Urban Water Sanitation in China

Challenges and Opportunities

WANG Zhenyu China National Committee for Pacific Economic Cooperation

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A general survey of fresh water quality—2006, Communique of Ministry of Environment Protection



2006年七大水系水质类别比例



2006年七大水系水质类别比例比较

The Problem is serious.

- Around 100 million urban residents do not have access to safe water.
- Water resource pollution serious. 3988 water pollution incidents occurred from 2001 to 2004, nearly 1000 per year in average. 693 water accidents in 2005, 49.9% of total pollution accidents.
- 2005 survey showed that 27% of monitoring sections of 7 rivers were ranked V in water quality.
- Half of the ground waters in urban areas are polluted in various degrees
- Over-development of the river water in the north (53% in Huai He, 66% in Liao He and 100% in Haihe) drastically reduced the self-clearance capacity of the rivers.
- 72% of 222 drinking water resources of 113 key environmental protection cities are up to quality standards.
- Fast urbanization, an annual increase of over 15 million urban residents, water demand increases sharply.
- Low sewage treatment ratio: in 2006, only 55.67% of sewage was treated.
- By 2006, there were still 248 cities without sewage treatment plants
- Over 400 cities out of 667 cities suffer water shortage, 30-40 billion cubic meters of water is in short every year.
- Urban water systems suffers ecological damages with the increase of water exploitation, sewage discharge, cement covered area and loss of biodiversity, hence blue green alga booms in many water bodies.

Quoting Qiu Baoxing, Vice Minister for Housing and Urban-Rural Quality Safeguard of Urban Water Supply

- Quality deterioration of drinking water sources
 - Organic pollutants
 - Water eutrophication (algae growth)
 - Water pollution emergencies by industrial discharge
 - Requirements for upgrading water purification process and emergency response system



Deep-Rooted Causes for the Problem

- The cost of law-abiding is very high while the cost of law-violation is relatