishment of new pension plans and curbing of medical expenses for the aged will become increasingly pressing issues. However, the elderly should not be seen as weak or unwanted members of society. Rather, efforts should be made to provide them with appropriate benefits at appropriate cost, with the goal of providing diverse measures aimed at enriching the lives of the elderly.

(4) Unification of social insurance funds on the national level

A stronger financial base needs to be established to promote social security reforms. This will require eradicating regionalism and building a system of pooling insurance funds that transcends regions. The establishment of a national unified fund will make it possible to operate a more equable social security system. For stable management of insurance funds, efforts should be made to promote the idea of self-help with commercial insurance or provisions within families. The refinement of pension fund systems not only increases the total amount of pension funds, but also forms a powerful savings mechanism, leading to an increase in investment for economic development.

1.3 Basic Approach

1.3.1 Nature of Social Security Funding

With the increase in the numbers of those insured by social insurance and the trend toward an older population, China must significantly expand its funding base to ensure future social insurance benefits. How, then, should this funding be obtained? The basic methods for procuring funds include taxes, social insurance premiums, reserve investment, user payments, and public bond issues. The key is the method or combination of methods selected. Financial arrangements for social insurance are generally divided by fundraising methodology into: (1) Public funding arrangements (usually funded with taxes and object tax); (2) social insurance arrangements (primarily funded with social insurance premiums); and (3) user payments. The advantages and disadvantages of each arrangement are given below.

(1) Public funding

Advantage

•Since this system is funded with taxes, there are no problems involving non-payment or delayed payment.

Disadvantages

•Individual adjustment of payment by the insured is impossible.

•Easily effected by economic fluctuations, and income is prone to instability.

(2) Social insurance

Advantages

•Individual adjustment of payment by each insured party is comparatively easy.

•Not readily affected by economic fluctuations; high income stability as revenue source.

•Awareness of financial outlays by the insured works relatively easily and efficiency in social security benefits increases.

Disadvantages

•Individuals may fail to join social security systems, may fail to pay, or may fall behind in payments.

(3) User payments

Advantages

•Public payment (payment through taxes and social insurance premiums) is reduced.

•The arrangement curbs the demand for social security services and discourages abuse of services (given the tendency toward overuse of services that are provided free of charge), encouraging independence and self-reliance.

•Provides equitability between users and non-users.

Table 1 summarizes the differences, particularly between public funding and social insurance arrangements, including the advantages and disadvantages given above. The question of which financial arrangement to select must be considered separately for different systems and benefit purposes. But for general social security benefit classifications, based on the contents of Table 1, the options are as follows:

(1) Structure in which beneficiaries are poor and low-income workers (livelihood protection, etc.): Since this is coverage after the fact, for cases in which it is no longer possible to maintain a minimum standard of living, a public funding arrangement must be chosen from the viewpoint of the insurance principle.

(2) Structure in which beneficiaries are not limited to low-income workers, and where

benefits are more or less proportional to income (pension proportional to remuneration): Since payment by the insured must be made proportional to income, a social security arrangement that allows individual adjustment of payments should be selected.

(3) Structure in which benefits are virtually equal regardless of income (fixed basic pension and medical insurance): In cases where social insurance systems must be run perfectly, a social insurance arrangement should be selected for the sake of efficiency. However, given the probability of individuals failing to join, failing to pay, or falling behind in payments, a public funding arrangement may be more appropriate. Given the issues related to Chinese social security in particular, a public funding arrangement should probably be adopted on the introduction of the fixed basic pension system described below.

Table 1.Comparison between Public Funding and Social Insurance Arrangements

		Theoretical Aspect		Practical Aspect	
		Social Insurance System	Government Expense	Social Insurance System	Government Expense
System	1. Adaptation to the economic system	○	×	○	×
	2. Universality of the coverage	○	×	○	×
	3. Right to receive the payment	○	×	○	×
	4. Standard of the benefit	○	×	○	×
Sources of Funds	5. Easiness of fund raising	○	×	○	×
	6. Easiness of unified payment controll	×	○	×	○
	7. Stability in fund raising	—	—	○	
	8. Increment of the funds	—	—	×	○
	9. Fairness in contribution	—	—	—	—
	10. Taxation based on individual condition	—	—	—	—
	11. Simplification of procedure& administrative cost	×	○	×	○
	12. Influence on the economic growth and its efficiency	—	—	—	—
	13. Fairness in charging for the service	—	—	—	—
Service	14. Access to the service, selection of the service	○	×	○	×
	15. Promptness of the service	—	—	—	—
	16. Comprehensive provision of the service	—	—	○	×
	17. Quality of the service	—	—	○	×

Note:○ stands for Excellent、× for bad、— for neutral

Source: “Basic Issues on Modern Social Security and Social Welfare.”, Katsuhiro Hori , Mineruva Press, 1997

As explained above, user payments offer advantages and should be implemented, and the proportion of user payment increased, whenever possible. This arrangement can take various forms, including total payment, partial payment, fixed sum payment, fixed rate payment, affordable payment, and benefit-proportional payment. User payments should be implemented in various combinations of these options.

Stabilizing future funding requires adjustment and cooperation with similar social security systems within the private sector. However, with commercial insurance, which only covers the risks that comply with profit-making objectives, a minimum standard of living for all people cannot be secured. The government must be responsible for operating basic social security systems. As a rule, to the maximum extent possible, other areas should be left to self-reliance efforts and to the private sector.

1.3.2 Standard for Rate of National Burden

Public funding (taxes and social insurance premiums), funding for the national social security burden as a percentage of national income is certain to rise in China, too, due to social insurance systems for low-income workers and an aging population. Table 2 shows the ratio of public funding to national income in Japan, the United States, and Europe. Whereas the figures are 36.5% for Japan and 35.7% for the U.S., figures for European countries are some 46 ~ 70%. In China, the private payment portion, excluding taxes, is reported to be 17% of average wages.

A large increase in the national burden means reduced access to income, with the danger of reduced incentives to work. Moreover, as the percentage of income transferred through social security rises, unfair payments and benefits tend to expand (excessive benefits, overuse of social security services, etc.). Excessive increases in the rate of national burden should be avoided.

Table 2. International Comparison of Public Funding (taxes, social insurance premiums) as a Percentage of National Income

Country	Social Security Fund Raised/ National Income in 1993		
	Taxes	Employer and Employee Contribution	Total
Japan	24.4%	12.1%	36.5%
in 1997	23.5%	13.8%	37.3%
America	25.2%	10.6%	35.4%
Britain	36%	10.2%	46.2%
Germany	31.3%	24.9%	56.2%
France	33.3%	29.1%	62.6%
Sweden	50.5%	19.9%	70.4%

Source: “guide to social security year 2000 version”, Chuo Hoki Publishing

1.3.3 Refinement of Social Security for an Aging Society

As seen in the examples of Jiangsu Province and in the cities in Jiangsu Province in the next section, the ratio of the elderly to working population is increasing rapidly in China. Social security systems need to be refined to handle not only for aging demographics, but also for changes in the relationships of the elderly and families – that is, the trend toward nuclear families in urban areas. While the Elderly Rights and Interests Security Law enacted in 1996 will serve as a foundation, new systems must also take into account the following points.

(1) Creation of an environment to ensure work and employment opportunities for the elderly and to make effective use of skills developed over many years, as well as support for the elderly in securing income through their own efforts

(2) Support for the development of the minimal skills needed to deal with rapidly changing technologies (particularly IT-related) through lifelong education and training.

(3) Creation of an environment where quality services are provided by private businesses as part of the provision of comprehensive, efficient social security services intended to cover accurately the diverse needs of the elderly

(4) Achievement of reasonable medical expenses and intergenerational fairness through the establishment of medical insurance systems suited to an aging society

1.3.4 Improvements in Existing Social Insurance Systems

(1) Old-age insurance (public pension)

1) Establishment of basic pension

Many countries rely on a two-layered pension system, a system based on a basic pension that uses a social insurance arrangement and a levy arrangement funded with taxes, which acts as a safety net to ensure a minimum standard of living in old age. This is then supplemented by a pension proportional to income (See Figure 1)[1]. But in an increasing number of recent cases, out of consideration for intergenerational fairness, this second layer is being reformed to a pension based on a reserve arrangement for each generation to ensure that payment of insurance premiums and taxes is not continually raised as a result of the falling ratio of workers due to aging[2].

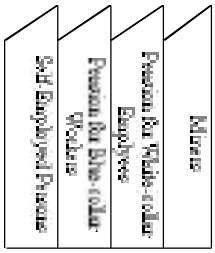
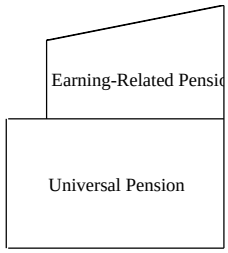
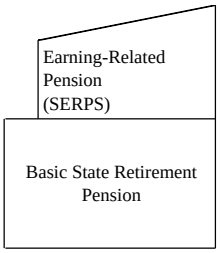
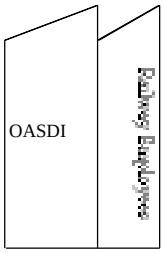
The current public pension in China has no basic pension portion that is applied equally to all, as in Japan or the United Kingdom. Only pension plans proportional to remuneration limited to formal employees of urban corporations (the majority of current participants are employees of state enterprises and the participation rate of employees of private and foreign affiliated enterprises is low) and employees of government organizations are in the process of being introduced and expanding participants. This process deserves recognition as the first phase of the introduction of social security system. The system can also be described as having a complex funding arrangement (discussed in detail in the next section) combining a levy arrangement based on a social insurance premium arrangement, and a reserve arrangement using a individual pension account system, and as being suited to actual

[1] Arrangement for appropriating income from social insurance premiums of the working generation for pension benefits of retired generations through intergenerational transfer. This permits adaptation to economic fluctuations such as price and wage rises, but with progressive aging, the percentage of the working generation declines, and the burden increases. Thus, this is an arrangement suited to cases in which the population growth rate is high in comparison to economic growth rates and interest rate levels.

[2] Arrangement in which pension funds saved by individuals of a generation during their working lives are divided and appropriated for pension benefits after retirement. Notwithstanding progressive aging, since pension costs are reserved, the burden upon the working generation does not increase. But this system is vulnerable to economic fluctuations, such as declining prices and interest rates. In cases of progressive aging and low population growth, a reserve arrangement is desirable from the viewpoint of intergenerational fairness.

conditions in China today.

Figure 1. Foreign Basic Structures of Old-Age Pension Systems

		Germany	Sweden	Britain	America
Program Structure					
Coverage	The Employed	*Compulsory for both Blue and White-Collar worker to enter pension systems respectively designed for them *Compulsory for miners to enter a special system	*Compulsory to enter Univeral Pension Program *Compulsory for those with an annual earning over 36,400 kronor to enter earning-related pension program	*Compulsory for those earning 66 pounds a week or more to both pension programs *People may contract out of SERPS (Scheme of Earning-Related Pension System) according to specified conditions	*Compulsory to enter OASDI *Compulsory for railway employees to enter the Railway Retirement Pension System
	The Self-Employed	*Compulsory for farmers to enter a special system *Compulsory for artists to enter either pension system designed for blue or white-collar workers *Free choice for others between blue and white-collar workers' pension systems	*Compulsory to enter Univeral Pension Program *Compulsory for those with an annual earning over 36,400 kronor to enter earning-related pension program	*Compulsory for those earning 3770 pounds annually or more to enter Basic retirement Pension Scheme	*Compulsory for those with an annual net income over 400 pounds to enter OASDI
	The Non-Employed (including housewives)	*Free choice between blue and white-collar workers' pension systems	*Compulsory to enter Univeral Pension Program	*Free choice to the Basic Pension Scheme or not	*Exclusion

Source: “guide to social security year 2000 version”, Chuo Hoki Publishing

However, in the future, systems will have to introduce the fixed payment basic pension part, covering primarily those living in urban areas (whether their family is registered in town or farming village).

In the case of this basic pension part, with a system separated by occupation such as private employees, public employees or the self-employed, pension funds become unstable, resulting in unfair benefits and payments, since the balance in the number of participants and beneficiaries collapses due to changes in employment or industrial

structures. Both to ensure the long-term stability of the pension system and to achieve fair benefits and payments, a unified system for all occupations needs to be established. Given current conditions in China, the recommended funding arrangement is public funding supplemented by a social insurance arrangement.

2) Fund management

The pooling and management of social security funds is currently undertaken in municipal-level units by the social security fund administration center of the municipal unit. The fact that the previous administration and management by each enterprise has been expanded to regional units with the aim of equalization of the burden deserves recognition. However, when the rate of participation in social security systems is low, the system is too small on a municipal level to be the primary insurance body, which implements insurance programs with sufficient distributed risk. Also, the establishment of a basic pension plan that covers all urban residents as described above and the establishment of a more efficient system to promote the mobilization of labor will also require unified funds administration and management by provinces (under the current system, the role of provincial fund administration centers is to collect adjustments from the administrative centers of each municipality and to redistribute to municipalities struggling to manage funds), as well as unified administration and management on a national level.

3) Cover for temporarily employed and low-income workers in urban areas

Temporary workers, day laborers, and even the unemployed should be given the option of voluntarily joining pension plans. A system should be established whereby participants who pay premiums sufficient to maintain future pension beneficiary rights can receive the corresponding pension security. A system should be established for low-income workers in urban areas where only those meeting certain conditions are exempt from paying the total amount or half the amount of insurance premiums through public funding (a reduction in the amount of pension benefits under the exemption system would be inevitable).

4) Pension payment conditions

Under the current system, a pension is paid on mandatory retirement to insured parties who have paid premiums for at least 15 years. Payment of pensions in developed countries generally starts from 60 ~ 65 years or persons who have paid insurance premiums for more than a certain period (30 ~ 40 years, in Japan people who have been participants for at least 25 years) are paid a pension. Compared with these examples of developed countries, the conditions for receiving benefits are basically lenient in China. A review of the conditions for receiving benefits is necessary for more stable fund financing.

Under existing old-age insurance for regular employees living in cities, reserves of individual pension accounts are currently paid by a unified payment method (monthly payments of 1/120th of reserve over ten years). Payment methods should be diversified. Especially for individual pension account funds, the introduction of the defined-contribution investment as an investment method should be considered.

(2) Medical insurance

1) The need for universal medical insurance

As with old-age pensions, medical insurance under the current system generally covers regular corporate employees and public employees living in cities. While medical insurance is also being introduced in farming villages with robust economies in agricultural areas, the rate of participation is still low, and such programs remain in the trial stages. Future medical insurance systems must cover migrant workers from farming villages and private businesses, as well as conventional farmers. The introduction of such a system will require fundraising through some form of social insurance. Due to broader coverage and higher proportions of low-income earners, stable insurance revenue for such systems is likely to be a problem.

For these reasons, such systems should be operated at public expense, insofar as this is possible, primarily through tax funding. This should not take the form of supplementing shortfalls in program funds with public funding, as with existing

medical insurance systems with the ratio of public funding sometimes changing. Rather, the ratio of public funding should be set in advance and social insurance premiums imposed according to ability to pay. For temporary workers and day laborers, a special medical insurance system should be established, financed by insurance premiums payable in daily installments and by public funding.

2) Review of user payment

Under the current system, basic medical services such as outpatient services are paid from individual medical insurance accounts. In cases where the cost of treatment exceeds certain levels due to hospitalization or other required care, benefits are paid from a medical insurance fund. The system incorporates the principle of user payment and deserves recognition for preventing excessive demand for medical services. However, the individual does not pay the entire amount of individual account funds. To curb escalating medical expenses and to achieve stable management of medical insurance funds, it may be advisable to consider the introduction of a system wherein individuals bear costs at a fixed ratio when using medical services, regardless of the seriousness of their condition.

3) Review of the medical insurance burden on the elderly

Apart from the privileged few such as retired management figures and old Red Army personnel, persons aged 45 and over in China (or in the case of Jiangsu Province) are exempt from paying 2% of their individual wages for medical insurance programs, even when employed. They are exempt from paying insurance premiums as individuals (This conclusion is based on interviews in Jiangsu Province). However, since the elderly require more costly medical services and treatment than workers, excessively preferential treatment of the elderly within an aging population will increase geriatric medical expenses and apply pressure on management of medical insurance funds. While a medical insurance system for the elderly does need to be maintained through the transfer of income from young generations, exemptions from payment of premiums during employment should be abolished.

(3) Unemployment insurance (employment insurance) - Closing reemployment centers

The role played by reemployment centers in receiving the large pool of temporary laid-off workers generated by state enterprise reforms and in reducing the burden on overstaffed state enterprises deserves recognition. However, the response to temporary laid-off workers using reemployment centers was just one part of the measures designed to prolong the life of state enterprises. In the future, in the interests of the sound management of unemployment insurance, enterprises must lay off workers only when lay-offs are made necessary by economic conditions. The system to use reemployment centers for protective measures of state enterprises by absorbing laid-off workers should be abolished. In other words, workers laid off under the previous system should be immediately treated as unemployed. Social security benefits for them should be kept at the same level as for the unemployed. Additionally, the current maximum period for unemployment insurance benefit of 2 years should gradually be revised and reduced according to future labor supply and demand.

1.4 Current Condition of Social Insurance in Regional Cities in Jiangsu Province

1.4.1 Existing Systems

Existing systems associated with social insurance are briefly outlined below.

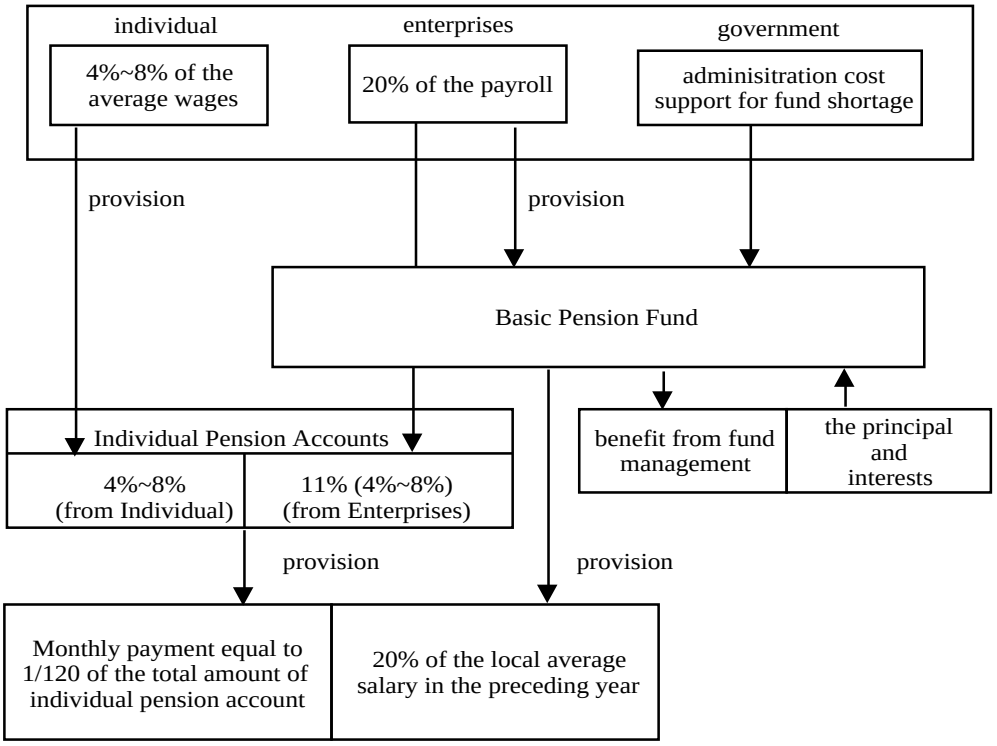
(1) Old age insurance (public pension)

As shown in Figure 2, the pension system being introduced in China's urban areas collects funds through payment by three parties: individuals, enterprises, and the state. Insurance premiums paid by individuals are 8% of average wages (final target value) and are deposited into individual pension accounts in a reserve arrangement. Enterprises pay 20% of the total wages paid to employees (maximum amount) into a pension fund. From the amount paid into the fund, 3% of the average wages for each employee (final target value) is apportioned to individual pension accounts. That is,

11% of each employee's average wage is paid into each individual pension account. The state pays any expenses involving administration and management of the fund, and makes up any shortfalls in funds.

Benefits of 20% of the average monthly wage of each individual during employment are paid from pension fund to participants who have paid premiums for at least 15 years. There are separate provisions for persons who have made contributions for less than 15 years. In addition, individuals are paid 1/120th of the reserve from their private pension account over 120 months (ten years). As a result, after ten years of benefits, benefits are paid only from the pension fund.

Figure 2. Schematic Diagram of Basic Pension System in China's Urban Areas



・pension is provided to people who paid contributions for 15 years and more
・pension payment beyond 120 months is provided only from basic pension fund

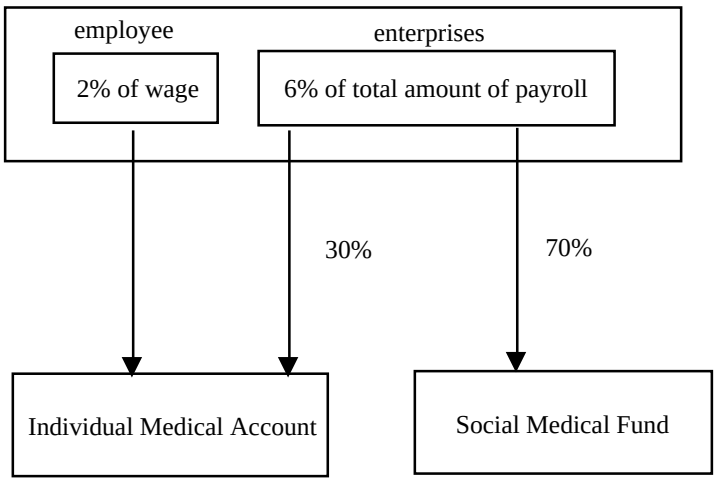
Source: Prepared by the study group, based on interviews at the Office of Labor and Social Security in Jiangsu Province

(2) Medical insurance

The cost of medical insurance is borne by enterprises and individuals, as shown in Figure 3. Employees deposit 2% of each individual's average wages into a private medical insurance account, while enterprises pay 6% of the total wages paid to employees, 70% of which is pooled in a medical insurance fund, with the remaining 30% paid into private medical insurance accounts (paid equally into the private account of each employee).

Currently in Jiangsu Province (unified nationally), medical insurance benefits are basically paid from private medical insurance accounts in the case of medical expenses involving minor illness – e.g., outpatient treatment (all at the patient's expense if there is no balance in private medical insurance account) – and in the case of severe illnesses costing more than a certain amount (approximately 10% of annual average wages), medical expenses are paid from the medical insurance fund, and partly by the patient. Benefits paid from the medical insurance fund are restricted to four times the annual average wage. Patients are supposed to pay treatment fee costing more than maximum amount, since such treatments fall under the aegis of private insurance.

Figure 3. Schematic Diagram of Medial Insurance System in China's Urban Areas



Source: Prepared by the study group, based on interviews at the Office of Labor and Social Security in Jiangsu Province

(3) Unemployment insurance (employment insurance)

This section explains the procedure according to which laid-off workers receive unemployment benefits. Workers laid off by state enterprises join a reemployment center, which pays a livelihood allowance to temporary laid-off workers for three years, and assumes responsibility for the social security payments due from the workers. Enterprises, the unemployment insurance fund (operated through payment of an amount equivalent to 2% of the total amount of wages paid by enterprises and 1% of average wage of employees), and the government budget each contribute one-third of the funding required by reemployment centers. This system reduces the burden upon state enterprises – which in the past have paid all social security expenses for retired employees – to one-third of the former amount.

Temporary laid-off workers unable to find reemployment in their three years as members at this reemployment center are considered unemployed and are covered by unemployment insurance. While the period of unemployment benefits varies according to the duration of payment into the unemployment insurance fund, the maximum duration is two years. A system securing a minimum living standard is established whereby an unemployed person officially residing in a town and whose period of entitlement to unemployment benefit has expired is paid an adequate allowance by the regional government of his or her town of residence to maintain a minimum standard of living.

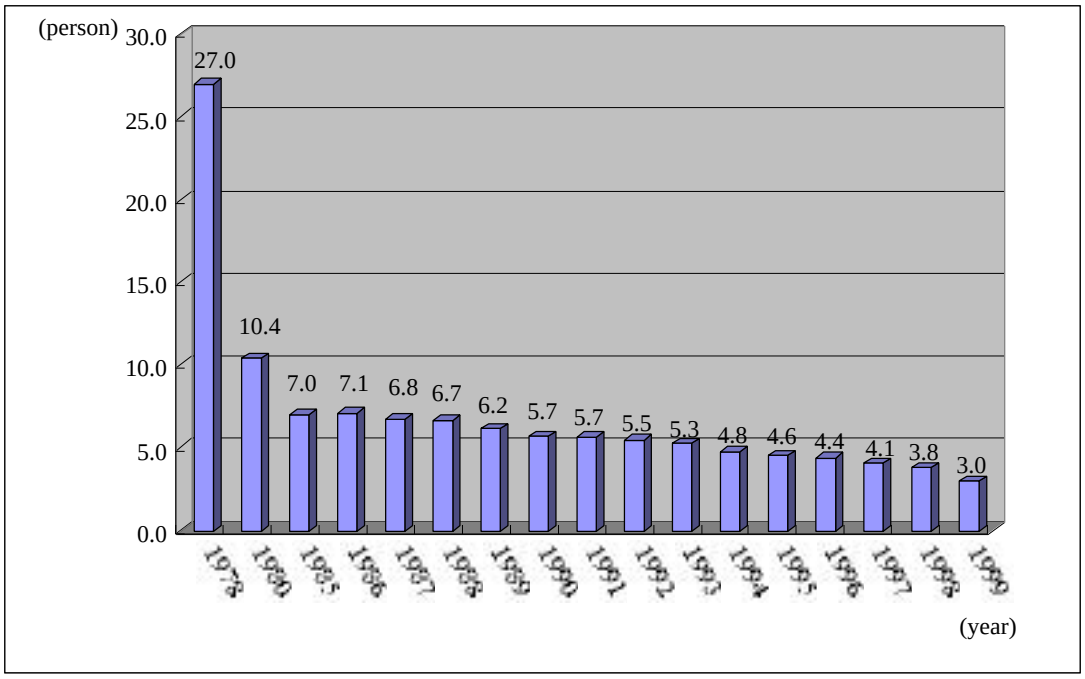
1.4.2 Current Condition of Aging

In Jiangsu Province, due to a combination of state enterprise reforms and an aging population, the number of retirees as a percentage of the population is increasing. As shown in Figure 4, the number of employed workers per retiree has fallen to a ratio of roughly 1 to 9 in the space of 20 years, from 27 in 1978 to three in 1999. The current total of retirement funds and pension payments due to mandatory retirees is growing, while the burden upon workers is rapidly increasing.

Figure 5 shows the number of workers per retiree in Changzhou, Zhengiang, and

Lianyungang. The municipalities with larger GDP have smaller ratio of workers to retirees. Although an analysis of three cities is of course inadequate to form definite conclusions, this trend appears more marked with higher economic levels or progress in urbanization.

Figure 4. Working Population Ratio to Retired Population in Jiangsu Province (enterprises' workers) (from 1987 to 1999)



Source: Jiangsu Statistical Yearbook, 1999, 2000

Table 3. Working Population Ratio to Retired Population in Changzhou, Zhenjiang and Lianyungang (Enterprises' Workers)

Municipality	Working Population	Retired Population	Working Population/Retired Population	GDP (100 million
Changzhou	497,243	162,751	3.1	538.7
Zhenjiang	362,963	104,409	3.5	416.5
Lianyungang	441,816	85,291	5.2	285.0

Note: Lianyungang's figure is that of 1998, others' are of 1999

Source: Changzhou Statistical Yearbook 2000, Zhenjiang Statistical Yearbook 2000, Statistical Yearbook of Lianyungang 1999

1.4.3 Issues Concerning Social Security

In Jiangsu Province, the most pressing issue involving social security is the low level of participation in social insurance systems. Table 4 indicates the level of participation in old-age insurance in Changzhou. Currently, 4,111 enterprises and 344,507 people have insured. However, since the total number of enterprises located in Changzhou is 19,963, the participation rate for all enterprises is 20.6%. According to accounts in Changzhou, since virtually 100% of state enterprises are participants of insurance systems, the participation rate for enterprises excluding state enterprises is 16.4% (= (1,717 + 1,396)/18,966 x 100), derived by taking the total number of enterprises that are not state owned as 18,965 (19,963 – 998).

Moreover, calculating the percentage of participants based on the total number of corporate employees in Changzhou (497,243) gives a high percentage of about 69%, due to the large number of employees of state enterprises. However, due to the number of migrant workers from farming villages and temporary workers who are not employed as regular employees, day laborers and part-time employees, this figure is thought to be quite small.

Table 4. Current Status of Basic Old-age Pension Insurance for Corporate Workers in Changzhou (1999)

	Number of Enterprises	Number of participants	Amount of pension paid (10,000 yuan)	(Retirement money)
State-owned Enterprises	998	150,355	42,474	(40,351)
Township Collective-owned Enterprises	1,717	103,909	28,867	(27,596)
Enterprises of Other Ownership	1,396	90,243	13,024	(12,336)
Overseas Investments	(417)	(32,627)	(1,607)	(1,520)
Township Private Enterprises	(275)	(5,729)	(37)	(35)
Total	4,111	344,507	84,365	(80,283)

Source: Changzhou Statistical Yearbook 2000

Table 5 shows the status of participation in old-age insurance programs in the municipal district areas of Changzhou. The participation rate of enterprises 53% (= 2,375/total number of enterprises in municipal district x 100) is higher compared to the city overall, but even so does not represent a high participation rate. Table 6 shows the number of those participating in farming community old age insurance (voluntary old-age insurance system covering farmers) in Changzhou – some 212,000 participants. Since the farming population of Changzhou is 1.306 million, the participation rate is 16% - extremely low – indicating that only limited numbers of farmers have joined to date.

Not only is the rate of participation in social insurance programs low at non-state enterprises, these enterprises employ many farm laborers (migrant workers whose families re-registered in farming villages) as temporary labor. Since the numbers of these farm laborers is increasing rapidly in urban regions, future coverage of their social security within a civil society is essential.

Table 5. Current Status of Basic Old-age Pension Insurance for Corporate Workers in Changzhou Municipal District Areas (1999)

	Number of Enterprises	Number of participants	Amount of pension paid (10,000 yuan)	(Retirement money)
State-owned Enterprises	443	96,620	34,311	(32,499)
Township Collective-owned Enterprises	866	44,609	15,147	(14,338)
Enterprises of Other Ownership	1,066	80,657	12,804	(12,114)
Overseas Investments	(353)	(27,913)	(1,552)	(1,471)
Township Private Enterprises	(172)	(2,350)	(3)	(2)
Total	2,375	221,886	62,262	(58,951)

Source: Changzhou Statistical Yearbook 2000

Table 6. Current Condition of Rural Old-age Pension Insurance in Changzhou (1999, Unit: 10,000 people)

	Whole City	Urban Areas
Total Member Covered by the Rural Pension System	**21.22**	**1.70**
Member Entering the Pension System in 1999	**1.81**	**0.20**

Source: Changzhou Statistical Yearbook 2000

A second issue to be addressed is the problem of late payment of social insurance premiums and non-payment. Although they participate in social insurance systems, many enterprises have fallen behind in payments or failed to make payments altogether, due to weak or absent legislation regarding the collection of social insurance premiums. Although provincial governments are establishing local ordinances and provisional regulations to make payment compulsory, they are unable to impose sanctions on enterprises that fail to pay, since the legal grounds are currently unclear. In the future, the legal validity of collecting social insurance premiums must be strengthened through legislation by the central government to prevent late and non-payments.

A third issue is the expansion of medical expenses. Tables 7, 8, and 9 show the social security expenditures of Changzhou, Zhengiang, and Lianyungang. Excluding assistance for laid-off workers (or severance pay) and retired employees (retirement funds), the percentage of medical and public health costs is high. Since medical costs are expected to increase with the progressive aging of the population, questions of curbing rising medical costs and securing necessary funds will become topics for discussion.

Table 7. Expenditure for Social Security in Changzhou (1999)

(Unit: 10,000 yuan)

Workers welfare costs	59,244.1
Welfare facilities/welfare allowances	14,346.1
Public relations costs	2,377.6
Medical and public health costs	33,063.1
Others	9,457.3
Unemployed, laid-off, retiree welfare costs	144,263.1
Severance pay	5,441.8
Retirement money	113,817.2
Retirement living expenses	1,938.6
Medical and public health costs	19,024.9
Others	4,040.6
Total	203,507.2

Source: Changzhou Statistical Yearbook 2000

Table 8. Expenditure for Social Security Expenditures in Zhengiang (1999)

(Unit: 10,000 yuan)

Workers welfare costs	12,762.2
Welfare facilities/welfare allowances	3,679.9
Public relations costs	1,097.5
Medical and public health costs	5,309.4
Others	2,675.4
Unemployed, laid-off, retiree welfare costs	86,315.2
Severance pay	6,404.2
Retirement money	72,784.4
Retirement living expenses	1,261.6
Medical and public health costs	2,783.1
Others	3,081.9
Total	99,077.4

Source: Zhenjiang Statistical Yearbook 2000

Table 9. Expenditure for Social Security Expenditures in Lianyungang (1998)

(Unit: 10,000 yuan)

Workers welfare costs	29,810
Welfare facilities/welfare allowances	12,401
Public relations costs	1,335
Medical and public health costs	12,542
Others	3,532
Unemployed, laid-off, retiree welfare costs	60,141
Severance pay	6,062
Retirement money	42,594
Retirement living expenses	716
Medical and public health costs	6,982
Others	3,787
Total	89,951

Source: Statistical Yearbook of Lianyungang 1999

1.5 Recommendations for Jiangsu Province

As previously explained, the State Council makes all policy decisions in China involving social security systems. Since the scope of policy decisions that provincial governments have the power to implement is limited, this section briefly outlines recommended future directions for policies that can be implemented by provincial governments.

(1) Administration and management of social insurance pensions at the provincial level

In Jiangsu Province, social insurance funds are currently administered and managed on a city level. However, since city level in rural areas offers a scale too small for implementing insurance programs with sufficient distributed risk, unified fund administration and management on a broad provincial level must be implemented.

(2) Refinement of policies for an aging society

Since a high percentage of the elderly in urban regions in Jiangsu Province are retired employees of state enterprises before reform, certain levels of social security benefits are currently being administered, and quality of life is not poor. However, given future increases in the numbers of elderly retiring after state enterprise reforms and the increasing trend toward nuclear families with progressive urbanization, family support alone will likely be inadequate to provide elderly care. While it remains important to implement measures to protect individuals from conditions that would require care, it is also necessary to upgrade care facilities and systems.

(3) Conferral of medical insurance on temporary laborers, day laborers, and the unemployed

For temporary laborers and day laborers, a special medical insurance system needs to be established through insurance premiums paid on a daily basis and regional funding. For the unemployed, a medical insurance system that provides exemptions from premiums for limited periods needs to be established.

(4) Transfer of social insurance

The social insurance rights of employees at both state and non-state enterprises that have joined social insurance systems should be mutually recognized by different social insurance participant enterprises. However, future demands will require the establishment of a system that allows the smooth and reliable transfer of social insurance rights and efforts, as well as increased participation in social insurance programs by enterprises.

Chapter 2 Housing Reform: Guaranteeing an Urban Living Space

The last few decades of China's housing system reform, together with rapid macro-economic expansion and the development of the property market, has seen the adoption of market principles promoted in such areas as production, circulation and consumption in the housing industry. The industry has already become a new area of growth in the national economy, residents themselves becoming keen investors and buyers. The system of investing in housing construction has gradually been transformed: a property investment body composed of State, collective and individual is now successfully in operation, while the sources of housing construction funds and the diversification in housing investment have basically been established. The system of housing distribution is also slowly changing with the purchasing of property by individuals becoming the mainstay of housing consumption; the unified allocation of housing resources by the State or work unit is now distribution of housing on a commercial basis. In housing management structures, traditional mechanisms of management are being more specialized, socialized and market orientated. Further reforms of the housing system and the implementation of supporting government policy will lead to a more lively housing market, a higher overall quality of residential construction and commercialization of housing, which will substantially raise the quality of life for urban residents.

2.1 Policy Recommendations

The China's urban housing system reforms already have a history of 20 years, but despite the achievements, great reform is still needed in the overall control and regulation of housing, property development, market circulation, financial support and service management.

(1) Policy for the General Regulation and Control of Housing

Under the conditions in which a market economy operates, the important role of

the government is to draw up policies for overall regulation and control, in line with the conditions produced by the market, and the extent of development of those conditions. These policies cover the following areas: tax revenue, the general regulation and control of land, interest rates, examination of business credentials and ensuring project quality. Housing development in China has already begun to transform from the original method of direct management through government administrative control to indirect management, which relies on taxation, finance, the law, development planning, the available land as well as government policies on industry. Despite this, the policies of general regulation and control of the above mentioned areas are either far from complete or on the other hand have already been drawn up, but face different problems: management is inefficient, and it requires the serious strengthening of implementation, further use of scientific methods, better market analysis and forecasts, establishment of a decision-making mechanism that is scientific, and a raise in the standard of policy making and management.

(2) Policy on the Development and Provision of Housing

After the resolution of the basic problems in the sale of State-owned housing, China should devote more energy to developing the housing market. It should set up and perfect a system to provide economical multi-storied housing, and different housing policies to suit families with different incomes. Of housing provided, the proportion, which is commercial housing, economical housing and low rent housing is decided rationally according to the residents' ability to pay and the structure of the demand in different regions. The policy for provision of housing, tax policy and management methods should all be systematized. To whom economically appropriate housing is offered and the standard by which it is to be sold should be clearly defined; low rent housing should establish a reliable source of properties and funds. A complete system of application, examination and approval, and moving out as well as a system for the lowest income residents of application, verification, and appropriation of house rent subsidies will be set up. The constituent parts of commercial residential housing costs should be gradually normalized and the

residences overall quality should satisfy the residents' requirements for living. Looking at the present state of the housing market, what is urgently needed is a policy, which defines the levels of income that makes people eligible for commercial residential housing and economically appropriate housing. Also vital is policy concerned with house design and the partition of living space, as well as underscoring the different treatment in policy of property construction and development as opposed to circulation and consumption. Development of economically appropriate housing should be defined by government policy, it should not have unrestricted sale, and there should be a limit on profit. At the same time, the housing market should be shaken up through the issuing of subsidies and setting reasonable house prices so that the workers actually have the ability to buy property. Another method is large increases in rent to encourage workers to buy housing. Beneficial conditions should be created to further reform.

(3) Policy on Housing Property Rights and Trading

Because China's constitution only permits the right to use land for commercial reasons, and land used for different types of housing (be it commercial residential housing or economically appropriate housing) is dealt with differently and has a vast difference in value, the problems facing the adoption of market principles in China's urban housing are not inconsiderable.

Currently, some cities adopt the method of putting on the market land originally classified for residential use. The price is determined by the classification of standard land price for the city that the piece of land falls under, supplemented by the price of the land-use right, this is also known as the land revenue. Other cities are looking into operating by dividing the housing market into two markets. One market is of houses which have obtained the transference of land-use rights for 70 years which will be dealt with independently, aimed in the main at top-income earners; after the land-use rights have expired, the property owner makes an after-payment on the land price. The other market is to use residential land, which has had the land-right transferred for free for economically appropriate housing and

State-owned housing that has been sold off. The price of the land and the building are separated, the government entrusting a real estate agency to collect land rent from the occupier. The land rent is paid on a monthly basis at a rate that the resident can support. The transaction in residential property rights is only an alteration of housing property rights, while land use rights remain unchanged – residents who purchase their own homes are responsible for land rent. The Chinese government should take account of these practices and experiences as soon as possible, and carry out effective guidance, regulation and control of housing trade and circulation.

At the same time as further standardization of the housing trading market, China is also developing a housing lease market, transactions being made through such methods as mortgages and pledges. The management system of market transactions is being further strengthened and reformed, stressing the development of the duties and range of services in the housing trade.

(4) Housing Financial Policy

In the future, the direction of China's housing financial policy reforms will be decided by the relatively well-established channels of raising housing funds, as well as the diverse range of tools available for housing finance. A series of different loans suitable for borrowers of different ages and with different incomes who have a variety of needs will be provided. Through constantly pushing forward new ideas in the housing financial system, and establishing both loan risk and an insurance and guarantee system of borrower responsibility for the housing loan. An individual housing loans market should be actively nurtured, further raising the share of housing credit in overall financial assets. According to the specific situation of each area, the housing accumulation fund system should be continuously improved, and the establishment of government policy on housing finance in areas such as loan interest and government guarantees established. A housing finance system suitable for China, in which commercial and governmental housing finance coexist, should be created.

(5) Housing Services and Management Policy

Structures that are absolutely necessary to the development of the housing industry, such as housing appraisal bodies, real estate agencies, legal advice offices and real estate management services, although for the most part already exist in China, are still extremely lacking in the corresponding government standards. The many contradictions and problems will require the establishment of a suitable housing services and management system, based mainly around a diverse range of property rights. But what is presently needed is the thorough dissemination and standardization of real estate management practices. More value needs to be placed on ensuring the benefits of those who hold the property rights, and expand the system of the owners' committees so that it becomes commonplace. We also need to accelerate the steps of altering the housing management structure, housing management which originally was handled by each work unit (*danwei*), now needs to be fundamentally shifted over to real estate management which is socialized, specialized and based on market economy principles.

2.2 The Course of China's Urban Housing System Reforms

China's housing system was traditionally a welfare system characterized by State monopoly, free allocation of housing, low rent, and unlimited period of occupancy. This kind of system is unable to effectively satisfy the housing requirements of urban residents, and does not fit in with the objective needs of a socialist market economy. The practise of low rent has meant that even the cost of housing upkeep cannot be recovered. Not only can the State not recover the great amount of funding it invested into housing construction, moreover a huge sum for subsidies is also required. Thus, there must be a total reform of the traditional housing system, a transformation of the mechanisms, so that commercialisation and socialization of housing can be realized.

China's urban housing system reforms have gone through approximately five steps in the last 20 years.

(1) Experimental Sale of Housing: 1979-1985

In 1978 Deng Xiaoping raised the issue of housing reform, and in June 1980 the Central Committee of the Communist Party of China and the State Council officially endorsed "The Outline Report of the National Capital Construction Working Conference", and put into effect government policy for the commercialization of housing. The key part of government policy during this period of housing reform was the experimental sale of property, and can be divided into two types: subsidized and non-subsidized sale of housing.

In 1979, the government allocated funds to four cities, Xi'an, Liuzhou, Wuzhou and Nanning, for the construction of housing available for private purchase. By the end of the same year each province and autonomous prefecture one after another selected areas in which to experiment with property sales. Due to the less than ideal results of non-subsidized housing, it was quickly replaced by the subsidized sales.

In 1982, the State approved Zhengzhou, Shashi, Changzhou and Siping as experimental areas for the subsidized sale of newly constructed housing. Individual purchasers were only required to pay one third the cost of the property, the other two thirds being subsidized by local government and the purchasers work unit. But this type of method created an overly large burden on businesses and local governments, consequently meeting with fierce opposition it was cancelled in 1985, being viewed as just selling off low-priced housing.

(2) Subsidies and Rent: 1986 – 1990

The main policy on rent and subsidies was to make sensible adjustments to the rent of State-owned housing according to housing depreciation, upkeep, management fees, the profit from investment and property tax. At the same time a specified amount of housing certificates were granted according to the level of adjusted rent in order to offset new increases in rent. Housing certificates were issued according to a fixed proportion of the individual's salary, so that rent was paid on a greater number of houses, but fewer houses were actually profitable - this changed the

former allocation method, which had worked on a system of classifications. Three grades of housing funds were established, for urban areas, enterprise work units and individuals. The sale of State-owned housing was actively organized, at the same time as reforms in public finance, banking and credit.

In 1986 Yantai, Changzhou, Bengbu and Tangshang were confirmed as experiment areas, and by the beginning of 1988 the State Council, following the first National Housing Reforms Working Conference, printed and distributed the "Policies and Measures on the National Urban Reform of the Housing System By Stages and In Groups". It was at this time that the traditional welfare housing system felt a substantial blow from the reforms, signifying that housing system reforms had entered a stage of comprehensive experimentation and had affected overall policy design. Unfortunately due to the currency inflation that began in 1988, this policy was prematurely abandoned before it had a chance to be comprehensively implemented.

(3) Using Sales to Replace Rent: 1991-1993

In June 1991, the State Council issued the "Notice on the Continued Active and Unswerving Implementation of Urban Housing System Reforms" which explicitly defined the fundamental aims of housing reforms, reiterating the government policies concerned and putting forward the theory of partial property rights. It also required the implementation of new policy regarding newly constructed housing, and emphasized the importance of a unified national policy.

During November of the same year, the State Council also published the "Suggestions on Comprehensive Urban Housing System Reforms", this was a key document in the history of the reforms, stating categorically the guiding philosophy and fundamental aims, describing the stages that need to be reached to attain these aims. It put forward four fundamental principles and stipulated 12 main government policies of reform, demanding they be implemented on a national scale from 1992. This signified China's housing reforms had already passed from a stage of exploration and experimentation into a new period of national comprehensive

implementation.

(4) The Stage of Comprehensive Implementation: 1994 – June 1998

In July 1994 the "State Council Resolution on Further Reforms of the Urban Housing System" was issued and implemented, it indicated that the fundamental aim of housing reform was the establishment of a new urban housing system which fit with a socialist market economy, in order to realize the commercialisation and socialization of housing; and that the construction of housing should be accelerated to improve the conditions of citizens.

The basic implication of the reform was: 1) to reform the construction, availability, allocation and management system of housing; in other words that housing construction would be changed from a system in which the State and work unit had full control to a system of rational responsibility shouldered by both the State, the work unit and the individual; to change from a system where each work unit is responsible for the construction, allocation, upkeep, and management of housing to a system in which operations are socialized and specialized; to transform the method of housing allocation by welfare to a method of allocation according to monetary wages (based mainly on distribution according to work); establish an economically appropriate housing availability system with social guarantees aimed at low and middle income families, and a commercial housing availability system aimed at high income families. 2) set up a housing accumulation fund system. 3) Develop housing finance and housing insurance, establishing a housing credit system in which commercialism and government policy coexist. 4) Established a standardized market for real estate transactions and develop a market for socialized property upkeep and management.

(5) Monetization of Housing Distribution: July 1998 to Present

On the 3rd of July 1998, the State Council released the "Notice on the Further Reforms of the Urban Housing System and Acceleration of Housing Construction", which stated clearly that the aims of reform were to stop housing allocation in kind,

and to phase in monetized housing allocation; to set up and perfect a system of providing multi-level economical urban housing, develop housing finance, and cultivate and standardize a housing trading market.

2.3 Achievements of China's Residential Policy Reform

China's urban residential policy, through the more than 20 years of active experimentation described above, has implemented a series of major breakthroughs which had the expected great contribution on maintaining the sustained rapid development of China's housing construction. For the foreseeable future the implementation of China's urbanization strategy has constructed a firm foundation. In the last 20 years, especially in the last 5, the main achievements of China's housing policy have been embodied in:

(1) A Fundamental Change in the Low rent, Welfare Style System Used by State-Owned Housing. China's urban residents concept of housing has undergone a great transformation.

Since 1994, every area of China has been actively pushing forward the reform of State-owned housing rent, steadily selling off State-owned property. The level of rent in public housing which was a few fen in the early 90s and around 0.6 yuan per square meter in 1995 has now risen to the present level of 2.0 Yuan; around 80% of saleable State-owned property has already been sold off to the public, this is a fundamental change in the low rent, welfare style system used by State-owned housing for the last 40 years. The old housing is now pretty much nonexistent. Following the advance in housing reform, the concepts of "ownership empowerment" and the idea that property is inflation proof and increases in value has taken hold. The fervor of housing investment and consumption has been fully awakened, and an important change is taking place in peoples` perception of residency.

(2) A Historical Breakthrough Achieved in the Reform of the Housing Allocation System

After 1998, allocation of housing in kind no longer existed on a nation wide scale, and the policy of monetized housing allocation in the vast majority of cities and counties is progressively being implemented. Thus reform has achieved a historical breakthrough which has long been a difficulty in the reform of the housing allocation system. The furthering of reform will thoroughly break the foundation upon which the old system grew, promoting rapid development in areas such as availability, finance and intermediary service. This has caused a strategic shift in implementing the key points of housing reform, as it enters a new stage of establishing universally the new system of urban housing after destroying the old.

(3) Accelerating the Process of Adopting Market Principles in Housing, and the Profound Changes Which Have Occurred in the Mechanism Operating Urban Housing Construction

Since 1995, the proportion of individuals purchasing commercial residential buildings has seen a great increase. From January to November 2000, the area of commercial residential buildings sold to individual purchasers was 89.23%, 36% higher than 1995's 53%. In Guangxi, Hainan, Hunan and Jiangsu provinces and Chongqing, Jilin and Tianjin municipal areas the proportion of individual purchasers exceeded 95%. Following the huge increase in the number of residents owning their own houses, an urban housing property rights organization was initially formed, based mainly on the property rights of individuals. In establishing a foundation for property rights to develop the stock market, the majority of areas in China have already developed a secondary market for housing.

(4) The Great Readjustment Which Occurred in Housing Credit Structures, and the Rapid Development in the Housing Financial Business

The main part of housing consumption transformation is that it has brought about the increase of individual housing loans and regulated housing credit structures.

Since 1995, individual housing loans at the Commercial Bank of China have doubled every year; in 1999, the banks new increase in individual housing loans has already exceeded property development loans. At the same time, individual housing accumulation fund loans have also had a reasonably rapid development. According to statistics from the first three quarters of 2000, China's new increase in individual housing accumulation fund loans is 17.9 billion yuan, equivalent to an increase of 52% on the previous year; the balance of individual housing loans is 44.4 billion yuan, accounting for 26.6% of the accumulation fund balance, and 66.4% of the balance of the accumulation fund loan.

(5) The Sustained Speed of Development in Urban Housing Construction

From 1995 to 1999, the area of land on which housing construction was completed annually in China increased from 375 million square meters to 559 million square meters, an average of 459 million square meters per year.

(6) The Basic Establishment of the Position in China's National Economy of the Housing Construction Industry

In 1999, China's housing industry increased in value to a proportion of close to 4% of GDP, surpassing important industries such as iron and steel, energy, the chemical industry, electronics, automobiles and textiles. Housing construction in China has already become a growth point in the national economy. The impact and position of the industry in the national economy is becoming greater every day. Particularly in recent years, it has played an important role in the Chinese government's strategy of encouraging residents' housing consumption and expanding the domestic property demand.

2.4 Existing Problems in China's Housing Policy

From the above we can see that although the reform of China's government policy on housing has had definite achievements, looking at the overall picture it has not followed a totally ideal course. Although the fundamental philosophy behind

the reform is correct, many problems still exist, mainly manifesting themselves in the following:

(1) Valuing Planar Development over Vertical Development in Urban Construction

Present development of urban land lays particular stress on development upwards above ground and neglects the use of space under ground. Development concentrates on expanding outward into new development zones, rather than altering the area within the existing city. Stress is placed on the present cost of land development, ignoring the long-term economic and social benefits brought by upward spatial development of the land of the inner city. Low-level solitary detached buildings are favored over many storied edifices, which are multiple-use.

(2) Additional Areas Needing Reform Which Lag behind, Holding back Housing Consumption

1) Insufficient financial support of housing consumption

China's finance mainly provides support for the development of housing commercially. Despite the rapid expansion of housing consumption credits in the last two or three years, many problems still exist when looking at the current situation of the mortgage business.

2) The intermediary service industry for housing have a low level of training, are small scale and lag behind in the reform of the system.

3) Real estate management service is low level, its development lags behind other areas, and criticism from house buyers is unavoidable.

(3) The Market System Is Unsound, Property Circulation Faces Difficulties

At present the building of a housing market system in China is seriously lagging behind, and this has much to do with laws and regulations, which have not yet been established or are incomplete. The secondary market in particular has not yet been fully developed, which means that there is no way in which buildings can circulate freely. According to government policy, it is only after a comparatively long time

that most of China's urban residents who purchased public housing after the housing reforms can put their house on the market. This seriously restricts the development of the housing market.

2.5 Government Policy and the Situation of Urban Housing Construction in Jiangsu Province and the Sunan Region

(1) The Process of Urban Housing Reform in Jiangsu Province

Reform of the State-owned housing system in the urban areas of Jiangsu Province can be divided into the following three stages:

1) Period of Exploration: 1982 – 1991

In 1982, Changzhou city was one of the first four cities in China to experiment with subsidized selling off State-owned housing. This mainly consisted of "the permitted subsidized selling to individuals of new housing invested in by the government or work unit". Since its beginning in 1985, Jiangsu province has already implemented the policy of reform of housing rent in cities such as Zhenjiang and Changzhou, in accordance with the work of experimental housing reforms arranged by the State Council. At the core of this is the policy to change hidden subsidies to open subsidies.

2) First Steps of Implementation: 1991-1995

From 1991 to 1995, Jiangsu province began to implement the following, drawn up by the provincial government: "Suggestions on the Implementation of Reforms on the Urban Housing System in Jiangsu Province", and "Suggestions on the Implementation of Reforms on the Urban Housing System in Jiangsu Province, Counties (Municipalities)". It carried out the multiple stages of reforms in State-owned housing in rents and the corresponding issue of housing supplements. It also devised the principles and regulations in the scope, object, price, payment methods and methods of preferential taxation for the sale of State owned housing.

3) Further Development: 1995 to Present

In 1995, the provincial government issued "The Policy on Furthering the

Reforms of the Urban Housing System", symbolizing that the housing reforms of Jiangsu province had gone one step further. This document stipulated that each city and county should carry out reforms of rent according to local conditions, with the choice of either rent being made up by various elements or alternatively the payment of rent being a fixed proportion of family income. At the same time, specific regulations set the scope, principles and purchasing price categories of State-owned housing. The housing accumulation fund system was widely promoted, and the work of selling State-owned housing in Jiangsu province was pushed onto a normal track.

(2) Government Policy and the Situation of Urban Housing Construction in the Su'nan Area

In the 1980s, the town industry of the Su'nan area was a rising new force which suddenly came to the fore, becoming known as the nationally famous Su'nan model. This gave much vitality to the development of small cities and towns of Su'nan, greatly pushing forward the urbanization of the rural areas and integrating the cities and towns. Housing of the small town and countryside were constantly improved, following the rise in their income levels. The residents underwent the great transformation from the brick and tile houses of the early stages of the 1980s economic reforms to building two and three story houses, and from the building of houses on residential land made over by the rural collective to buying commercial urban residential housing. Jiangyin city and Xishan city in Jiangsu province underwent a similar experience.

Throughout the 80s, the housing of farmers and the majority of small town residents were all built on residential land which made over gratis by the collective of the village or town, some of the farmers still building houses on their own arable land. Due to a lack of planning, despite the improvement in housing structures as new houses were built, there were no corresponding public facilities and the problem of dirt and disorder existed throughout. In addition, the building of factories on arable land swallowed up a huge area, an enormous waste of land resources.

In 1996, Xishan city drew up and implemented the “Management Methods for Land Used for Residential Construction”. This created a legal framework for management and set specified limits in the construction of housing and the land used for such construction.

“Management Methods for Land Used for Residential Construction” had altogether 41 articles, the third article stipulated that the land used for construction of housing must conform to the village or small town’s overall plan for construction, the overall plan for land use and the annual plan for land used for construction. The forth article stated that residential construction must persist in following the principle of using land in a ‘legal, economical, and rational’ way, fully utilizing existing land permitted for residential use and vacant land. When arable land is utilized, the land management office must strictly control the utilization based on the quota of arable land that can be occupied (as decreed by the local municipal authority). The fifth article stipulated that the land used to construct a house owned by a citizen must obtain the land use right from the administrative method of transferring property rights. Land used for commercial housing without exception must pay for this transfer.

“Management Methods for Land Used for Residential Construction” also stipulates that if rural and urban residents conform to one of the following conditions, then application for residential land use can be made for any land within their *hukou* (area in which the citizen is registered as a permanent resident): (i.) the resident has non-residential land or land which originally had residential use which has an area less than that the standard (as stated in the “Management Methods”); (ii.) it is land which has been approved for settling by retired cadres, staff, workers, military; Hong Kong, Macau and Taiwan compatriots; Overseas Chinese; or descendants or relatives of overseas Chinese returning to their home village.

Rented housing, residences which are used for business or enterprises, or land originally allocated for residential purposes which has been resold or made over, and thus does not conform to the conditions under which land to be transferred for use as residential can apply, cannot apply to be land used for housing construction.

Residents are only permitted to apply for land to be used to construct housing on one piece of land. Those that conform to the conditions for transferring land-use right on the area which they can construct housing must first legally deal with the property or residential land that they originally owned before applying. Those who conform to the conditions of transferred land-use can purchase property on land made over for residential use. Those dealing in housing must legally register the change in land and property.

Rural residents not within the planning area of a market town cannot apply for the alteration of land-use to residential construction within that market town planning area.

All residents who violate the "Jiangsu Province Family Planning Regulations" who have not yet received the administrative penalty are not permitted to construct housing. Children born outside the family planning regulations cannot increase the land-use by transfer into residence.

The standard for land used for construction of residences by rural residents (including newly built houses and land originally used to build houses, courtyards, as well as the surplus land in the space in front of and behind the building) is determined according to the per capita area of arable land in each town, using the household as the work unit:

(i.) In towns in which the per capita area of arable land is less than one *mu*, the residential land cannot exceed 133 square meters.

(ii.) In towns in which the per capita area of arable land is more than one *mu*, the residential land cannot exceed 166 square meters.

(iii.) The area of residential land occupied by housing or attached buildings cannot exceed 70%.

Private plots of land, land for animal feed and other land cannot be deducted from the area of residential land.

Urban residents who build housing within the planning area of market towns, (besides building on residential land which according to the prescribed standards falls within the permitted limits) should be mainly composed of purchased

commercial residential housing. But if necessary, then the transfer of land-use rights on State-owned land can be applied for, the relevant fee be paid according to regulations, the housing or building constructed by the urban resident not exceeding an area of 65 square meters per household.

Rural residents applying to use land for residential purposes can count one son as a household, or one daughter as a household if there is no son. Children must be 16 years or older before they are eligible to apply for land to be used as a residence. Parents who live with their children cannot arrange for land to be used for residential purposes.

Residents of residential land approved for use (including residential land approved for at some time in the past) only have the right of use, they are not permitted to buy, sell, rent or transfer this right without authorization.

Concerning the procedures for the application, examination and approval of building construction, "Management Methods for Land Used for Residential Construction" stipulates that: the town land management office after appraisal will confirm the conditions which must be met for building construction, and complete the procedures. The office will record the area of land to be used, the location as well as whether or not old buildings on the site should be demolished. Those rebuilding or constructing houses on non- arable land report to the town peoples government for approval. A permit for the land to be used for the construction of housing is issued to the resident. Rural residents occupying land used for arable farming (including private farmland and other land for agricultural use) and urban residents applying to build a house, first must have their application examined, verified, and agreed to by the town people's government, then report to the city land management department for examination and approval and pay each land-use fee. The applicant will then be issued with a permit to use the land to construct housing.

After households have obtained the permit to use the land to construct housing for the resident, they should apply to the town or village office for the permit for a construction project.

Households building a house can only begin construction after the township

(town) or village construction office and land management office have sent someone to survey the area.

Households building a house, after the building is complete, should apply for the township (town) or village construction office and land management office to check and examine the building before approval. If the building conforms to the demands of planning and is within the area of land approved for use, a residential land-use certificate will be issued.

At the same time as controlling the building of housing by urban and rural residents by strictly adhering to regulations, Jiangyin City and Xishan City as well as each small urban area will organize real estate development companies, and begin the transaction of the real estate business.

The Xishan city "Management Methods for Land Used for Residential Construction" stipulate that real estate development companies developing commercial residential housing must make over land-use rights according to the "Provisional Methods of Transferring and Assigning Use of State-Owned Land in Wuxi County".

The transfer of sections of land for use for commercial residential housing is limited to within the boundary of the town or village residential planning area, and is mainly for the building of multi-storey apartment block style housing. The longest period of time for transfer of land for use for commercial residential housing is limited to 70 years.

The assignment of land-use rights for commercial residential housing through the method of transfer must sign the assignment agreement, and according to the law conduct the registering of the alteration of land-use rights. The right and obligations of the transfer agreement are thus transferred. Rental and mortgage land-use rights should sign separate contracts and agreements, registration of rent and mortgage, and certificates of rental and mortgage are conducted by the municipal land management bureau, the lawful rights and interests of which are protected by State law. When the transferred land use right for commercial residential housing has expired, with the exception of land which needs to be recovered for the common

good of society, renewal is normally permitted, and the transfer of land-use rights contract can be re-signed.

Dangkou town in Xishan city issued several regulations concerning the strengthening of management of residents housing within the boundary of the town. It stipulated that besides the rebuilding of housing for the elderly as permitted by the department in charge of planning, that the construction of housing for residents could not be re-approved for building. The source of urban residential housing should normally be mainly commercial residential property for purchase, at the same time the obtaining of land use rights for building through auction or bidding at the secondary market is also permitted.

Xinqiao town in Jiangyin city is now drawing up a new plan for transfer of rural residents into the town. It is planned that within the next two years all of the rural residents will move into the town, and turn the land occupied by the village into arable land. Thus, the drafting of a new rural housing policy, forbidding rural residents from building new houses on land permitted for residential use, has encouraged those in rural areas to buy commercial housing in urban areas. The town government granted a fixed subsidy. The housing policy for the rural population and residents of small cities and towns in Jiangsu Province is going through a process of change, by establishing a central village, moving the rural population into the towns, and establishing a central town, some of the residents have had to move many times. This new process of transformation, encouraging the rural populace to settle in urban areas and purchase apartment style commercial housing built by real estate companies, is increasing the urban population and raising the level of urbanization.

2.6 Recommendations for Jiangsu Province

(1) Continue to carry out the housing subsidy fund, make a concerted effort to push forward the monetization of housing allocation: 1) Adopt strong measures, capital which was previously used by public finance and work units to buy and repair

houses should be transferred to housing subsidies as soon as possible. 2) Clear up the recovery of funds from selling off State-owned housing. After leaving enough funding for the upkeep of areas shared by housing, facilities and equipment, and transferring fund to the housing management office, the remaining funds should be concentrated for use in issuing housing subsidies in the years to come.

(2) Accelerate the construction of the low rent housing system. If low rent housing is unsuitable to be a part of construction, this can be solved through subsidized rent and encouraging the fit the conditions to be put on the market as leased housing. Also the money for housing resources can be raised through government and work units purchasing old houses, or accepting social donations.

(3) Invigorate the stock transactions on the housing market. Simplify the procedure as much as possible so that it is easier to get into the market. Cities that have not fixed the standard land value can determine this according to a set defined proportion or other suitable method in order to conclude transactions and collect the transfer fee. At the same time, the critical adjustment of government policy of tax revenue on house rent should be used to push forward a guiding tax system, standardize the basic figure of rent tax revenue, and instigate a housing lease market, and then bring the full impact of this market to bear on consumption and investment.

(4) Altering the Function of Government, Building a Fair Competitive Market Environment. Should further accelerate the promotion of strategic readjustment of real estate agencies, and form intermediary service mechanisms and systems adapted to the development of the real estate market.

(5) Strengthen research into the issue of standardizing real estate policies. Following the successful bilateral trade negotiations between China and other nations, the entry of China into the WTO is only a matter of time. In provincial areas with a high degree of economic reform such as Jiangsu, the real estate business in respect to business development, admittance into the market, housing quality and the standardization of building materials should conform to international practice.

Section 4 Maintaining Sustainable Development

Chapter 1 Water Resources Management

1.1 Policy recommendation

1.1.1 Policy recommendation

(1) Bureau of Water Affairs

It is necessary to set up a management system of water affairs in order to effect an integrated management of water affairs, including integrated planning, integrated water tapping permission, integrated allocation, integrated regulation, and integrated management concerning the prevention of floods and water logging, water reservoirs, water supply, water conservancy, the protection of water resources, sewage disposal and recycling, and groundwater back-filling. Only when such a water resources management system is adopted, can it be possible to affect the sustained use of water resources as well as the sustained development of our economy. We should say, in the management of water resources in medium and small-sized cities, the bureau of water affairs represents the developmental direction of reform.

The new bureau of water affairs carries out integrated management of water affairs in urban and rural areas to suit the faster development of urbanization. As compared with the former one, the new bureau of water affairs is an administrative agency of the government at every level responsible for the integrated management of water resources. It carries out integrated management in the prevention of floods and water logging, water reservoirs, water supply, water consumption, water conservancy, drainage, sewage disposal, and the protection of water and soil resources. It may, through the establishment of an integrated water resources management system, organically integrate the development, use, management, allocation, conservancy, and protection of water resources as one, and effect integrated management of water resources in quantity and quality, which may promote the optimized allocation of water resources, and the exploitation and protection of water resources.

(2) Cost-sharing mechanisms between the user (tapping) of water resources and the producer (engaged in the treatment and discharge of sewage)

At present, sewage discharge is assessed simply based on the prevention of water pollution. But the actual discharger may practically generate "resources" through the treatment of sewage and waste effluents according to the national standards. As a "resource regenerator", it is entitled to enjoy certain distributed interests, and hence it is necessary to construct a mechanism governing the distribution of interests between water tapping and sewage discharge.

(3) Introduction of market mechanism

It is necessary to completely introduce the market mechanism into the microscopic level of regions. Here, the market mechanism has two implications: one being shifting the costs of sewage treatment to the costs of water tapping, and the other being changing the current deficit financial situation in which the Government is responsible for the investments to and management of water supply facilities and sewage treatment facilities.

It is worth noting that it is popular to carry out chartered operation in the world under the mode of PPP (Public-Private-Partnership) arrangements. The advantage of the chartered rights lies in the good transparency of its procedures, and both before and after privatization, the Government and the chartered operator have to strictly observe the agreement on the chartered rights. However, because of historical reasons, urban utility facilities in China are now managed under the mode of "Official operation under official supervision", and they practically remain in a monopoly position and are managed at less productivity, low speed, poor efficiency, and high costs.

1.1.2 Objectives and structure of this survey

It is not necessary to spend any more space on the analysis of water problems in China, for relevant governmental authorities or news media in China keep mentioning the severity and urgency of water problems almost every day. The R&D institutions in China also made many fruitful studies and put up many valuable proposals. In view of this, in the process of survey, we will focus on this problem: the

Chinese Government has invested a great sum of fund and constructed a great number of facilities each year, but the situation has not essentially turned better. It is possibly because there exist many defects in the "water system", except pressures from her population and her industrial development, mainly, of the manufacturing industry. Here involved in the "water system" are all kinds of interrelated factors, such as legal systems, administrative systems, social habits, and national consciousness. Based on above considerations, we held discussions, in this survey, on the topics as shown on Table 1.

Table 1 Topics under survey

Topics	Survey methods	Proposed approaches to solution
Present situation of water problems in China	Data materials were collected concerning water problems in China under the support from the Water Resources Institute of the Chinese Academy of Water Conservancy and Hydroelectric Sciences.	
Water-related legal systems	Data materials concerning water-related legal systems in China were collected and collated, as well as compared with their foreign counterparts. Field surveys and interviews were held in Zhenjiang City (Jinagsu Province) and Langfang City (Hebei Province) to collect proposals and comments from relevant administrative departments and professional figures concerning current systems of water resources management.	It was proposed to redefine the concept of "water resources" in the legal system.
Management of water resources	Surveys were made on the systems of water resources management at the national, river-basin, and regional levels, and results were compared with systems of water resources management in foreign countries. Interviews were held in Zhenjiang City (Jiangsu Province) and Langfang City (Hebei Province) to collect proposals and comments from professional figures concerning the current legal systems.	It was proposed to set up a "State Water Resources Committee" at the national management level. It was proposed to carry out integrated planning and integrated distribution of water resources based on river basins. It was proposed to carry out integrated management at the regional management level

		instead of the separate management of water resources at the level of administrative departments. A new Bureau of Water Conservancy Affairs should be set up to perform the function of water resources management.
Water problems in medium and small-sized cities	On-the-spot surveys and interviews were held in Zhenjiang City (Jinagsu Province) and Langfang City (Hebei Province) to collect proposals and comments from relevant administrative departments and professional figures.	It was proposed to separate the residential water consumption system from the industrial water consumption system.

Source: The JICA Study Team

1.2 Present situation of water problems in China

The water problem actually consists of two aspects, i.e., the problem of water resources and the problem of water quality pollution, which are complementary to each other. The reduction of water resources may lead to the reduction of its capacity in the purification of pollutants and to a even still severe pollution of water resources, which may, in turn, lead to further reduction of water resources.

It is necessary to make a general survey on water problems in China from a macroscopic point of view, before the discussion on water problems in medium and small-sized cities.

1.2.1 General survey

China approximately has a total of 2800 billion m^3 of water resources, i.e., 2220 m^3 per capita, which is expected to reduce to 1760 m^3 per capita in 2030 when her population reaches 1.6 b. According to the common standards in the world, a country will be put into the category of water-stringent countries when its water resources per capita averages below 1700 m^3. Hence, China will have a real serious situation in water resources in the future.

During the 50 years after the founding of the New Republic, the total water consumption increased from over 100.0 billion m^3 in 1949 to 556.6 billion m^3 in 1997, while the comprehensive consumption per capita increased from less than 200 m^3 to 458 m^3.

1.2.2 Social & economic development and the demand for water

At present, the demand for water is facing major pressures from both population growth and fast economic development. Based on the common understanding, the two pressures will increase continuously before 2030.

The pressure from population growth includes the increase in water consumption caused by the absolute growth of population and the fast development of urbanization. (Table 2)

Table 2. Predicted residential water tapping in cities in the future

Year	Total population (×00m)	Population using water(×00m)	Indicators for water consumption (L/person_d)	Yearly water tapping (×00m m^3)
2000	13	2.8	185	189
2010	13.96	3.5	210	268
2030	15.33	5.0	250	456

Source: The JICA Study Team

Based on the standards and structural features of industrial development in China, the industrial development of China will rely more on the development of its manufacturing industry, and hence, the consumption of industrial water will be in fast growth.(Table 3)

Table 3. Predicted industrial water tapping in the future

Year	Total value of Indus. Production (×00m Yuan)	Water tapping (×00m m^3)	Rate of decline for water tapping per 10000 Yuan of indus. Produc. (%)	Ration of use consumption (m^3/10000 Yuan)
1990	12620	500	6.0	396
2000	31221	665	4.0	213
2010	59181	929	3.0	157
2030	180858	1899	2.0	105

Source: The JICA Study Team

The predicted demand for water mentioned above and agricultural water consumption for next 30 years are shown on Table 4.

Table 4. Predicted total demand for water in the future

Year	Agri. water consumption			Indus. Water consumption			Urban water consumption			Total
	Amount (×00m m^3)	Rate of growth (%)	Percent (%)	Amount (×00m m^3)	Rate of growth (%)	Percent (%)	Amount (×00m m^3)	Rate of growth (%)	Percent (%)	
2000	4848	-0.41	85.0	665	3.34	11.7	189	3.56	3.3	5702
2010	4653	-0.13	79.5	929	3.64	15.9	268	2.69	4.6	5850
2030	4530	-0.43	65.8	1899	3.0	27.6	456	2.38	6.6	6885

Source: The JICA Study Team

1.2.3 Water supply

According to the report from CAWCHS Water Resources Institute, China practically has a total of water resources between 800.0 billion and 950.0 billion m^3. As shown on Table 1, China will almost have no potential to be further used in 2030 when the demand for water will amount to about 700.0 billion m^3.

On the contrary, continuous deterioration in the quality of water resources, and the unbalanced distribution of water resources constitute a severe threat to China's capacity of water supply.

(1) Quality of water resources

The deterioration of water quality still remains unchecked in the major river basins of China as shown on Table 5.

Table 5. Water quality in major river basins of China

River basins	Length of river under evaluation	In compliance with C1 and C2 standards (%)			In compliance with C3 standards (%)			In compliance with C4 and C5 standards (%)		
		1995	1996	1997	1995	1996	1997	1995	1996	1997

Changjiang	8831	58	37	42	22	31	29	20	32	29
Yellow	7057	24	13	7	6	18	27	70	69	66
Zhujiang	5732	47	29	39	6	40	43	47	31	18
Huaihe	2050	13	18	16	20	16	40	67	66	44
Songhuajiang	2325	0	0	6	26	38	23	74	62	71
Liaohe	1329	0	0	6	14	13	23	86	87	71
Haihe	3116	16	0	32	10	50	24	74	50	44
Inland rivers	7887	67	60	66	1	30	13	32	10	21
Total	38372	41	25	32	11	27	29	48	48	39

Source: The JICA Study Team.

The discharged sewage and waste effluents total 40.0 billion tons each year, of which those treated at the C2 standard before discharge comprises only 5%. This has caused severe pollution to the river sections near urban areas.

(2) Unbalanced distribution of water resources among regions

As shown on Diagram 1 and Table 6, there exists a remarkable unbalance in the distribution of water resources in China. The Yellow River Basin, the Huaihe River Basin, and the Haihe River Basin, including Beijing, Tianjin, and other major cities, constitute 15% of the total territory, 34.2% of the total population, 32.1% of the total GDP of China, while their fresh water resources only constitute 7.7% of the national total.

It is, nevertheless, necessary to take into consideration large-scaled water transfer projects across river basins in the future, in order to satisfy future water demand in these regions. A series of problems still remain unsolved either on the costs or on the quality of water resources.

As shown on Table 6, the cities with water shortage problems consist of both those with stringent water resources, and those where the source of water is polluted and no clean water is available.

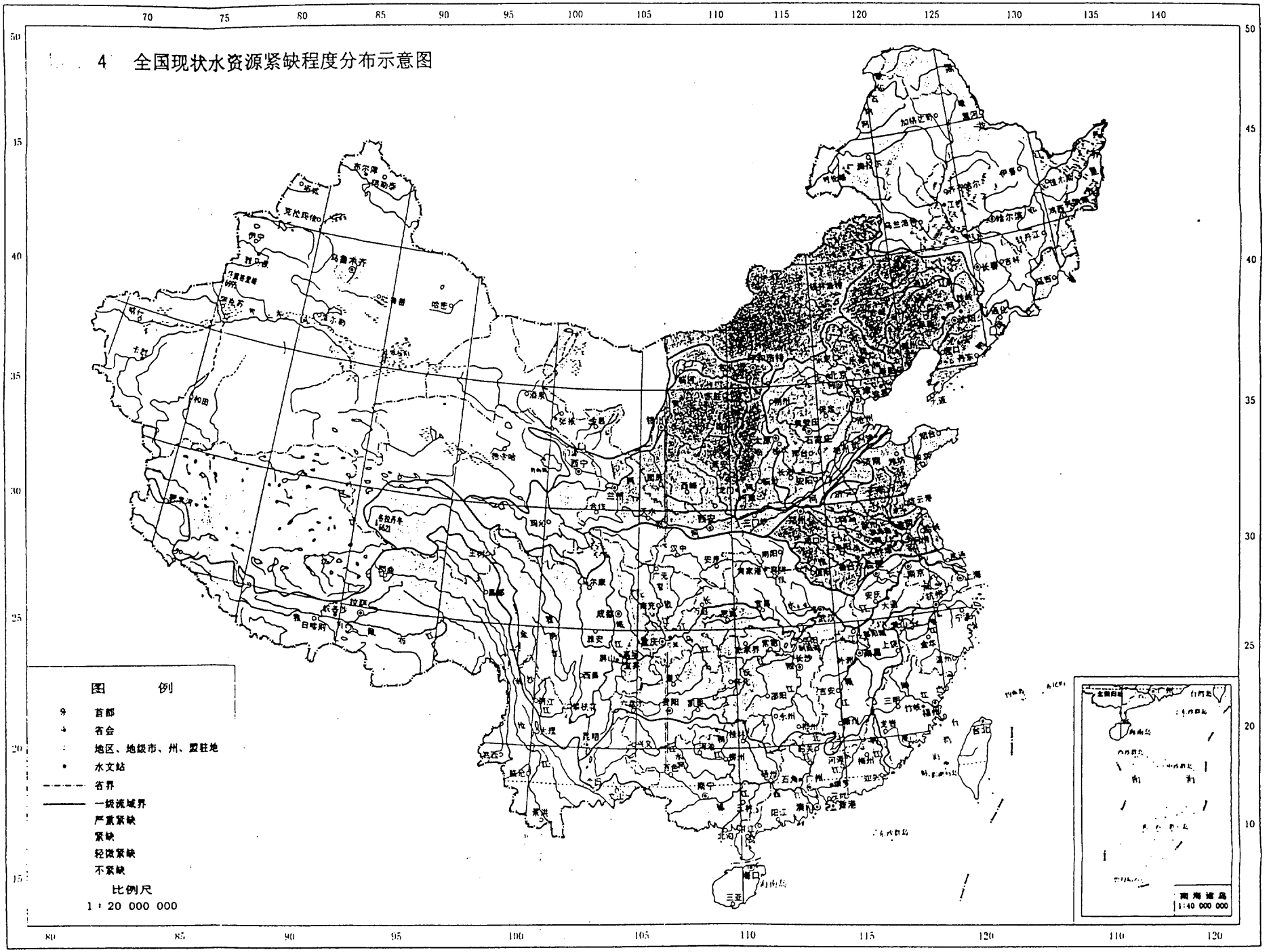
Table 6. Distribution of major cities with water shortage problems in China

River basins	Provinces, cities, and regions	Number of cities	Name of cities
Song-Liaohe	Inner Mongolia	3	Chifeng, Manzhouli, Tongliao
	Liaoning	14	Shenyang, Dalian, Anshan, Fushun, Banxi, Dandong, Jinzhou, Yingkou, Fuxin, Liaoyang, Panjin, Tieling, Chaolyang, Huludao
	Jilin	9	Changchun, Jilin City, Siping, Liaoyuan, Tonghua, Baishan, songyuan, Baicheng, Yanji
	Heilongjiang	11	Harbin, Qiqihar, Mudanjiang, Jiamusi, Jixi, Hegang, Shuangyashan, Daqing, Yichun, Qitaihe, Heihe
Haihe	Beijing	1	Beijing
	Tianjin	1	Tianjin
	Hebei	10	Handan, Xingtai, Shijiazhuang, Baoding, Cangzhou, Tangshan, Qinhuangdao, Langfang, Zhangjiakou, Chengde
	Henan	5	Anyang, Hebi, Xinxiang, Jiaozuo, Puyang
	Shanxi	4	Datong, Yangquan, Changzhi, Shuozhou
	Shandong	1	Dezhou
Huaihe	Jiangsu	5	Xuzhou, Lianyungang, Huaiyin, Yancheng, Yangzhou
	Henan	9	Xinyang, Zhumadian, Shangqiu, Kaifeng, Zhengzhou, Zhoukou, Luohe, Xuchang, Pingtingshan
	Anhui	3	Huaibei, Huainan, Bengbu
	Shandong	2	Jinan, Qingdao
River basins	Provinces, cities, and regions	Number of cities	Name of cities
Yellow River	Shanxi	2	Taiyuan, Jicheng
	Inner Mongolia	3	Huhhot, Baotou, Wuhai
	Shandong	1	Taian
	Henan	2	Luoyang, Sanmenxia
	Shaanxi	4	Xi'an,Tongchuan, Baoji, Xianyang
	Gansu	3	Lanzhou, Baiyin, Tianshui
	Qinghai	1	Xining
	Ningxia	2	Yinchuna, Shizuishan
Changjiang	Yunnan	2	Kunming, Dongchuan
	Guizhou	4	Liupanshui, Zunyi, Anshun, Guiyang
	Sichuan	10	Changdu, Chongqing, Zigong, Panzhihua, Luzhou, Deyang, Jinyang, Neijiang, Leshan, Wanxian

	Hunan	9	Changsha, Xiangtan, Hengyang, Shaoyang, Changde, Yueyang, Huaihua, Loudi, Zhuzhou
	Hubei	7	Wuhan, Huangshi, Jingsha, Xiangfen, Shiyan, Yichang, Suizhou
	Henan	1	Nanyang
	Shaanxi	1	Hanzhong
	Jiangxi	6	Nanchang, Jingdezhen, Pingxiang, Xinyu, Yantan, Jiujiang
	Anhui	7	Anqing, Hefei, Chuzhou, Huangshan, Tongling, Maanshan, Wuhu
	Jiangsu	7	Nanjing, Nongtong, Wuxi, Changzhou, Suzhou, Yangzhou, Zhenjiang
Zhujiang	Yunan	3	Nanpanjiang, Erhai, Lujiang
	Guizhou	3	Liupanshui, Xinyi, Anshun
	Guangxi	2	Guiling, Beihai
	Guangdong	5	Gaungzhou, Shenzhen, Sshantong, Zhanjiang, Shantou
	Hainan	2	Haikou, Sanya
Rivers in the southeastern area	Zhejiang	5	Ningbo, Wenzhou, Shaoxing, Zhoushan, Lishui
	Fujian	6	Taizhou, Fuzhou, Xiamen, Putian, Quanzhou, Zhangzhou
Inland rivers	Xinjiang	2	Urumqi, Karamay
	Gansu	2	Jiayuguan, Jinchang

Source: The JICA Study Team.

4 全国现状水资源紧缺程度分布示意图



1.3 Laws and systems relevant to water resources

1.3.1 Present situation and major problems

After the 1980s, the Chinese Government started its efforts to control and manage water resources according to the law. As of now, China has established the legal systems relevant to water resources, as shown on Table 7.

Table 7. Chinese legal systems relevant to water resources

Fundamental laws	Water act of the People's Republic of China, 1998
Relevant laws	Law of the People's Republic of China on the Conservation of Water and Soil, 1991
	Law of the People's Republic of China on the Prevention and Control of Water Pollution, 1996
	Law of the People's Republic of China on the Prevention of Floods, 1997
Relevant regulations	National Regulation on the Monitoring and Management of Environment, 1983
	Standards of Environmental Quality for Surface Water , 1983
	Regulation on the Monitoring of Water Quality, 1984
	Regulations of the People's Republic of China on Control over Dumping of Wastes in the Ocean, 1985
	Quality Standards of Agricultural Irrigation Water , 1985
	Hygienic Standards for Residential and Drinking Water, 1985
	Tentative methods for the Management of Licenses for the Discharge of Water Pollutants, 1988
	Methods for the Supervision and Management of Environment Protection in the Treatment of Sewage, 1988
	Regulations on Channel Management, 1988
	Regulations concerning the Prevention of Water Pollution from the Paper-making Industry, 1988
	Regulations on the Control and Management of Pollution in the Protective Areas of Drinking Water Sources, 1989
	Quality Standards for Water Used for Landscaping and Amusement Purposes, 1991
	Standards concerning Collecting Fees for Excessive Discharge of Sewage , 1991
	Regulations concerning the Application, Registration, and Management of Pollutant Discharge, 1992
Local laws at province, city, or region level	There are over 300 local laws in total.

Source: The JICA Study Team

In China, the term of "water resources" is widely used in governmental documents, by news media, and by ordinary people. As we understand, this term of "water resources" only implies that "water, of a non-fungible nature, is a kind of valuable and limited resources." In fact, the concept of "water resources" is not well defined in the legal systems of China. (Table 8)

Table 8. "Water Resources" as defined in the legal system

Defined in the water act	Problems incurred
Ownership of water resources	According to the Water Act, the ownership of water vests in the National Government or a collective. This has given rise to the existence of a binary structure of water rights. Judging from its legal features, the legally bound water rights have unlimited exclusiveness, while in practice, water rights have non-exclusiveness, which is a feature of water rights. Many problems are found in the current management system of water rights in China. Theoretically, water rights vest in the National Government or a collective, while in fact, they belong to a certain department or a local government. This has given rise to barriers to the optimized distribution of water resources. Although a Yellow River Water Conservancy Committee, for example, was set up, and may exercise rights on behalf of the Ministry of Water Resources, and has played an active role in the management of water of the Yellow River, the divided administration in the development and use of water resources still remain unchanged in essence. Certain people have a concept advocating "It is only in vain to save water which flows in front of your doorstep, and the more you use the better it will be". This concept has long been a driving factor in their behaviors of water use. Drawing large amounts of water from the Yellow River may undoubtedly incite earlier depletion of the River and cause great ecological and environmental problems. The national Government only has a nominal ownership of water rights, and the exclusiveness of water rights has turned to be non-exclusiveness.
Rights to use and operate water resources	As of now, the right to own, operate and use water resources has not been clearly defined in China, and under the current legal framework, the ownership of water resources vests in the National Government or a collective. An overall analysis on the whole process of development and utilization of water resources reveals that the National Government always grants, with or without consciousness, the right to operate water resources to local governments or certain departments, which in turn play the roles of the owner, user, and operator of water resources.
Rights of sewage discharging enterprises	The enterprises that discharge residential sewage and industrial waste effluents after standard treatment may be regarded as a "regenerator of water resources". However, the term of "resources producer" has not been

	defined in the current law, and this has made it difficult, in a certain sense, for the existing water treatment industry to subsist.

Source: The JICA Study Team

1.3.2 Possibility and necessity of "exploitation of water resources"

As stated in 1.3.1, the term of "water resources" is not clearly defined in the legal systems of China, and this is one of the most important defects in the "water system". It is essential to revise and prefect the laws relevant to water resources, especially the fundamental *Water Act*, for the practical solution of water crisis in China.

When it is proper to revise the *Water Act*, it is necessary to bring in the following concepts, in order to define the concept of "Water Resources".

(1) Ownership of water: The ownership of all the water resources vests in the National Government.

(2) The right to use water

In the exercise of the use right of water, the following factors shall be taken into consideration:

1) Four kinds of basic needs shall be met

- Water for human subsistence purposes
- Water for agricultural purposes
- Water for industrial activities
- Water for ecological (natural environment) purposes

2) Factors relevant to the priority to use water

- Principle of priority for land of water sources: The water source land has the priority in handling relations between upstream and downstream areas.
- Principle of priority for food security: Food security is one of the most important issues of China.
- Principle of priority for water use efficiency
- Principle of priority for present status of water use

1.4 Management of water resources

1.4.1 Present situation of and problems relevant to the system of water resources management

China has set up an organization for the management of water resources, which, being the largest of the world, consists of 3 levels, i.e., the national, river basin, and regional (province and city) levels, as shown on Table 9.

Table 9. The system of water resources management in China

<table>
<tr><th></th><th colspan="2">Organizational framework</th><th>Current function</th><th>Problems</th></tr>
<tr><td rowspan="8">Management at the national level</td><td>Departments</td><td>Major functions</td><td rowspan="8">Formulate and promulgate laws and regulations concerning water management through legislature;

Compile plans on water supply and demand at the national level;

Plans on project development;

Review plans on the management and development of river basins.</td><td rowspan="8">Divided management has resulted in an excessively loose pattern of management;

Conflicts are often found among regulations and principles formulated by the departments and hence these regulations and principles seem less authoritative.</td></tr>
<tr><td>M. of Water Resources</td><td>management of surface water</td></tr>
<tr><td>State Environmental Protection Administration</td><td>protection of water environment</td></tr>
<tr><td>M. of Geology and Mining</td><td>management of ground water</td></tr>
<tr><td>M. of Construction</td><td>construction relevant to the development and protection of urban water resources</td></tr>
<tr><td>M. of Agriculture</td><td>construction relevant to water use for agricultural purposes</td></tr>
<tr><td>M. of Energy Resources</td><td>management of hydroelectric construction</td></tr>
<tr><td>M. of Forestry</td><td>protection of forests in the river basin</td></tr>
</table>

	State Land Administration	management of construction projects in protection of the river basin		
	State Development Planning Commission	granting approval to water resources projects		
	M. of Communications	management of inland shipping		
	M. of Public Health	monitoring and protection of drinking water		
	M. of Finance	granting funds for flood prevention		
	State Science and Technology Commission	management of scientific research on water resources		
	State meteorology Bureau	release and management of precipitation forecasts		

	Organizational framework	Current function	Problems
Management at the river basin level	A total of 7 water resources committees or river basin management bureaus were set up for the management of the Yangtze River, the Yellow River, and the Taihu Lake.	Formulate and implement pans on the development of river basins; Formulate plans on the supply and demand of water in the river basin; Resolve disputes concerning water use in all the regions.	The water resources committee, engaged in practical technical work, has only a limited actual authority in the control and distribution of water resources in the river basin, and is unable to effectively promote the management of water resources and the implementation of policies.
Management at the regional level	Its organizational framework is similar to that of the national level. It accepts the vertical guidance from the management at the national level to a great extent.	Formulate and implement plans on the supply and demand of water in the region; Formulate and implement relevant projects; Collect water resources fees and manage the treatment and discharge of sewage.	It has similar problems to those at the national level.

Source: The JICA Study Team

1.4.2 Modes of water resources management

If the legal system can be accomplished relevant to the concept of "water resources" mentioned in 1.3, the National Government will be endowed with the full

power in the management of water resources. A desirable mode of water resources management is shown on the table below:

Management at the national level	Set up a State Water Resources Committee.	As the supreme authority in the management of national water resources, it will exercise rights to manage all the water resources.
Management at the river basin level	Set up and reinforce regional management committees.	The regional management committee is substantially authorized to manage water resources in accordance with the principle "to implement integrated planning and management on water resources based on river basins.
Management at the regional level	Set up regional bureaus of water conservancy affairs.	The divided functions of departments in the management of water resources will be integrated and performed by the Bureau of Water Conservancy Affairs. The Bureau of Water Conservancy Affairs will conduct supervision over and management of water operators (engaged in water supply or sewage disposal. The Bureau of Water Conservancy Affairs should have the right to refuse applications for water supply in its own region.

Source: The JICA Study Team.

1.4.3 Management and operation of water resources

The mode of water resources management mentioned in 1.4.2 is aimed at the rational distribution of water resources. Water resources represent a kind of deficient economic resources, and their distribution represents a redistribution of interests in essence. The core problems of distribution centers on the distribution and coordination of interests, and the solution of conflicts among relevant parties. In consideration of allocating water resources, it is especially necessary to take into consideration the transition mechanism of interests among regions.

There are 3 approaches relevant to the mechanism of transition of interests at the regional level.

（1）Mode of administrative order

It is a strong mode of integrated management of river basins. An integrated and optimized management of water resources in the river basin is to be affected through legislature, reinforcing authoritativeness of management departments for river basins, and resolving conflicts in local interests according to the law. Theoretically, it is best in efficiency to distribute water resources through the integrated management of river basins. However, in practice, it is also very difficult for compulsory laws to attain their anticipated goals due to the lack of stimulating mechanism.

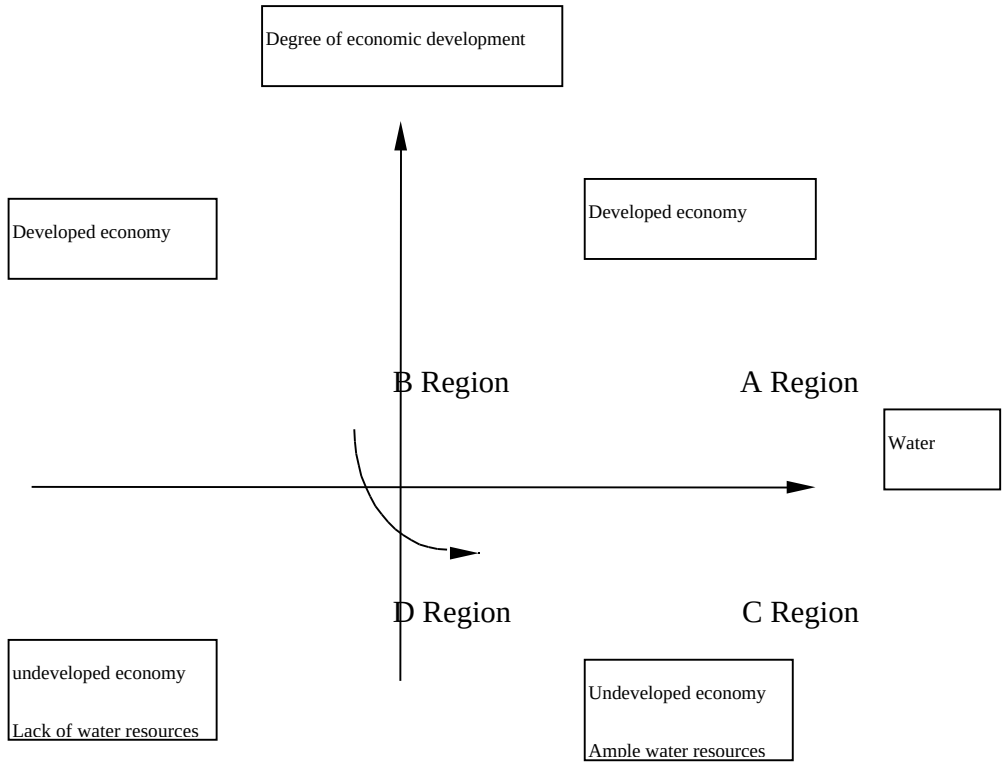
（2） Mode of market orientation

It mainly focuses on the establishment of reasonable mechanisms for adjusting interests in water distribution, and establishes reasonable modes of rights to water resources and economic management of market transactions, through the reform of property rights. The Government guarantees the rational distribution and utilization of water resources in the whole river basin, through its intervention to the transaction markets, instead of administrative orders, in order to establish the market mechanisms of water based on legal systems, which guarantee the price system and the operation of markets. This is a valuable idea. However, the completely market-oriented inter-regional distribution of water resources is feasible in economy but is not in politics. Hence, it is difficult to implement in practice.

（3） Mode of quasi-markets

At the macroscopic level, you should not apply too many viewpoints of market economy. Instead, you should use the viewpoints of public economy in the construction of mechanisms of distributing interests among regions. Specifically speaking, you should use the river basin as a unit and effect the distribution of interests among regions and between the upstream and downstream regions, through setting up "funds for the adjustment of water resources", as shown on Figure 3.

Figure 3. Concept of interests to be distributed among regions



Judged as a whole, there exist potential "water markets" in different upstream and downstream regions of the river basin. On the one hand, the upstream area may exploit water in excessive amount due to the easy accessibility of water resources, causing severe waste of resources, whereas water conservancy, as a need for investment, may provide potential water supply. One the other, the downstream region is severely short of water supply and in urgent need of water resources, whereas economic losses in industry and agriculture may provide potential financial support. An exchange of resources may be beneficiary to both sides. The downstream region may offer funds equivalent to its economic losses in industry and agriculture to exchange with the upstream region for potential water supply. Water shortage and the payment for upstream water will both urge it to promote the standards of water conservancy, and as a result it will enjoy more benefit on an overall basis. The upstream region collects fees for water utilization from the downstream region, in order to make investments to water-saving irrigation. In spite of lower consumption

of water, it may create yields at a steady increment and gain increases in total income, reflecting certain market efficiency. Besides, market exchange has a dynamic nature and may be the reflection of changes in and demand for water supply. It may eliminate, in part, the unreasonable directive type of water allocation among regions, and may help avoid system failure to a great extent.

The "funds for the adjustment of water resources" is set up because it is difficult to have fair market transaction due to too much economic difference among regions in China. In the Yellow River Basin, for example, greater differences quickly started to appear in the late 1990s among the 8 provinces and regions along the Yellow River. In 1998, GDP per capita of Shandong was equal to 126.9% of the average national level, while that of Gansu only 54.2%. Under such a significant regional difference, it is difficult for a water market to appear spontaneously. It is necessary to adopt political means, and establish a coordination system and an interest compensation mechanism to guarantee the implementation of the water market. Furthermore, the funds for the adjustment of water resources may be used to resolve the conflicts on interests between the upper and the lower streams.

1.5 Management of water resources in medium and small-sized cities --A case study of Zhenjiang City of Jiangsu Province

1.5.1 Issues to be discussed

Through survey tours to Zhenjiang City and other cities, the Study Team found problems in water resources management at the city level, as follows:

(1) Similar to the management system at the national level, the functions "to manage water resources" are distributed among too many departments, resulting in the ambiguous definition of power and responsibility.

(2) Most of the sewage treatment facilities, under construction or already in operation, may only collect limited amounts of fees from their clients, and cannot but operate under financial subsidies from the government, and it is difficult to keep them in operation.

(3) Lack of methods to determine the reasonable price of water resources

The evaluation of water resources is essential to the management of water resources.

The value of water resources is the substantial reflection of compensational use of water resources, a compensation to the owner of water resources for its delivery of water resource assets, and the most fundamental precondition to keeping sustained supply of water resources.

In view of this, the Study Team attempts to offer a fundamental tool for the management of water resources at the municipal level, through the evaluation of water resources in Zhenjiang City.

1.5.2 Evaluation of water resources

No method is in place that is widely recognized for the evaluation of water resources either in China or in other countries of the world.

The so-called original value of water resources refers to the amount of money that a consumer pays to the owner of water resources, for its exercise of the right to the utilization of water resources, which reflects economic relations between the owner and operator of water resources. It is, in nature, the capitalization of rents for water resources. Models available for the calculation of water price include the shadow price model, the marginal opportunity cost model, and the demand and supply pricing model. These models are assessed as follows.

（1）Shadow price model

The shadow price model was proposed by Tinbergen and Kantorovitch in the 1950s. It originates from mathematical planning. It represents the price of products and resources under a certain optimal situation, which reflects social labor consumption, resources rarity, and demands for final products. The shadow price currently in use has already lost its precision defined in the mathematical planning, and denotes, in a wide sense, instead of actual prices, the price of social value, which may reflect the rarity of resources. A shadow price larger than zero indicates rarity of resources. The greater the rarity is, the higher the shadow price will be. When the

shadow price equals zero, it indicates that this kind of resources is not rare, and has a surplus. Hence, increase in this kind of resources will not bring any economic efficiency[3]. The shadow price is often acquired through the resolution of the linear planning equation, the adjustments based on domestic prices, the determination based on international market price, and the substitution of the opportunity cost method.

（2） Marginal opportunity cost model

The marginal opportunity cost (MOC) is a useful abstract and measure, from an economic point of view, of the objective impact exerted by the exploitation of resources. It indicates the cost born by the society for the consumption of a certain kind of natural resources, which should be, theoretically, Price P the user pays for its consumption of resources. When P < MOC, excessive use of resources may be stimulated. When P > MOC, normal consumption will be restrained. The MOC theory considers that the consumption of resources involves 3 kinds of costs:

- Marginal production cost (MPC), which refers to the cost directly invested in the acquisition of resources.
- Marginal use cost (MUC), which refers to the net efficiency the user of resources will abandon in the future.
- Marginal external cost (MEC), which refers incurred losses, which include losses incurred at present and in the future, and include all kinds of external environmental costs.

MOC integrates resources with environment and is an economic measure of costs in the use of resources, and is a remedy of defects of the traditional resources economics, which neglects both the environmental price paid for the use of resources, and the interests of future generations or the victim. Besides, MOC may be used as a valid evidence for decision making in the identification of reasonable policies and measures for the resources environmental protection, including investments, management, taxes and rents, subsidies, and the controlled price of natural resources.

（3） Demand and supply pricing model

This model was proposed by Tanes and R.R. Lee, who consider that water supply, as a commodity, complies with the equation:

$$Q_2 = Q_1 \bullet (\frac{P_1}{P_2})^E$$

Whereas:

Q_2: water consumption after price adjustment;

Q_1: water consumption before price adjustment;

P_1: original water price;

P_2: price of water resources after price adjustment;

E: price elasticity coefficient of water resources.

Water price = $P_2 - C$, in which C represents the production cost and profit of water resources.

The so-called elasticity denotes the relation between the percent changes in the dependent variable and the percent changes in the independent variable. The elasticity coefficient is the demand-and-supply elasticity coefficient.

1.5.3 Estimated water price of Zhenjiang City

(1) Model selection

Based on the practical situation of Zhenjiang City and available data information, we chose the demand-and-supply price model in the estimation of water price in Zhenjiang City, as shown below:

$$Q_2 = Q_1 \bullet (\frac{P_1}{P_2})^E$$

(2) General situation

Zhenjiang City is located in the southwestern part of Jiangsu Province on the south bank of the Yangtze River, at 31°37' -32°19' N and 118°58' -119°58' E. It is 76.9 km wide in the west-east direction. It borders Changzhou City on the southeast,

Nanjing City on the west, and Yangzhou City on the north, and opposite to the Taizhou City across the Yangtze River, as shown on Figures 4 and 5.

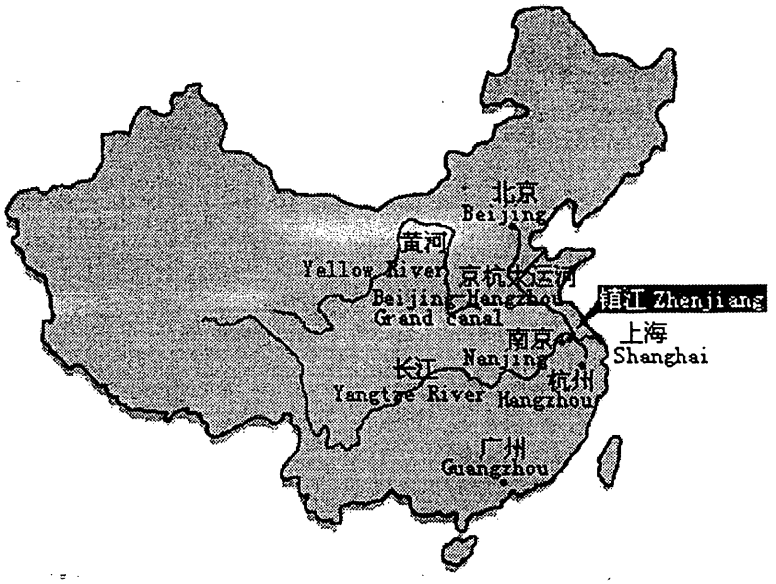


Figure 4. LOCATION OF ZHENJIANG CITY

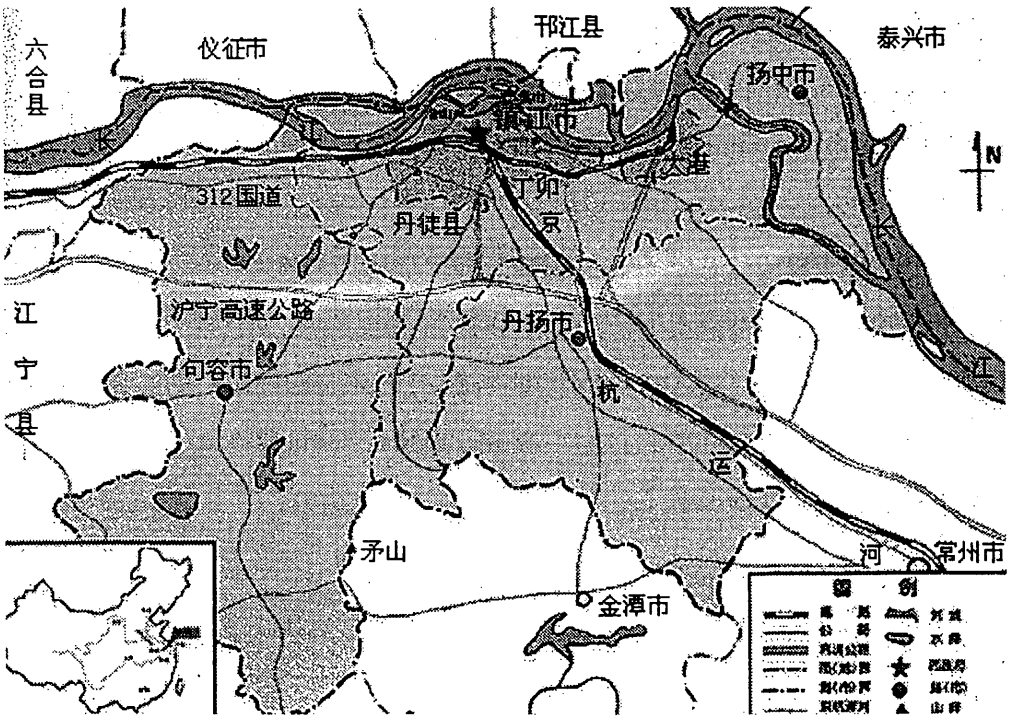


Figure 5. MAP OF ZHENJIANG

By the end of 1998, this city had a total of 97 townships and districts under its

jurisdiction, including 3 districts, i.e., Jingkou District, Runzhou District, and Zhenjiang Xinqu, and 4 cities (counties), i.e, Danyang, Jurong, Yangzong, and Dantu. This city has a total area of 3843 sq. km, comprising 3.74% of the total area of the province, with its urban area occupying 273 sq. km.

Located in the Hu-Ning industrial zone and at the crossroads of the Yangtze River and the Jing-Hang Canal, Zhenjiang City possesses unique advantages in port transportation, communications, energy, water conservancy, land provision, and urban environment. In view of this, this city is positioned as a famous historical and cultural city of China, an important port in the lower reaches of the Yangtze River, as well as a city for industry, trade, and tourism. According to the city planning, this city will have a size at 500,000 residents/50 sq. km in the short run, and at 650,000 residents/68 sq. km in 2010.

Zhenjiang City has a rolling terrain that declines from the west to the east, and from the south to the north, and thus is characterized by landforms dominated by hill land. In this area, the Ningzhen Mountain Range runs in the east-west direction, while the Maoshan Mountain Range in the south-north direction, with the highest peak being the Dahaushan Mountain (43.72 m) in Jiurong. The Shilichangshan Mountain (349 m) is the highest peak in the urban area. The Binjiang Lowland and the sandbanks in the middle of the Yangtze River were derived from the current accumulation of sand in the River. They are, from west to east, Shiyezhou, Zhengrunzhou, Xinminzhou, Jiangxinzhou, Gaoqiaozhou, and 4 sandbanks of Yangzhong, i.e., Leigongzhui, Taipingzhou, Xisha, and Zhongxinzhou.

By the end of 1998, this city had a total population of 2.66 m, including 0.59 million in urban areas, with a non-rural population of 0.92 m. The male, 1.3513 million in number, is slightly higher in the sex ratio than the female, 1.30 million in number, comprising 50.87 and 49.13% respectively. This city had a total of 933,900 families, including 209,500 families in the urban area, with 3-member families in a dominant position. This city had a birth rate of 8.60% and a natural population growth rate of 1.64%.

In 1998, this city accomplished a GDP of 3,912 million RMB, 1.2% higher than the average level of the province, including an increment of 3.2 billion from the

primary industry, an increment of 22.02 billion RMB from the second industry, and an increment of 13.9 billion RMB from the third industry. The GDP per capita of this city averaged 14,720 RMB. The increments from the primary, second, and third industries constructed 8.2, 56.3, and 35.5 respectively in the composition of GDP.

(3) General survey on water resources in Zhenjiang

Zhenjiang City falls into the north Asian monsoon climate, with an average air temperature of 15℃, a non-frost period of 237 days, and 2057.2 hours of sunshine. Zhenjiang has access to 3 kinds of water sources, i.e., natural rainfall, transit water, and groundwater.

Zhenjiang has ample rainfall averaging 1065 mm per year, with a runoff volume of 999 million m^3 per year. There are around 120 rainy days in the year with a variation rate of 17%, as shown on Table 10.

Table 10. Seasonal distribution of rainfall in Zhenjiang

Season	Rainfall（mm）	Percent（%）
Spring（Mar.-May）	256	24
Summer (Jun.-Aug.)	467	44
Fall (Sept.- Nov.)	210	20
Winter (Dec.- Feb.)	127	12
Total	1065	100

Source: Bureau of Water Conservancy of Zhenjiang City

There are over 60 rivers in Zhenjiang City, with a total length of over 700 km, and most of them are artificial canals. The water system consists of 3 areas, i.e., the area along the Yangtze River, the west Taihu Lake area in the east part of the city, and the Qinhuaihe River area in the west part of the city. The artificial reservoirs and ponds of the city have a total capacity of over 500 million m^3, including 107 reservoirs with a unit capacity of over 0.10 million m^3 each, comprising a total capacity of 374 million m^3.

The Yangtze River is an important water source of Zhenjiang City. The Yangtze River has one section running across the borders of Zhenjiang City, which is about

103.7 km long. The Yangtze River, running through this City at an average of 973.0 billion m^3 of transit water per year, is an important pillar of water resources in the social, economic, and environmental development. Only in 1990, about 1.0 billion m^3 of water was tapped by Zhenjiang City from the Yangtze River.

In Zhenjiang City, there is an ample groundwater resource, which is mainly distributed over the plain area at a depth of about 60 million. Water is good in quality, containing less than 2 grams of mineralized substances. In comparison, it is poor in shallow groundwater sources in hilly areas.

The annual total of water demand at different guarantee ratios as well as the balance of water demand and supply in Zhenjiang City are shown on Table 11.

Table 11. Predicted demand and supply of water resources in Zhenjiang City

Unit: 100 million m^3/year

Guarantee ratio	Years	Water resources available	Water demand	Sufficient or deficient	
				Suf.	Def.
Present situation		32.051	33.333		1.828
50	1995	41.252	41.231		0
	2000	47.747	47.736		0
	2010	77.104	77.172		0.058
	2025	141.256	157.997		16.741
75	1995	37.296	37.275		0
	2000	43.557	43.533		0
	2010	72.275	72.694		0.433
	2025	134.056	153.114		19.054
95	1995	48.143	48.137		0
	2000	54.196	54.126		0
	2010	82.073	82.962		0.876
	2025	142.814	162.99		20.173

Source: The overall planning on national territory of Zhenjiang City（1996-2025）

During the past few years, frequent changes in water price took place in Zhenjiang City. Tables 12 and 13 show the changes in tap water price in urban areas of Zhenjiang City, and in water costs of water conservancy projects.

Table 12. Changes in tap water prices of Zhenjiang City

Unit:Yuan/Ton

Year	Industry	Commerce	Hotels and restaurants	Residential purposes
1990	0.11			
1991	0.27	0.3		0.14
1993				0.27
1996				0.57
1997	0.9		1.4	0.61
1998		1.15	1.55	0.95
1999	1.3	1.4	2.00	
2001	1.64	1.87		1.34

Source: Bureau of Water Conservancy of Zhenjiang City

Table 13. Changes in water costs of water conservancy projects of Zhenjiang

Year	Industry（RMB/m^3）		Residential purposes（RMB/m^3）	Agriculture（RMB/*mu*）
1985	0.0013		0.02	0.005-0.008
1990	0.03		0.15	1.6
1996	0.04		0.15	4.0
2000	0.09		0.03	7.0

Source: Bureau of Water Conservancy of Zhenjiang City

(4) Results of water price estimation in Zhenjiang City

First, the elasticity coefficient of water price in Zhenjiang City was calculated. Table 14 shows data relevant to water supply in the past 2 years in Zhenjiang City.

Table 14. Water supply and price in urban areas of Zhenjiang City during the recent years

Year	Indicators	Units	Urban area	Danyang	Yang-zhong	Jurong	Price
1998	Total supply	10,000 m^3	12,033	3,839	1,009	1,200	1.22
	Industrial consumption	10,000 m^3	6,450	3,387	312	840	

	Residential consumption	10,000 m^3	4370	452	607	360	
	Population involved	10,000 m^3	54.5	11.26	9.2	8.10	
1999	Total supply	10,000 m^3	12,130	2,462	889	1,200	1.57
	Industrial consumption	10,000 m^3	6,719	2,030	206	811	
	Residential consumption	10,000 m^3	4,391	432	629	389	
	Population involved	10,000	59.00	11.80	9.20	8.10	

Source: The Zhenjiang City Year Book of Statistical Data（1999-2000）

Based on Table 14, the price elasticity equation was used to calculate the water price elasticity coefficient of Zhenjiang City, which shows **E=0.27**.

Next, we will estimate the demand for water resources in urban areas of Zhenjiang City in 2010. According to prediction, Zhenjiang City will have a population of 0.68 million in urban areas in 2010 as indicated in the overall planning on national territory of Zhenjiang City. The demand for water resources in urban areas of Zhenjiang City may be predicted for 2010 based on the average retention and consumption of water resources per capita.

In 1998, there was a population of 0.55 million in the urban areas of Zhenjiang City, consuming a total of 43.70 million m^3 of water for residential purposes, i.e., at 204 liters/person day. Water was consumed at an average of 212-liter/person day for both 1998 and 1999. Since the living standards may be significantly raised following economic development in Zhenjiang City, and based on the living standards in other developed cities, a significant increase in residential water consumption is expected and the residential water consumption is expected to average 280 liters/person day in 2010, i.e., a total of 69.49 million m^3 of residential water consumption in 2010. Based on the consumption ratio in 1999, water consumption in the urban area will reach 191.96 million m^3, up 70.66 million m^3 from 121.30 million m^3 in 1999. Based on the demand-and-supply relation equation:

$$Q_2 = Q_1 \bullet (\frac{P_1}{P_2})^E$$

[（12130-7066）/12130]=（1.57/P_2）$^{0.27}$

P_2 = 3.76 RMB/m^3

Hence, from this, the value of water resources may be derived:

3.76-1（1+10%）-0.9（1+10%）

= **1.67RMB/m^3**

Water price was calculated on the assumption as follows:

- The Yangtze River would provide water to Zhenjiang at the present level, and Zhenjiang City could only depend on the water resources now available, in its future development;
- Sewage would be treated and tap water supplied at the limited profitability of 10%; and,
- The cost of tap water would remain in the future as it is now.

(5) Implications of water price estimation

Water price estimation has implications as follows:

1) A great many methods are available for the management of water resources, including one that calculates water resources and includes them into the national economy calculation system and hence is the most effective. This conclusion is drawn based on the calculation of national economy.

National economy calculation denotes one that proceeds, based on the availability and use of human, material, and financial resources within a certain spatial and temporal range, relevant to the measurement of production, distribution, exchange, and consumption, and to the measurement of total, speed, ratio, and efficiency. With regard to its main functions, it consists of 4 important systems, i.e., a measurement system for socioeconomic development, an information system for scientific management and decision-making, a warming system for socioeconomic operation, and a language system for international economic and technical exchanges.

The exclusion of water resources and other resources environments from both the western SNA (System of National Accounts) national economy calculation system and the current Chinese MPS (System of Material Production Balances) national economy calculation system has led to severe failure in reflecting changes in water resources and other resources environments in the national account. As a result, economy keeps growing while the amount of resources environment assets is on a steady decrease. This is, in essence, a kind of false prosperity of national economy incurred at the costs of resource consumption.

Water resource calculation constitutes an integral part of the natural resources calculation system. Owing to its inherent properties, its calculation is very difficult, involving not only the calculation of actual amount of water resources and the calculation of value, but also the calculation of water quality of water resources. The calculation of actual quantity and quality of water, based on a great amount of statistical and monitoring data, is relatively simple. But the calculation of water price is relatively complicate and more important than the former, and is essential to the calculation of water resources. Value offers a common means for comparison, and hence may determine the importance of water price in the macroscopic management of water resources.

2) Transactions of water resources and other natural resources on markets should be based on a perfect market mechanism, to which the reasonable determination of water price is essential and vital. In the meantime, since water resource is a kind of extremely peculiar natural resources, involves a wide range of application, and is an important component of the life support system as well as a kind of irreplaceable material, it is practically necessary to determine water price. How to determine water price under the conditions of market economy has become an important issue to resolve if the exploitation of water resources is to comply with the development of market economy.

In fact, water price occupies an important position in the management of water resources. It is not only a connector of the links of water-conservancy economy, but also a tie linking water-conservancy economy and other sector economies. Water price may help master the dynamic rules of water-conservancy economy, reflect the

industrial policies of the government concerning water conservancy, adjust economic relations between the water conservancy industry and other industrial economies, and reasonably distribute gains of the water conservancy industry. A proper water price may not only help reduce water consumption, but also may raise water use efficiency, and realize the effective allocation of water resources among social sectors, as well as the reasonable allocation of water resources among different regions.

1.5.4 Management of water resources in meddle and small-sized cities

(1) Problems

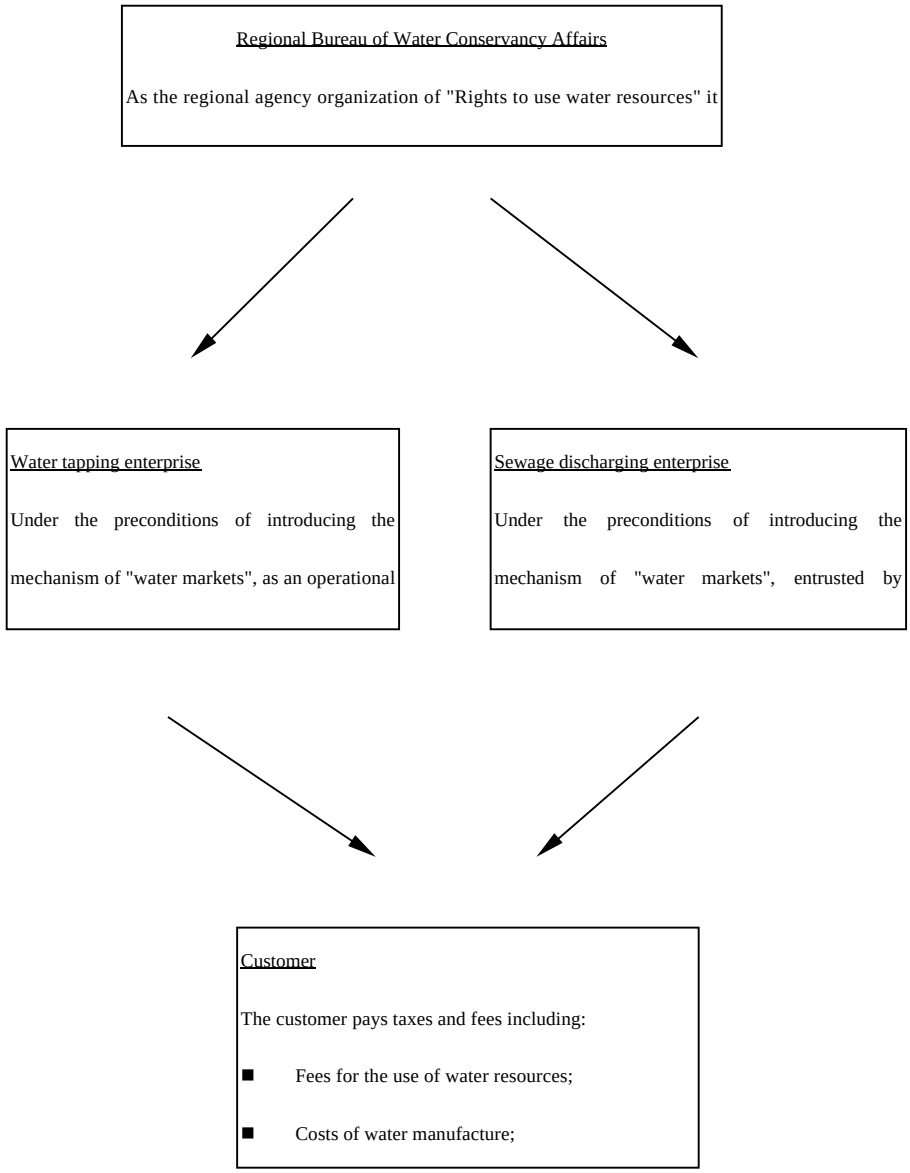
Now there exist two problems concerning the management of water resources in medium and small-sized cities:

1) Similar to the management system at the national level, the functions "to manage water resources" are distributed among many departments.
2) Within the current framework of legal systems, the Government is completely responsible for the budgetary support to the construction and operation of sewage treatment facilities. It is very difficult for medium and small-sized cities to construct and maintain sewage facilities, resulting in the further deterioration in the quality of water environment.

(2) Methods of solution

As stated in section 1.3, the solution of this problem lies in the establishment of the following mode of management after the concept of water resources is established in the legal system, as shown on Figure 6.

Figure 6. Regional management of water resources and the model of water markets



Source: JICA study team

1) Bureau of Water Affairs

It is necessary to set up a management system of water affairs in order to effect an integrated management of water affairs, including integrated planning, integrated water tapping permission, integrated allocation, integrated regulation, and integrated management concerning the prevention of floods and water logging, water reservoirs,

water supply, water conservancy, the protection of water resources, sewage disposal and recycling, and groundwater back-filling. Only when such a water resources management system is adopted, can it be possible to affect the sustained use of water resources as well as the sustained development of our economy. We should say, in the management of water resources in medium and small-sized cities, the bureau of water affairs represents the developmental direction of reform.

The new bureau of water affairs carries out integrated management of water affairs in urban and rural areas to suit the faster development of urbanization. As compared with the former one, the new bureau of water affairs is an administrative agency of the government at every level responsible for the integrated management of water resources. It carries out integrated management in the prevention of floods and water logging, water reservoirs, water supply, water consumption, water conservancy, drainage, sewage disposal, and the protection of water and soil resources. It may, through the establishment of an integrated water resources management system, organically integrate the development, use, management, allocation, conservancy, and protection of water resources as one, and effect integrated management of water resources in quantity and quality, which may promote the optimized allocation of water resources, and the exploitation and protection of water resources.

2) Cost-sharing mechanisms between the user (tapping) of water resources and the producer (engaged in the treatment and discharge of sewage)

At present, sewage discharge is assessed simply based on the prevention of water pollution. But the actual discharger may practically generate "resources" through the treatment of sewage and waste effluents according to the national standards. As a "resource regenerator", it is entitled to enjoy certain distributed interests, and hence it is necessary to construct a mechanism governing the distribution of interests between water tapping and sewage discharge.

3) Introduction of market mechanism

It is necessary to completely introduce the market mechanism into the microscopic level of regions. Here, the market mechanism has two implications: one being shifting the costs of sewage treatment to the costs of water tapping, and the

other being changing the current deficit financial situation in which the Government is responsible for the investments to and management of water supply facilities and sewage treatment facilities.

It is worth noting that it is popular to carry out chartered operation in the world under the mode of PPP (Public-Private-Partnership) arrangements. The advantage of the chartered rights lies in the good transparency of its procedures, and both before and after privatization, the Government and the chartered operator have to strictly observe the agreement on the chartered rights. However, because of historical reasons, urban utility facilities in China are now managed under the mode of "Official operation under official supervision", and they practically remain in a monopoly position and are managed at less productivity, low speed, poor efficiency, and high costs.

（3）Advantages and disadvantages of the mode of "bureau of water affairs"

1) Advantages:

The integrated management system under the mode of bureau of water conservancy affairs has advantages as follows:

- The integrated management of water resources is in compliance with the natural features and rules of water. Water resource is recycled and converted within the geographical unit of a river basin. Only the river basin-based management may suit the natural and ecological features of water resources. While cities are managed based on administrative regional planning, an integrated management of water resources, within a range that is as large as possible in the administrative regional planning, may conform with the concept of regional water resources management.
- The integrated management of water resources may help the Government improve its efficiency of decision making. The Bureau of Water Conservancy Affairs may handle the spatial and temporal distribution of water resources as well as problems relevant to the demand and supply of water resources on an integrated management basis. It may also set up rules like water tapping permits,

to make reasonable regulations over water resources, which may help resolve water tapping problems between urban and rural areas, between industry and agriculture, and among administrative regions, handle integrated arrangement between surface water and ground water, and between out-going and locally used water resources, balance demand and supply, optimize allocation, and gain optimum economic efficiency with a limited amount of water resources.

- The integrated management of water resources may help effect the overall balance of water resources. Under the integrated management, only the establishment of 3 compensational mechanisms, i.e., "who consumes water should make compensation, who pollutes water should make compensation, and who damages the water ecological system should make compensation", can help effect the balanced demand and supply of water. Only when an integrated management system of water resources is established to make integrated planning, carry out integrated regulation and construction, and implement an integrated water tapping system of water resources, as well as collect water resources fees and control the quality and quantity of water on an integrated basis, may it be possible to promote the development, use, management, allocation, conservancy, and protection of water resources, and to effectively resolve the shortage problems of water resources.

2) Disadvantages:

As of now, the implementation of the management mode of "bureau of water affairs" may have certain disadvantages. The adoption of a mode of highly integrated management may lead to a new type of total monopoly, a stiffened system, and low efficiency.

1.6 Results of survey of Zhenjiang City, Jiangsu Province and proposals

(1) Evaluation of water resources

When water is delivered to the consumer, he or she should bear the well-defined water price as given below:

Water price	Water resource cost	price paid for the use of water resources
	Water production cost	including water costs for water tapping regimes
	Environmental cost	including costs for sewage treatment

After many years of hard efforts, China has shifted from the stage of "uncompensational utilization of water resources" to the stage of "utilization of water resources at low prices", however, still with no recognized and reasonable methods available at present for the evaluation of water resources.

In this survey, to Zhenjiang City, under the assumption of certain preconditions, the Study Team estimated Zhenjiang City would have water resources at 1.67 RMB/m^3 in 2010, which is 0.01 RMB / m^3 at present in Jiangsu Province.

The evaluation of water resources is important in perfecting the management systems of water resources and in establishing justified and reasonable "water markets".

(2) Transition to the " Bureau of Water Affairs Mode" - a mode for integrated management of regional water resources

In order to overcome the current highly scattered management system of regional (city) water resources, the study team proposes that it is necessary to effect the transition as quickly as possible to the BWCA mode, a mode for integrated management of water resources. The BWCA mode has the following advantages as well as disadvantages:

1) Advantages:

- The integrated management of water resources may help the Government improve its efficiency of decision making. The Bureau of Water Affairs may

handle the spatial and temporal distribution of water resources as well as problems relevant to the demand and supply of water resources on an integrated management basis. It may also set up rules like water tapping permits, to make reasonable regulations over water resources, which may help resolve water tapping problems between urban and rural areas, between industry and agriculture, and among administrative regions, handle integrated arrangement between surface water and ground water, and between out-going and locally used water resources, balance demand and supply, optimize allocation, and gain optimum economic efficiency with a limited amount of water resources.

- The integrated management of water resources may help effect the overall balance of water resources. Only when an integrated management system of water resources is established to make integrated planning, to carry out integrated regulation and construction and implement an integrated water tapping system of water resources, as well as to collect water resources fees and control the quality and quantity of water on an integrated basis, may it be possible to promote the development, utilization, management, allocation, conservancy, and protection of water resources, and to effectively resolve the shortage of water resources.

2) Disadvantages:

A new type of high level of monopoly may possibly emerge, leading to a stiffened system and low efficiency.

Chapter 2 Municipal Waste Management in Local Cities of China

2.1 Policy Recommendations

Municipal waste (trash and garbage) management is one of the basic requirements to stabilize city life. China, Japan and other countries have been taking waste disposal measures respectively. In this guideline, municipal waste disposal measures for local small and medium-sized cities were examined by analyzing current status of municipal waste disposal in Changzhou Municipality and Zhenjian Municipality of Jiangsu Province as case studies. The basic measures for municipal waste management are as follows (the details are described in the subsequent parts);

Municipal Waste Management Measure 1 in Small-Medium Sized Cities; Waste Generation Control

1. Charging for Municipal Waste Disposal

(1) Charging for household garbage collection (role of the local government)

(2) Charging for business waste collection (role of the local government)

(3) Charging for collection and disposal of electric appliance waste (role of the central

(4) House-to-house collections (role of the local government)

2. Introduction of Extended Producer Responsibility (EPR) (role of the central government)

3. Promotion of Green Purchasing (role of the central and local government)

4.Environmental Enlightenment and Education to Residents and Offices (role of the local government)

5. Introduction of Command and Control, and Other Economic Measures (role of the central government)

Municipal Waste Management Measure 2 in Small-Medium Size Cities; Promotion of Re-Use and Recycling

1. Collection and Circulation of Recyclable Waste

(1) Introduction and expansion of separate refuse collection (role of the local government)

(2) Establishment of recycling centers (role of the central and local government)

(3) Expansion of deposit refund system (one of the choices of the EPR) (role of the central and local government)

(4) Setting of specific organization (one of the choices of the EPR) (role of the central government and local government)

2. Promotion of Recycling

(1) Establishment of recycling product markets (role of the central government)

(2) Support or expansion of regional level recycling

(3) Recycling of products containing hazardous materials (role of the central government and local government)

(4) Enactment of recycling standard (role of the central government)

3. Utilization of waste heat (role of the local government)

4. Prevention of illegal dumping (role of the central government)

Municipal Waste Management Measure 3 in Small-Medium Size Cities; Promotion of Appropriate Disposal of Waste

1. Enhancement of environmental measures on incineration facilities

(1) Setting of strict standard on incineration facilities (role of the central government)

(2) Minimization of waste incineration (role of the central and local government)

(3) Area-wide waste disposal (role of the local government)

2. Maintenance of landfill sites (role of the central and local government)

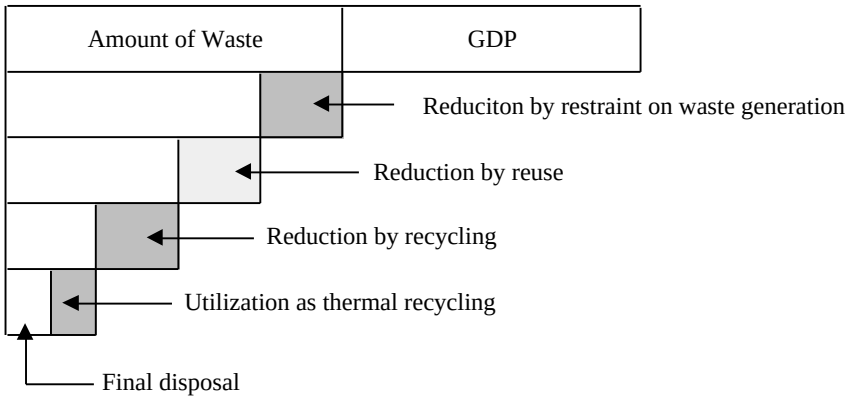
2.2 Basic Concept of Municipal Waste Management

Reducing waste discharge is one of the main tasks that the small-medium sized cities of China have to tackle on in the future as per capita waste discharge tends to increase. Under the present framework, which just aims for disposing discharged waste, development and construction of new facilities are required to deal with the

increasing amount of waste discharge. Therefore, it is necessary to promote reduction of waste generation, and reusing or recycling of recyclable resources, and to implement proper waste management measures[1]. Sifting the responsibilities on waste disposal from local government to private sector and introducing market economic approach are required to change the direction.

As being recited in the introduction already, there are four basic ideas regarding waste management. First priority is to restrain waste generation. Second priority is to re-use recyclable wastes on its original form. As few wastes can be reused on its original form, the third priority should be material recycling (to reproduce materials from collected wastes by doing intermediate processing) , which can be applied to a wide variety of materials, such as metals, glass, paper, and plastic. The thermal recycling, which is to use thermal energy collected form incineration heat etc., is the forth priority. Figure 1 shows the basic idea of waste management.

Figure 1 Basic Concept of Waste Management



Source: "Eco-cycle society", Yuhikaku, 1997

[1] Even if the products are reusable or recyclable, they should not be mass-produced nor mass consumed.

2.3 Municipal Waste Management Measure 1 in Small-Medium Sized Cities; Waste Generation Control

2.3.1 Charging for Municipal Waste Disposal

(1) Charging for household garbage collection (role of the local government)

The increase in the amount of per capita waste discharge mainly contributes to the increase in volume and weight of waste in small-medium sized cities of China. As in the case of Changzhou, the amount of per capita waste discharge will increase as long as economic growth continues in local cities if no measure is taken to reduce waste (consumption increases as income increases, and waste discharge increases as consumption increases.). Even if the ratio of reuse and recycling of waste improved, the amount of waste disposal would not decrease if the amount of waste discharge keeps increasing (the effect of reuse and recycling is offset.). As mentioned above, incentives for reducing waste discharge will not be given to household, and motivations for designing and producing eco-friendly products will not be given to enterprises under the free trash collection system as part of public services.

Charging trash collection fee will give incentives on households and enterprises for reducing waste generation (by decreasing consumption and changing life style, etc.) or for taking substitutive measures for trash discharge, such as home treatment[2], reuse and recycling, etc, since paying the trash collection fee means the decrease of income[3]. Moreover, the revenue from the charge collection can cover the waste disposal cost (It depends upon the price setting of the charge, and administrative expenditure, etc. needs to be considered to make net earnings.). In addition, economical burdens on farmers, which accrue from the introduction of trash collection

---

[2] Primary incineration and other treatments that bring about different type of environmental damage should be prohibited. The good treatments includes such as home composting.

[3] In the case of Ome City in Japan where trash collection fee system was introduced in 1998, it is reported that the system brought about reduction of about 30% of combustible garbage and about 40% of noncombustible garbage. However, some of cities where the system was introduced have not been able to reduce the amount of waste discharge.

charge, might be relatively smaller than the burdens on city dwellers because re-use of organic waste is easier in rural areas than in urban areas (as compost). Thus, it leads to re-distribution of income.

Some checking points on introducing trash collection charge and the some examples of charge collection measures are described below. Figure 2 shows the examples schematically.

Checking Points

1) The fixed charge system (the charge is constant regardless of the amount of discharge) does not give incentives to reduce garbage discharge (because people can discharge trash as much as they want to once they made payments.). The system introduced in Beijing in September 2000, which charges three yuan per family per month, does not give enough incentives for garbage reduction, as it is a fixed charge system. The system being implemented in Jiangsu Province (charges 2~4 yuan per person per month) also does not give enough incentives.

2) Payment per unit weight system is better than payment per unit volume system. However, the introduction of the former system is difficult technically, and the cost of execution of the former system would be very high. Using pay garbage bags or containers, or pay seals sticking to the bag or the container is widespread measures taken in the world as charge collection systems.

3) It is important to establish the trash collection charge system and waste recycling system (subsidy, extended producer responsibility, green purchasing, in-house organic waste treatment (such as compost)) simultaneously. The illegal disposal would increase without one of these systems.

4) There are two measures for collection of the charge. One is an individual charge system (the rate of charge is set according to the amount of the discharge from one unit of household.), and the other one is a group charge system (the rate of charge is set according to the disposal cost of each garbage collection district). Introducing individual charge system with the house-to-house collections (described below) is preferable to prevent illegal disposal though it depends on the management ability of the collection district.

Examples

1) The discharge proportion type: The charge is proportionally imposed according to the amount of the garbage discharge (type 1 of Figure 2).

2) The phased discharge proportion type: This is one of the discharge proportion types. However, higher rate of charge is imposed when the discharge exceeded a specific amount (type 2 of Figure 2).

3) The constant amount free type: Residents do not need to pay for trash collection up to a fixed amount of discharge, and the charge is proportionally imposed when the waste discharge exceeded the fixed amount. （Example: The municipality distributes constant number of garbage bags by free of charge. When the resident discharges trash over the volume of bags provided, she or he must buy the garbage bags）(type 3 of Figure 2).

4) The charge-assistance combination type I: This is a similar system to 3), but refund system is applied when the discharge is less than the fixed amount. (Example: When the resident did not use all garbage bags provided by the local government, the government receives the no-use bags by refunding same price as the purchasing price of the bag) (type 4 of Figure 2).

5) The charge-assistance combination type II: This is a same system as 4), but the unit rate of excess payment is set higher than the unit rate of refund. (Example: The unit price of the garbage bag used to discharge excessive amount of garbage is set higher than the unit refund price of the no-use garbage bag.) (type 5 of Figure 2).

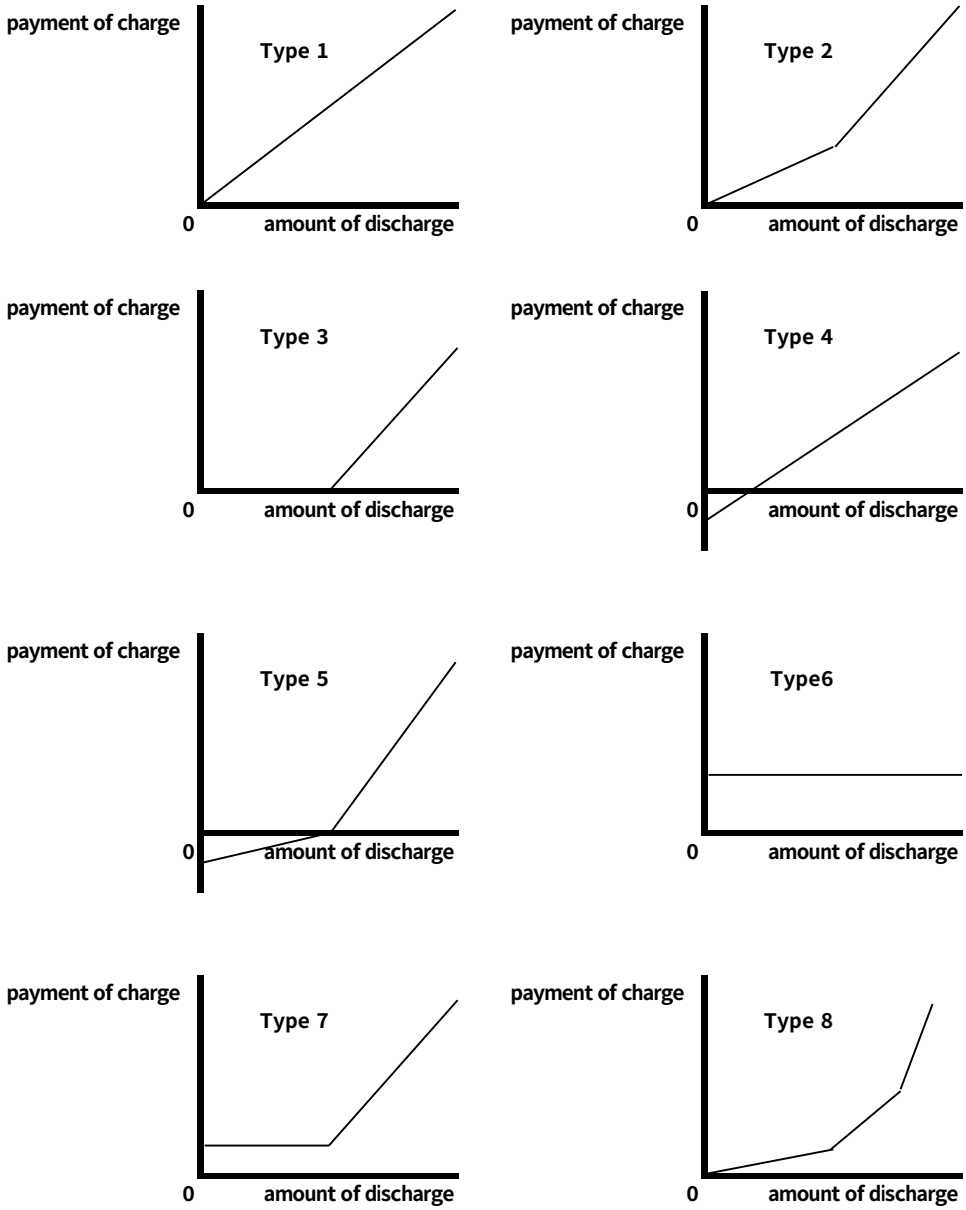
6) The fixed charge type: A fixed charge is imposed for household unit or for each of family member, regardless of the amount of waste discharge from the household. This system does not give enough incentives to households for reducing waste discharge (type 6 of Figure 2).

7) The combination of fixed charge and discharge proportion type: This system is a combination of 1) and 6). The fixed charge is imposed up to a fixed amount of discharge, and the charge is proportionally imposed according to the amount of waste discharge once the waste discharge exceeded the fixed amount (type 7 of Figure 2).

8) The multi-phased discharge proportion type: This is a similar system to 2), but

the rate of charge goes up according to the amount of waste discharge (type 8 of Figure 2).

Figure 2 Types of Charging on Household Garbage Collection



Source: made by retouching "Eco-cycle society", Yuhikaku, 1997

Since the per capita waste discharge has been increasing in small-medium sized cities of China, introducing the charging system for garbage collection is effective. The cities, which have already introduced type 6 of Figure 2, should adopt type 7 at the

next stage, and implement type 1 system at the final stage. Considering the fact that the high ratio of poverty-stricken population in small and medium sized cities of China, introducing type 4 or type 5 system, which have burden reduction potential, is better at the preliminary level

Collecting recyclable waste by free of charge while charging on collection of waste that is required disposal is effective way to reduce waste discharge (recyclable waste might be collected by recyclable waste dealers or volunteers, or by enterprises responsible for waste collection under the Extended Producer Responsibility (EPR)).

(2) Charging for business waste collection (role of the local government)

It is indispensable to charge on business waste (such as papers from copy machines and printers, and leftover food and plastic containers from fast food restaurants, etc.) along with charging household garbage collection. As the amount of discharge from one entity is big, payment per unit weight system should be introduced. The pay seal system and the written report system (waste is collected by designated dealers) are more effective and desirable than pay garbage bag system which suits for household garbage collection.

(3) Charging for collection and disposal of electric appliance waste (role of the central government)

Current state of disposal of home appliance waste in China is not clear at this study stage. The bulk of this type of waste has been reclaimed in Japan[4]. However, it is important to reuse and recycle home appliances as much as possible, since these products are relatively large and containing a lot of reusable/recyclable materials. As the cost for resource recovery and recycling of home appliance waste is high, charge should be imposed on the waste collection. The framework of charge system for

[4] Home appliance recycling law was approved in Japan in May, 1998, and the obligation for recycling of discarded home electronic appliances discharged from the household and the office was imposed on the products manufactures. The law is enforced to four products (television, refrigerator, washing machine, and air conditioner) in April 2001. Until the enforcement of the law, these products have

home appliance waste is described below, as it is strongly related to the Extended Producer Responsibility.

(4) House-to-house collections (role of the local government)

As mentioned above, the charge system for waste collection induces illegal disposal. If the garbage is collected from the waste-collection point set in a specific district, illegal disposal from another district is easy. The house-to-house collection is effective way to control illegal disposal. The Changzhou Municipality has a plan to introduce house-to-house collection by providing a specific container in each household. The Zhenjian Municipality also has a plan to adopt house-to-house collection to resolve hygiene related problems (the introduction of house-to-house collection leads to separate collection of waste in the future). Introducing charge system for household waste collection and house-to-house collection together leads to the reduction of waste generation.

2.3.2 Introduction of Extended Producer Responsibility (EPR) (role of the central government)

The Extended Producer Responsibility (EPR) is strongly relating to the above-mentioned container and wrapping garbage, and home appliances waste. Disposal of home appliances and plastic containers is technically difficult and costly. Thus, it is difficult to continue disposal of these kind of waste as a part of public services.

The EPR is to shift the responsibility of collection, re-use, recycling, incineration, and the final disposal of municipal waste from the local government to the product related enterprises, The EPR is one of economic measures for waste reduction and improvement of recycling rate. The compulsive recycling systems of wrapping waste introduced in Germany and France is the typical examples of the EPR. The responsibility being discussed here is not a physical responsibility but it is a payment responsibility, and the enterprises are able to shift the physical responsibility to a third

---

been disposed under the responsibility of local governments.

party by bearing the cost for accomplishing physical disposal. The following three points are enumerated as purposes of introducing the EPR.

1) The manufacturers design and produce eco-friendly products (easy for reusing or recycling), and consumers purchase eco-friendly products, because waste disposal cost is imposed on manufactures or consumers.

2) Reduction of waste generation, and reuse and recycling of waste are facilitated.

3) Economic efficiency of waste management is improved by privatization.

The presently introduced EPR is classified into three forms as described below.

1) Complete execution: The responsibility of waste disposal concerned is completely shifted from the local government to the related enterprises (the Circulation Economy and Waste Management law of Germany, etc.).

2) Partial execution 1: The local government and business entity concerned share the physical disposal responsibilities (container and packaging recycling law of Japan, home appliance recycling law of Japan, and government ordinance for household container and packaging waste of France, etc. Collection and separation of waste is responsibility for local governments in the container and packaging recycling law of Japan, and collection and transportation of waste is responsibility for local governments in the home appliance law of Japan.).

3) Partial execution 2: The business entity allots the disposal responsibility with the local government according to the types of waste (agreement between government and enterprises of Netherlands and Finland, etc.).

The OECD report said that waste reduction and improvement in recycling rate are accomplished under the form of 1) and 3)[5]. When introducing the EPR in China, considering the peculiarity of China, the ability and the efficiency of local government,

[5] Under the container and packaging recycling law of Japan, the local government is responsible for waste collection and separation. Thus, the cost burden on enterprises is small. As a result, the law has not been able to give the enterprises enough incentives for reducing production and number of

and the characteristics of the products is important.

There are two methods to recover waste disposal cost under the EPR; one is to add disposal cost to product price, and the other one is to make consumers pay disposal cost at the stage of disposal. Both methods have merits and demerits respectively as described below. When selecting one of them, considering the management system of central and local government, the characteristics of the products, the possibility of illegal disposal, etc. is important.

Cost addition to product price

- Transaction is simple and transaction cost is small.
- The price hike is difficult under the free competition among companies. Thus, the enterprises lean to oppose to introduce this type of cost recovery.

Payment by consumer

- Consumers are given incentives to purchase eco-friendly products and to reduce waste generation as they want to reduce the disposal cost.
- Illegal disposal might increase, as the disposal cost becomes direct burden on consumers.

Introducing taxation to specific types of containers, such as disposable containers, and prohibiting the use of the specific types of containers are effective to supplement the EPR.

2.3.3 **Promotion of Green Purchasing** (role of the central and local government)

When people buy products and services, they take account of their price, quality, conveniences, design and so on. However, considering their burden on environment is also important, when buying the products and services. Purchasing eco-friendly products and services is what we call “Green purchasing”.

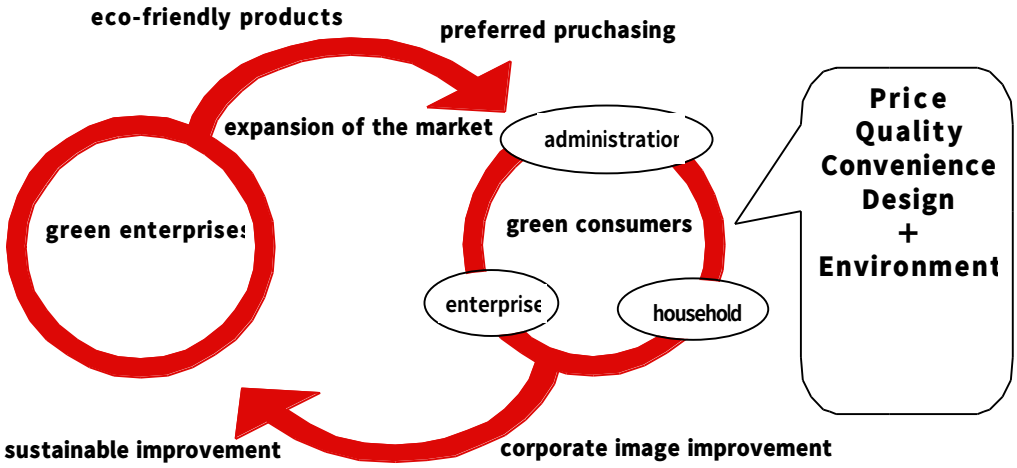
As shown in Figure 3, spread of green purchasing expands the market of eco-friendly products and services, and accelerates research & development of new eco-

---

product varieties.

friendly products. The big demand bodies such as administrative organizations and the enterprises should be the first to purchase green products to generate initial demand and to lower the price of the products. As the price of eco-friendly products go down, the purchasing power of household increases.

Figure 3 Flow of Green Purchasing



Source: the Japanese Environment Association

Green purchasing brings about the following merits.

- Reduce environmental burden from the business activities (reduction of energy consumption by use of energy-saving products, and reduction of waste by use of durable and recyclable products).
- Improvement of environmental awareness and acceleration of introducing environmental management system.
- Expansion of product market in accordance with the improvement of corporate image (by developing eco-friendly products).

2.3.4 Environmental Enlightenment and Education to Residents and Offices (role of the local government)

Constructing systems that controls waste generation at each stage of production, circulation, and consumption of products is required for overall waste reduction. The administration office should enlighten, guide and regulate the residents and the business offices to make them accomplish their roles described below.

1) Residents

- Try to purchase reusable or recyclable products as much as possible.
- Use the purchased products as long as possible and consider the effective use of the products when abandoning them.
- Cooperate to do separate waste collection for the promotion of re-use and the recycling of the waste.
- Purchase recycled products or eco-friendly products as much as possible (green purchasing).

2) Offices

- Increase the use of recycled materials and produce easy recycling products.
- Develop circulation and sales systems that lead to waste reduction, and extend the market for recycled products.
- Classify wastes when abandoning them and try to recycle the wastes as much as possible.
- Improve the level of research on waste reduction and recycling.

2.3.5 Introduction of Command and Control, and Other Economic Measures (role of the central government)

The following measures are also effective to reduce waste generation;

1) Prohibition or restriction of producing and using products that incur high social cost.
2) Discriminatory taxation to the products that incur high environmental burden.
3) Discriminatory taxation to waste disposal measures which causes damage on environment.
4) Guidance for producing and selling long life products.

2.4 Municipal Waste Management Measure 2 in Small-Medium Size Cities; Promotion of Re-Use and Recycling

2.4.1 Collection and Circulation of Recyclable Waste

The process of collection of recyclable waste and delivering them to recycling dealers is basic factor to stabilize reuse and recycling system. Developing recycling technology and extending market for reuse and recycling products are also important. To maintain the process of recycling, comprehensive social system is required. The system would be established by combining some of measures under the condition of the EPR. These measures are described below.

(1) Introduction and expansion of separate refuse collection (role of the local government)

Collecting a certain amount of homogeneous quality of recyclable wastes is imperative to recycle waste. Therefore, the system of collecting reusable and recyclable waste needs to be established, and the separate refuse collection is the base of the system. The Changzhou Municipality has a plan to start separate refuse collection by classifying waste in four types; 1) recyclable waste (papers, plastics, metals, etc.), 2) organic waste (reuse as compost), 3) toxic waste (batteries, etc.), and 4) other waste[6]. To promote reuse and recycling, the further detailed classification of recyclable waste would be required.

In relation with the above-mentioned EPR, it is controversial to decide who bears the responsibility of separate collection. In the case of waste classification in Changzhou, 1), 2) and some sort of 3) should be reused or recycled, and the EPR might be applied to 1) and 3).

The collection by the municipality that has already established the route of the waste collection is efficient. However, if the municipality bore the responsibility for separation, collection and transportation of waste, the burden on product producers,

[6] If the separate collection is introduced, it would be the first case at the level of small and medium size cities.

who bears the responsibility only for recycling products, becomes too small. Under such a situation, producers do not have enough incentives to reduce the production of would-be waste products and to design eco-friendly products as in the case of container and packaging recycling law of Japan. Therefore, even if the municipalities do separation and collection of recyclable waste, the product producer should pay all the disposal cost including cost for separation and collection. The cost burden increases as the classification of waste increases. To reduce the number of waste varieties (for example, the variety of pet bottle), polluter (in this case, it is producer) pay principle is preferable. Considering efficiency, realistic way is that the producer commissions the collection and transportation fees to the local government or joint organizations, which would be established by related producers.

As mentioned above, free collection of recyclable waste (while charging for waste that needs disposal) accelerates the separation of waste.

(2) Establishment of recycling centers (role of the central and local government)

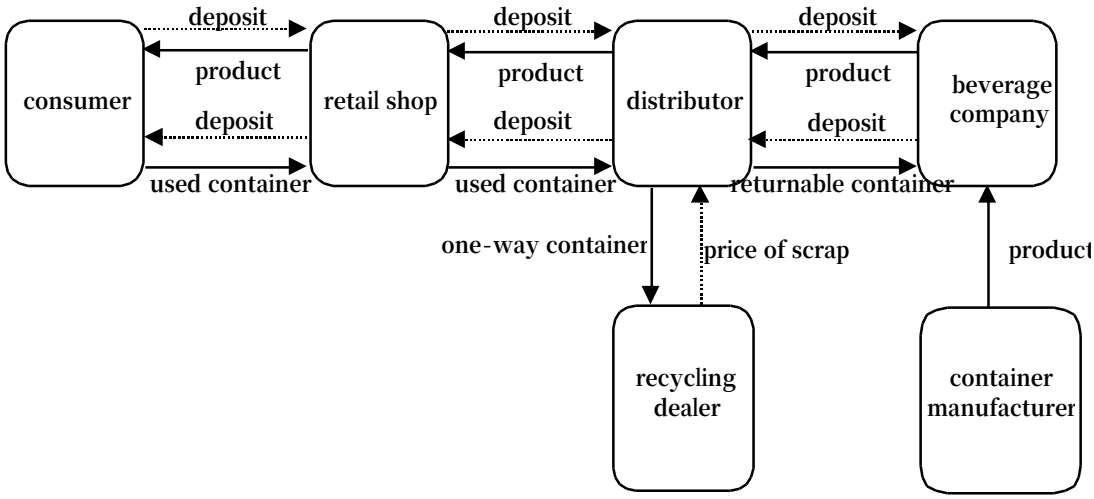
Accepting recyclable waste by free of charge at the recycle center is one of ways to accelerate waste separation. Large-scale containers would be set corresponding to the classification of the recyclable waste in the center, and the nearby residents would bring the waste by their own. The government or the business entities concerned would pay the management cost of the center. In China, the Useful Rubbish Recycling Center of the NEPA and the Green Passage Office of the Ministry of Information and Industry would play a pivotal role to establish area based recycling centers.

(3) Expansion of deposit refund system (one of the choices of the EPR) (role of the central and local government)

The deposit refund system is one of measures taken by the product producer to accomplish reuse and recycling obligation of their products (the obligation is bore by the EPR). Under the deposit refund system, a constant amount is added to the price of the objective products as deposit. The deposit is partially or totally refunded when the consumers returned the products to the designated places. Generally speaking,

the used products are supposed to return to the producers through the reverse route of the circulation route under the deposit refund systems. The deposit refund systems have been applied to drinking containers, waste oil, batteries, and automobile tires in the world. This system has been applied to glass bottles in China. The system is effective to raise the collection rate of the objective products, to promote reuse and recycle, and to prevent garbage (such as cans and bottles) from scattering. Figure 4 shows the example of the deposit refund system in Oregon State of the United States.

Figure 4 the Deposit Refund System of Oregon State of the U.S.



Source: "Mechanism of recycling" the Nippon Jitsugyo Publishing, 1998

The deposit refund system is classified into a voluntary deposit refund system and a policy-oriented deposit refund system. The former system is introduced with the economical rationality (for instance, when the cost of using reused containers is cheaper than the cost of procuring new containers). The latter system is introduced compulsorily with a policy intention. The system being introduced in China belongs to the former one. To promote reuse and recycling of beverage containers in the main, the latter system needs to be introduced (introducing policy-oriented deposit refund system might be reasonable when taking account of external costs). When introducing the deposit refund system, it is important to take account of the following points;

1）The ratio of the products for the deposit refund system is small in the waste in the small-medium sized cities of China at present. Thus, the impact on the waste reduction will be limited for the time being even if the deposit system is introduced. However, expanding the objective products and maintaining the system at the early stage are important, considering future increase of the ratio of the waste for the system.

2）Once the objective categories were set, there should be no exceptions in the categories. This is important point to keep fairness in market economy.

3）As for the route, it needs not necessarily be a reverse route. The refund to the container is done at the collection center (it is called as redemption center) in the California State of the U.S. Setting up the redemption centers helps to resolve problems relating to stock of the returned products and to reduce the burden on retail stores. In Sweden, the non-profit government authorized corporation established by container manufacturers has been operating the collection system of the beverage container and managing deposit money. In South Korea, the governmental agency (the South Korea Resource Reproduction Corporation) collects deposited money from the business entities at the stage of product production or import, and the deposited money is supposed to return to the entities. The returned amount of money is based on the amount of collection of the entities' own products (the products might be collected by the entities themselves or by the recycling dealers).

(4) Setting of specific organization (one of the choices of the EPR) (role of the central government and local government)

Commissioning all the works on product recycling (from separate collection to developing recycling products) to the officially recognized corporation is one of ways to fulfill the recycling obligations imposed on the product producers (the cost should be born by the producers). The Useful Rubbish Recycling Center might play this role as an officially recognized organization in China.

Establishing and operating a non-profit recycling organization is another ways to fulfill the recycling obligations for the product producers. This way leads to establishment of efficient recycling system because the producers have the best

knowledge to reduce the volume of waste and to reuse and recycle of their own products (the DSD of Germany is one of the examples).

2.4.2 Promotion of Recycling

(1) Establishment of recycling product markets (role of the central government)

The recyclable waste does not circulate well without actually being used. Payment might be required for the receipt of the collected recyclable waste when there is no demand for the waste (this is what we called “reverse-payment of the recyclable waste”). In the case of reverse-payment, the collected recyclable waste is often disposed again.

Therefore, it is necessary to increase demand for the recyclable waste and to decrease the cases of reverse-payment by policy inducement described below.

1）Taxation on virgin raw material

2）Subsidy for the purchase price of the recyclable waste

3）Subsidy for the development of recycling technology development

The tax revenue from 1）might make up the expenditure for the subsidy 2) and 3).

Moreover, the market of recycled products is often undeveloped, and there are some cases that the markets disappear in the short term even if the market was established. Therefore, it is necessary to promote the use of the reproduced goods from recycled materials through the following methods etc. and to expand demand of the products.

1) Imposition of compulsory use or reuse of fixed ratio of recycled materials on the manufactures
2) Promotion of the above-mentioned green purchasing
3) Support for recycling-promoting volunteer group
4) Preferential taxation treatment to the organizations using recycled product

(2) Support or expansion of regional level recycling

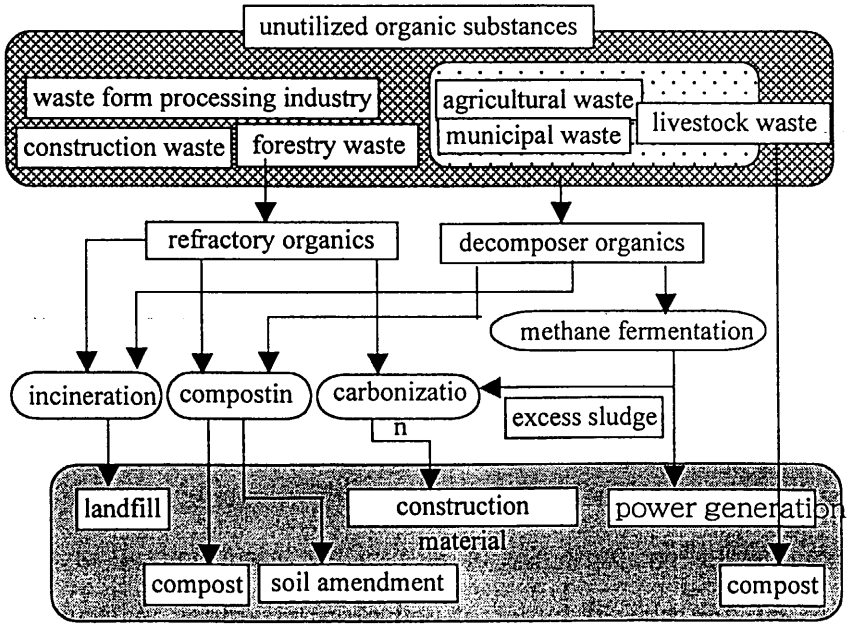
It is effective and important to support or expand regional level recycling system in the small-medium sized cities of China. Judging from the cases of the two cities

described below, it is estimated that the ratio of organic garbage is more than 50% of all the municipal waste in many of small-medium sized cities at present. The organic garbage will be used as compost again in the farm village. Thus, the recycling system of organic waste functions well and the majority of the garbage will be reused. Actually, the Changzhou Municipality have been had this kind of regional recycling system.

Regarding to the reuse of organic garbage, circulating within a township is appropriate judging from the case of Nagai City of Japan[7]. Figure 5 shows the ideal flow of technologies and substances for regional level recycling of organic waste. The concrete flow of reusing organic waste for the small-medium sized cities of China, which was drawn based on the interview in Changzhou, is shown in Figure 6.

Even if the ratio of organic garbage decreases in the future, the regional level recycling must be still effective. Thus, the system should be maintained.

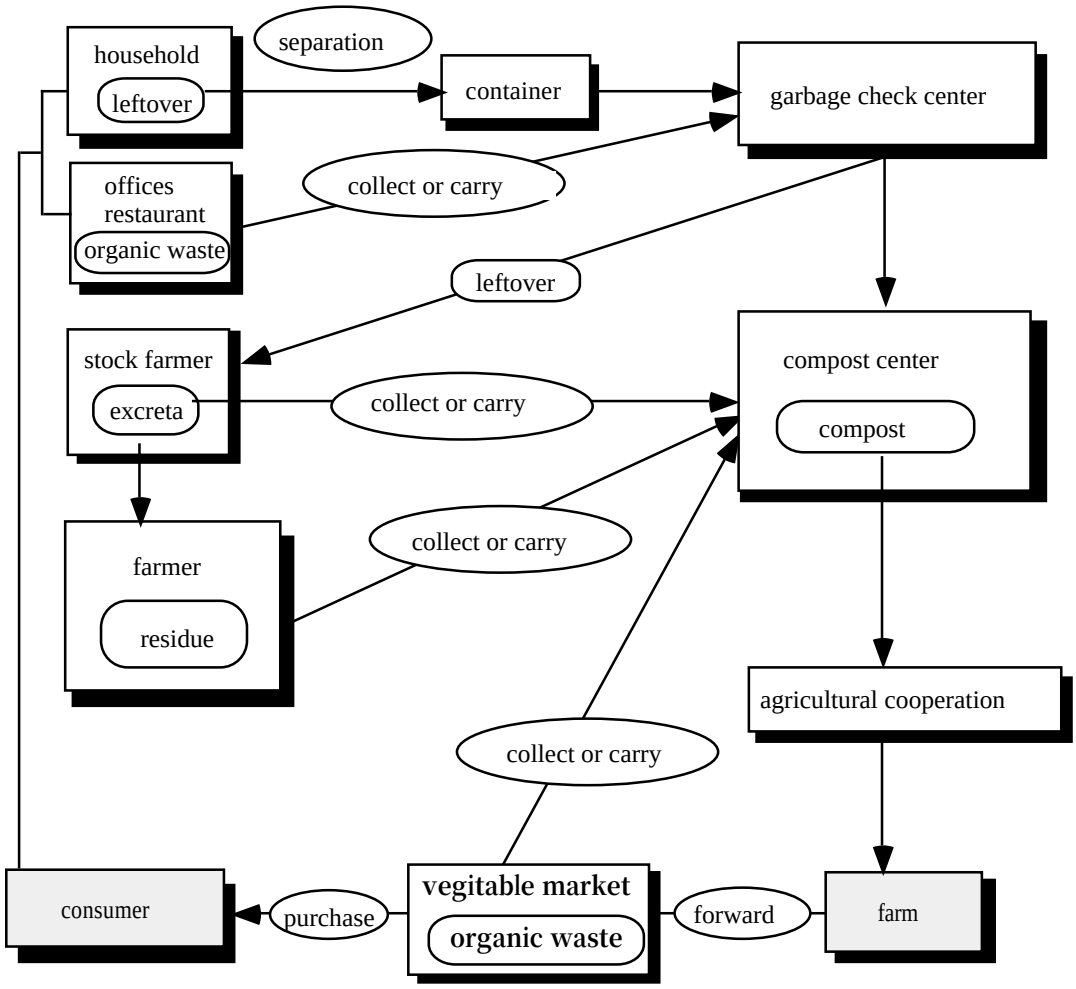
Figure 5 the Flow of Technologies and Substances for Regional Level Recycling of Organic Waste



Source: "Environmental information science thesis collection No. 14,2000", the Environmental Information Science Society

[7] In Changzhou, the organic garbage from the vegetable market has already been used as compost.

Figure 6 Example of Regional Level Recycling of Organic Waste



Source: the Study team

(3) Recycling of products containing hazardous materials (role of the central government and local government)

Cooperation with the related industries is imperative to facilitate recycling of the products, which contains hazardous materials (battery, electronic equipment, etc.). The recycle should be promoted by setting the target amount of products/equipment collection and the phased target of reducing hazardous materials contained in the newly developed products.

(4) Enactment of recycling standard (role of the central government)

Using the low-quality recycling materials might cause air and water pollution. Therefore, it is imperative to set the recycling standard, and promote high standard recycling. Moreover, assessing the load to the environment of the product (life cycle assessment (LCA: Life Cycle Assessment)[8]) should be implemented. Recycling plan, which decides the products to be recycled or disposed, should be made based on the result of the LCA. Setting target rate of recycling on each product is also important by using LCA.

Furthermore, target of waste reduction rate and recycling rate should be set by each of local government.

2.4.3 Utilization of Waste Heat (role of the local government)

Even if the reuse and recycling completed, waste may still remain. The flammable waste in the remaining waste would be incinerated in the facilities, which have countermeasures to prevent hazardous materials emission. The heat energy generated in the incineration facilities should be used as much as possible (such as heat supply and power generation).

2.4.4 Prevention of Illegal Dumping (role of the central government)

Counter measures should be completely taken to prevent illegal dumping done by the household and the waste collection dealers. The followings are enumerated as countermeasures to prevent illegal disposal.

1) Introduction of waste management voucher system (manifest system) ;

The enterprises, which commission wastes disposal to waste disposal dealers, can follow the transfer of the waste by publishing waste management voucher that is including information on the waste (such as name of the waste, amount of the waste,

[8] LCA is the method to quantitatively evaluate the environmental load from the beginning to the end of the lifecycle of the product. LCA is applicable to the widespread environmental problems, as integrated environmental load generated from the product will be evaluated.

form of the waste, amount of the waste, name of the forwarding agency, name of the disposal company, and directions of the waste disposal). The published voucher is supposed to deliver from the waste-discharge company to waste collection/forwarding companies, and the waste collection companies hand over the voucher to the waste disposal companies. In the case of clean up of hazardous waste sites, the responsibility is given to the voucher published company and the companies included in the voucher.

2) Reinforcement of penalty for illegal disposal

3) Clean-up obligation of old hazardous waste disposal sites; Clean-up cost should be imposed on the parties involved.

2.5 Municipal Waste Management Measure 3 in Small-Medium Size Cities; Promotion of Appropriate Disposal of Waste

2.5.1 Enhancement of Environmental Measures on Incineration Facilities

(1) Setting of strict standard on incineration facilities (role of the central government)

Generation of PCDDs (polychlorinated-dibenzo-p-dioxins), which is hazardous chemical materials, is big issue in Japan, and it is reported that 80 to 90% of PCDDs is emitted from waste incinerators. As the emission of PCDDs has become an object of public concern, PCDDs emission needs to be reduced immediately. It is not clear about the actual situation, but there are possibilities that PCDDs emit from the incinerators in small and medium sized cities of China.

Thus, it is necessary to measure concentration of PCDDs emission and to implement countermeasures in the facilities where the concentration exceeds the standard. The countermeasures includes, 1) appropriate combustion control, 2) modification form intermittent operation to consecutive operation, 3) improvement of facilities, 4) suspension of operation or abolition of the facility, and so on. Prevention of PCDDs generation in the incineration process and advanced treatment, such as fusion solidification of ash, are also necessary to reduce PCDDs contained in

incineration residue and fly ash. Further, taking litter prevention measures and prevention measure of groundwater and irrigation water contamination by leachate should be taken at the landfill site of the incineration residue

Regarding to the following detail items on municipal waste management measure 3, their contents will be described in the next report through further study and examination.

(2) Minimization of waste incineration (role of the central and local government)

It is technically difficult to achieve zero-emission of PCDDs from incinerators when the waste is incinerated. Further, huge amount of capital investment and sophisticated technology are required to remove high percentage of PCDDs. As the chemical reaction on the incineration process has not been perfectly clarified, it might generate another toxic substances if the waste is incinerated by high temperature to control the generation of PCDDs. Thus, priority should be given to the control of waste generation and minimize the disposal by incineration as much as possible. And, the basic solution for minimizing waste incineration is not to incinerate the waste that does not need to incinerate or causes bad environmental effects by its incineration. The organic waste should be composted or methane fermented. Preparing proper storage space is one of measures to dispose organic waste, as the organic waste degrades naturally. The waste including chlorine compounds (vinyl chloride resin, etc.) which causes PCDDs generation should be completely separated and not be incinerated. The waste, which is not separated or cannot separate, should not be incinerated.

(3) Area-wide waste disposal (role of the local government)

Establishing high-temperature and 24 hr consecutive operation incinerator is necessary to reduce emission of PCDDs. However, most of the incinerators operated by local municipalities are small and operation time is short in China. Consecutive operation is not required, as the amount of waste for incineration disposal is small in one unit of small and medium sized municipality of China. In that case, one of

solutions is to integrate each of incinerators and construct a consecutive operation incinerator by the coordination of adjacent municipalities. Financial difficulty to construct new incinerator might also be resolved.

2.5.2 Maintenance of Landfill Sites (role of the central and local government)

Landfill of the waste should be done with the appropriate measures. Hauling of the waste to the landfill sites should be done with information regarding waste disposal commission after separate collection and removal of hazardous materials. Monitoring at the landfill site is imperative, and monitoring system by the administration also needs to be strengthened. Considering environmental condition is prerequisite when selecting the landfill sites. In addition, 1) waste quality control, 2) enhancement of landfill structure, and 3) enhancement of monitoring system should be examined to appropriately manage landfill sites.

Landfill sites should be classified according to the types of waste landfilled, and standards for structure and maintenance should be set for each of the classified landfill site. The mixed waste without separation collection might cause chemical reaction and generate hazardous materials. As a result, the waste might contaminate underground water. Even if the waste was separately collected, landfilling of the waste should be carefully examined. In Japan, landfill sites are classified into the following three categories based on the waste landfilled at the sites; 1) least controlled landfill site, 2) controlled landfill site, and 3) strictly controlled landfill site.

The least controlled landfill sites accept five stable wastes (plastic, rubber, metal, glass/ceramics, and construction waste). Equipping liner facilities and leachate treatment facilities are not required. The controlled land fill sites accept wastes excluding highly hazardous materials. Putting liner sheet and equipping leachate treatment facilities are required. The strictly controlled landfill sites are separated by concrete from the outside, as the sites deal wastes that has saprophytism. The detailed explanation regarding classification of landfill sites in Japan is shown in table 1.

Environmental condition should be fully considered when monitoring or re-

utilizing completed landfill sites. Clarifying the standard for landfill site closure and introducing administrative monitoring system for conforming to the standard are important. Establishing long term monitoring system for the completed land fill sites is also important. Furthermore, taking prevention measures for environmental contamination when back-filling the landfill sites and notifying the fact that the sites were used as landfill sites when re-utilizing the completed landfill sites are necessary.

Table 1 Classification of Landfill Sites in Japan

Classification	0utline of landfill site	Facilities required
1. Least controlled landfill site	Waste from which hazardous materials will elute is not accepted. Prevention measures for landslide and ground subsidence are taken, and enclosure is set up to prevent invasion.	1) enclosure 2) notice board 3) prevention measure for landslide 4) prevention measure for ground subsidence 5) retaining wall/dike
2. Controlled landfill site	Liner facility, such as liner sheet, is set to prevent underground contamination as the sites accept waste which may elute hazardous materials. Leachate treatment facilities are also equipped.	1)～5) are sama as the above 6) vent system 7) liner facility 8) collecting system 9) leachate treatment facility
3. strictly controlled landfill site	Landfill site is completely insulated by concrete (thickness of more than 15cm), as the waste which is hazardous and has saprophytism.	1)～4) are same as the above 5) open channel 6) prevention measure for rainwater inflow 7) inner sluice facility 8) outer sluice facility 9) cover 10)prevention measure for corrosion

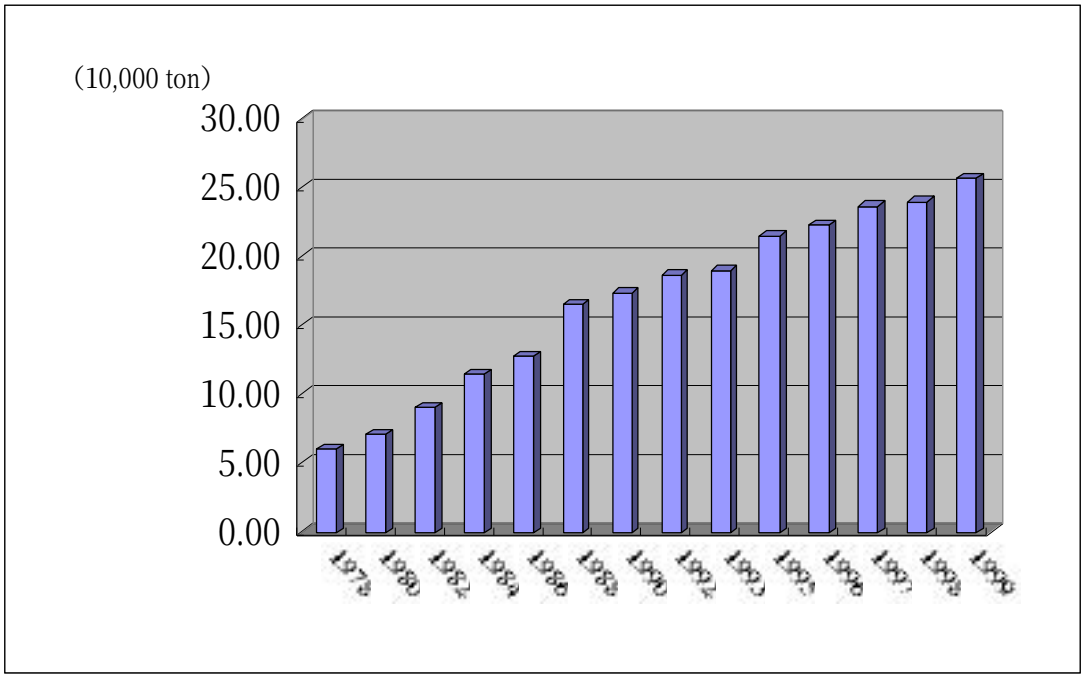
Source: HP of the Ministry of Welfare

2.6 Current Situation and Future Direction on Municipal Waste Disposal in Local Cities of China

2.6.1 Current state of Municipal Waste Discharge

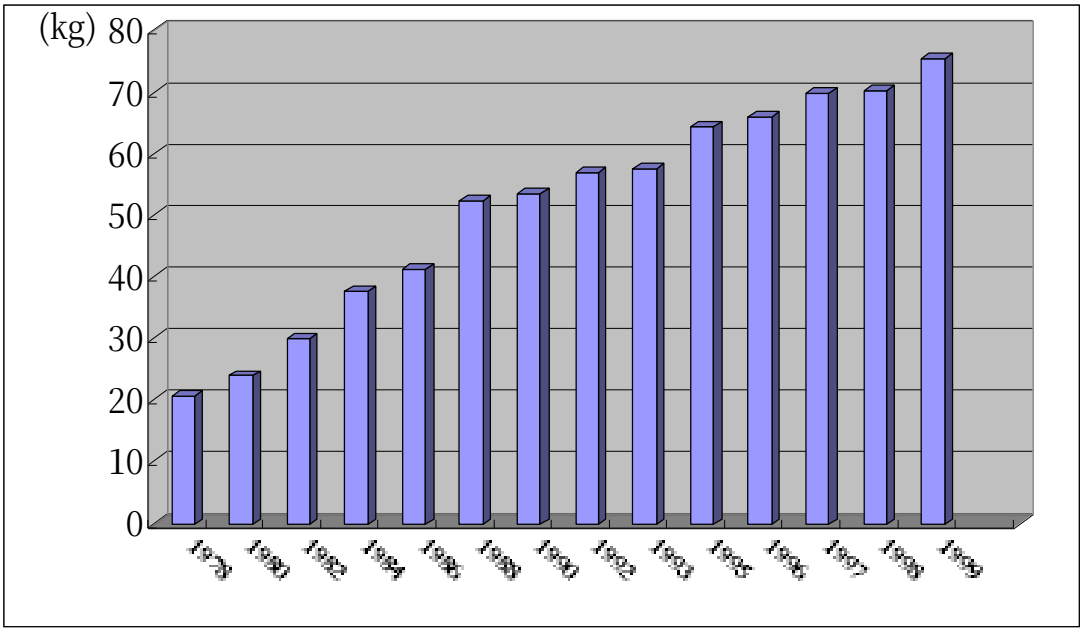
The amount of municipal waste in Changzhou has been increasing year by year as shown in Figure 7. The amount of waste reaches 257,000 tons per year in 1999, which is 3.6 times as high as of 71,000 tons in 1980. The factor of this increase is an increase of per capita waste discharge in addition to an increase of the municipal population. As shown in Figure 8, the amount of per capita waste discharge in Changzhou increased from 24 kg in 1980 to 75.7kg in 1999. (A nationwide average of Japan is 426 kg in 1998). The amount of municipal waste in Zhenjian also increased from 180,000 ton in 1995 to 200,000 ton in 1998 as shown in Figure 9.

Figure 7 Change of Amount of Municipal Waste in Changzhou (from 1978 to 99)



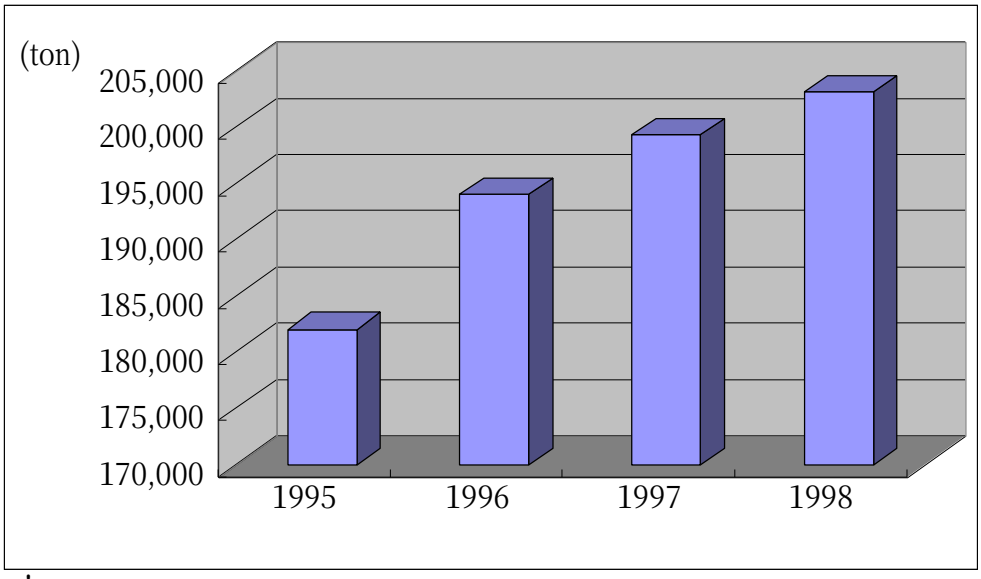
Source: the Study Team (made by using data from Changzhou city construction committee)

Figure 8 Change of per capita Waste Discharge in Changzhou (from 1978 to 99)



Source: the Study Team (made by using "Changzhou Statistical Yearbook" and data from Changzhou city construction)

Figure 9Change of Amount of Municipal Waste in Zhenjian Municipal Zone (including some townships*) (from 1995 to 98)



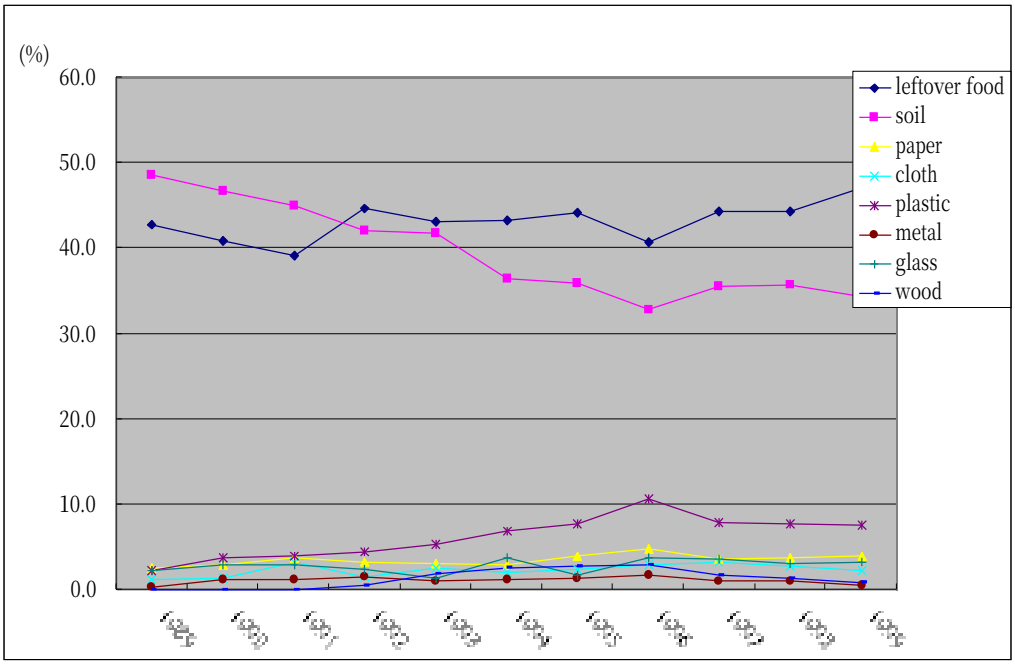
*The amount of waste disposal from Dingmao, Dagang, Jianbi, Dantu, Xiangshan, Rushan, Mai, Guantang, Weigang is included.

Source: the Study Team (made by using data from the Zhenjian municipal environmental hygiene center

The ratio by garbage composition in Changzhou is shown in Figure 10. As the figure shows, leftover food occupies about 50% of all waste, and the ratio becomes about 80% when the amount of soil is added to that of leftover food. The ratio of plastic has an upward tendency, though it had been fixed in the last three years.

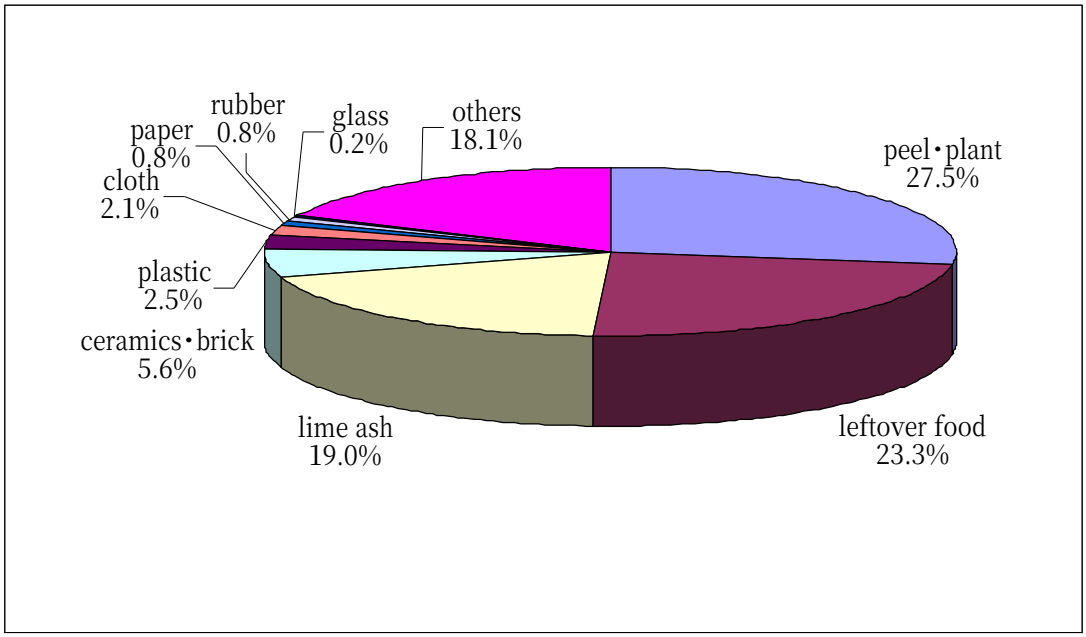
The garbage composition of Zhenjian Municipality is similar to that of Changzhou Municipality as shown in Figure 11. The organic garbage, such as peel, plant, and leftover food accounts for about 50% of all waste collected in a trash collection center in Jangbinxiu village.

Figure 10 Change of Ratio by Garbage Composition in Changzhou (from 1989 to 99)



Source: the Study Team (made by using data from Changzhou city construction committee)

Figure 11 Ratio by Garbage Composition at the Jangbinxiu Village Trash Collection Center in Zhenjian



* Data on 8th - 29th in August of 2000
Source: the Study Team (made by using data from the Zhenjian municipal environmental hygiene center

2.6.2 Future Issues on Municipal Waste Discharge

Under the present situation in which organic garbage is accounting for more than 50% of all waste, free trash collection as part of public service might be equitable treatment, as each resident discharges almost same amount of waste. Further, the free trash collection is part of solutions for hygiene related problems, such as epidemic prevention. However, it is not clear whether free collection works or not in the future as the amount of per capita waste discharge will increase dramatically in local cities like Changzhou and Zhenjian. Per capita income will increase as long as economic growth continues in China, so will the amount of garbage, because consumption increases along with the increase of income generally.

In Japan, the amount of waste increased as the Japanese economy developed. Moreover, the composition of garbage has changed due to the development of the science and technology, and the change in the lifestyle. The ratio of organic garbage

has decreased, while plastics and other materials, which are recyclable but difficult to dispose, have increased. The increase of throwaway products spurred the increase of waste discharge. As in the case of a city in Osaka Prefecture (Japan), the ratio of organic garbage is 29.9%, container and wrapping garbage (such as paper, plastic, glass bottle, and can) is 23.1%, and noncombustible garbage is 4.2%. It is clear that the ratio by garbage composition of the city in Japan is greatly different from that of Changzhou and Zhenjian where the ratio of organic garbage is more than 50%. The ratio of container and wrapping garbage is especially big when it is scaled in volume (rather than in weight).

According to the study conducted in Kyoto City in 1980, about 60 percent of the municipal waste were container and wrapping garbage in volume base. The volume based garbage components in other cities were almost same as in Kyoto City according to subsequently conduced studies. On the analogy of these studies, it can be said that the rural life style has almost disappeared in Japan. It is expected that the same trend as of Japan will be actualized in local small-medium sized cities of China in the near future. The origin of waste related problems has extended from container and wrapping to home electric products, and is expanding to electronic equipment now in Japan. It is foreseen that the root of waste related problems extends in China with a similar trend as of Japan.

In the Jiangsu Province, using polystyrene foam container and plastic bag (thickness of less than 0.025mm) is prohibited from October 2000. Further, the ordinance to prohibit production of non-reusable plastic container was promulgated in January 2001 and the government recommends using paper containers or biodegradable containers in substitution for non-reusable plastic containers. These administrative leadership should be highly praised.

The comprehensive problem in Japan is that the capacity of waste disposal is almost reaching to its limit spatially and physically, especially in cities due to the change of waste component and the increase of waste discharge. Up until now, each municipality has constructed new incinerators and landfills, or has given additional maintenance to existing facilities to cope with the demand increase for waste disposal.

However, it is difficult to expand the capacity of the incinerators and landfills now because of the upsurge of opposition movements to the expansion of these facilities as environmental awareness goes up. Further, it is quite obvious that expanding capacity of waste disposal facilities cannot solve a fundamental problem.

In Japan, consumers have not had incentives to reduce waste discharge since municipal waste disposal has been done by free as a part of public services (by using tax revenue in other words). In addition, motivation has not been given to producers to research and develop eco-friendly or recyclable product designs due to the lack of system giving responsibility of waste management to product producers. As a result, waste discharge has increased. It is difficult to reduce the amount of waste discharge without giving economical incentives.

In China, waste disposal is a part of public services at present. However, it should be converted to private service taking account of market economical point of view in the near future.

The other point that should be considered is special characteristics that the small and medium sized cities of China will have. These cities have been becoming the centers of business and social services. As the cities become economic and social centers, waste from business establishment increases due to the increase of paper consumption brought by the introduction of information technology, and the increase of leftover and plastic container consumption resulted in the development of food industry (such as fast food industry, etc.). In the case of Tokyo metropolitan area, the amount of per capita waste discharge from 23 districts, which are the centers of business and social services, is bigger than the amount from the Tama region that is the residential area. It seems that same phenomenon as in Tokyo will be actualized in the small and medium sized cities of China. Thus, it is necessary to consider measures to reduce business wastes in the early stage.

2.6.3 Current Situation of Municipal Waste Disposal

The disposal measures taken in the Changzhou Municipality are; 1) incineration (one incinerator (the capacity of disposal is 150 ton/day), 2) landfill disposal (three

landfill sites), and 3) reuse as compost (garbage from the vegetable market in the suburbs is reused as compost). As for the amount of disposal, 70% of the whole waste is reclaimed and remaining 30% is incinerated or reused. Considering an increase of waste discharge in the future, the capacity of landfill, and environmental pollution from landfill sites, waste discharge should be reduced drastically. On the other hand, almost all waste is reclaimed in the Zhenjina Municipality without separating refuse, and recyclable waste dealers recycle only partial of trash.

Judging from the above-mentioned current state of two cities, landfill is the main measure of waste disposal, and incineration or reuse/recycling to reduce waste volume is complementary measures in small-medium cities of China.

2.6.4 Future Direction of Municipal Waste Disposal

About 80% of the collected municipal waste is disposed by intermediate treatment (mainly by incineration) and landfill in Japan. The ratio of incineration disposal in Japan is the 2nd highest in the world after Switzerland (average ratio of European countries is about 40%). As for the process of municipal waste disposal in Japan, the basic flow is; garbage collection → transportation → intermediate treatment (mainly incineration) → transportation → final disposal (reclamation). The different point from the case of China is that the flow includes intermediate disposal to stabilize and to reduce volume of waste. However, incineration ash and residue are left even if the intermediate treatment, such as incineration, is done, and landfilling is still required as the final disposal measure. Further, the excessive incineration should be avoided, and the volume and weight reduction should be accomplished by reducing waste discharge.

Recently, the generation of toxic materials, such as endocrine disrupters including dioxin, through the chemical reactions on the process of intermediate treatment is becoming a big issue in Japan. A fundamental cause of the hazardous materials generation is composition change of incinerated waste (though an immediate cause is a combustion temperature of waste in the case of dioxin generation).

The generation of toxic materials deepened residents' awareness that the

intermediate treatment facilities, such as incinerators and the landfill sites, are pollution sources. Under these situations, constructing new waste disposal facilities is difficult due to the opposition from the resident.

To cope with the increasing amount of waste disposal, it is necessary to reduce the volume of waste with the intermediate treatment in China, though it is not a desirable direction. Examining treatment measures and facility design should be carefully conducted (As Japan has a lot of experience and technology on the intermediate disposals, learning from Japan might be one of ways.). Moreover, there are possibilities that toxic substances have been leaking from the old incinerators and landfill sites. Therefore, it is necessary to inspect existing waste disposal facilities and review the standard related to waste disposal. In addition, keeping incentive for reducing waste discharge is imperative even if the capacity of waste disposal improved as a result of construction of new facilities.

2.7 Recommendations for the Jiangsu Province

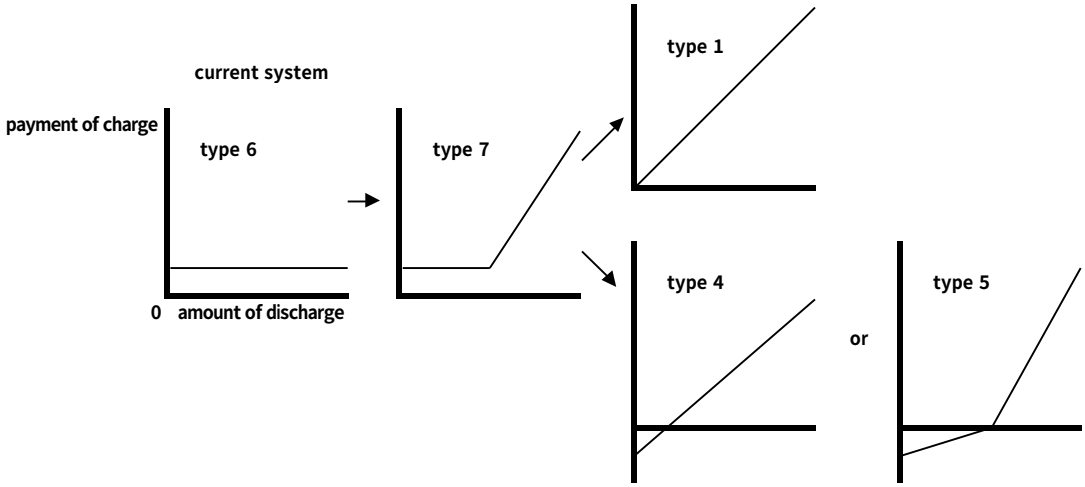
(1) Introduction of charging system for household garbage collection

Each of urban residents in Jiangsu province is levied two to four yuan per month now. However, this is a kind of fixed charging system and does not give residents incentives to reduce waste discharge, because residents can discharges garbage as much as they want to once made the payment.

Thus, the charging system, which gives incentives to reduce waste discharge, should be introduced in Jiangsu province. Definite ideas have already shown in figure 2. As Jiangsu province has already established the fixed charge system, it seems that introducing the combination of fixed charge and discharge proportion type system (fixed charge is imposed up to a fixed amount of discharge. Then the charge is proportionally imposed according to the amount of waste discharge once the discharge exceeded the fixed amount) is appropriate as a next step. Then, the discharge proportion type should be introduced as a final step. However, introducing the charge-assistance combination types, which has a function to alleviate economical

burden, might be better in developing cities in Jiangsu province, as economical gap between poor and rich is big in those cities. The process of introducing charging system is shown in Figure 12.

Figure 12 Process of Introducing Charging System for Garbage Collection



Source: the study team

When introducing charging system for municipal waste, the local government might distribute or sell specified garbage bags to each family as been implemented in Japan. In the case of refund, the government can buy back the bags. The garbage discharged by using specified garbage bags should be collected.

(2) Expansions of separate refuse collection

Changzhou municipality of Jiangsu province has a plan to introduce separate refuse collection, and Nanjing municipality has already introduced separate collection on trial. Both cases should be praised as the separate collection will be or has been done with house-to-house collection. To save labor, time, cost for the house-to-house collection, introducing day by day collection (Designated type of waste is collected each day. The waste should be left in collection points set up block by block.) might be effective. The example based on the waste classification of Changzhou municipality is as follows;

Monday: organic garbage

Tuesday: hazardous waste

Wednesday: no collection

Thursday: organic garbage

Friday: recyclable garbage

Non-designated garbage should not be collected, and cooperation of residents in the block will be necessary to prevent discharging non-designated garbage.

(3) Maintaining and promoting regional level recycling

Many of small and medium sized cities in Jiangsu province have already had regional level recycling systems, which reuse organic waste generated from the vegetable markets as compost. Japanese local cities also had same type of regional level recycling systems in the past. However, the recycling systems have almost disappeared because of the increase of artificial fertilizer use instead of compost. Recently, the importance of compost use has been reconsidered in Japan as the excessive use of artificial fertilizer degraded land fertility. In fact, the number of cities, which are trying to reintroduce regional level recycling, is increasing. It is difficult to reestablish regional level recycling systems, which disappeared as a result of the policy putting priority on economic growth. Thus, maintaining and expanding existing regional level recycling systems in Jiangsu province are important for the future of the province.

(4) Location and monitoring of landfill sites

Locations and monitoring systems of landfill sites need to be further improved judging from the inspection of some of landfill sites in Jiangsu province. Some of landfill sites are located adjacent to farmland. If the waste was landfilled without separation, hazardous materials from the landfilled waste might soak into soil and groundwater. Thus, landfill sites should not be located in the area adjacent to farmland

The system to monitor waste hauling is not well established, and the outsiders can

easily invade into the landfill sites, as there is no fence. Under the condition like this, illegal dumping will be easily done and hazardous waste might be disposed without permission. Thus, strict monitoring system should be established and prevention measures for invasion should be reinforced at each landfill site.

Name List of All Participants
in the Study for Preparing a Guide to Small and Medium-Sized Cities Development in People's Republic of China

People's Republic of China

Department of Regional Economic Development, State Development Planning Commission		
	Deputy Director	Yang Chaoguang
		Huang Weibo
Institute of Spatial Planning & Regional Economy, State Development Planning Commission		
	President	Du Ping
	Vice Director	Xiao Jincheng
		Shen Bing
		Shi Yulong
		Wang Qingyun
Liaoning Provincial Science & Technology Committee	Assistant Director	Meng Qinhai
International Co-operation Department, Liaoning STC	Deputy Director	Piao Mingzhe
Development-Planning Committee of Jiangsu Province	Director	Qian Zhixin
	Deputy Director	Wang Wenqing
	Chief of Development-Planning Section	
		Zhu Xiaoming
	Deputy Chief of Development-Planning Section	
		Sun Jun

Japan

First Development Study Division, Social Development Study Department, JICA		
	Director	Takao Kaibara (~2000.9)
	Director	Toshio Hirai (2000.10~)
	Deputy Director	Eri Honda
		Takayuki Oyama
		Nobuaki Koguchi
Japan International Co-operation Agency in PRC	Resident Representative	Norio Matsuzawa(~2000.7)
	Resident Representative	Yukihisa Sakurada(2000.8~)
	Deputy Resident Representative	Akio Arai
	Deputy Resident Representative	Chihiro Oishi
		Takashi Tanaka
		Yoshihisa Kasuya
		Kenji Maekawa
Project Director / Comprehensive Regional Development		Jinichiro Yabuta
Deputy Project Director 2 / Industrial Revitalization / Urban Development Policy		Zhou Muzhi
Local Finance/ Local Administration & Organization 2		Zhang Zhongliang
Education / Medical Care & Social Welfare / Environmental Management 2		Kozo Ishii
GIS Planning & Land Use		Misato Takahashi
Urban Environment & Water Resource Planning		Zhang Haoqun
Urban Planning 2 / Comprehensive Transportation Planning		Masaaki Sugita
Housing & Regional Planning 2 / Planning System		Yumi Shindo
Industrial Location		Zheng Jingshu
Project Management		Yoko Komatsubara

Member of Study group for Urbanization in Rural Districts in PRC

Research Institute for Urban & Environmental Development	Director	Kazuhiko Abe
University of Tokyo, Department of Urban Engineering	Associate Professor	Tetsuo Kidokoro
Hosei University	Professor and President	Tadao Kiyonari
Osaka Sangyo University	Professor	Shyuhei Konno
University of Shimane	Chief of the Institute for North East Asian Research	Yuji Masuda
The 21st Century Public Policy Institute	President	Naoki Tanaka
Nihon Keizai Shimbun, Inc.	Senior Staff Writer	Hiroshi Yahagi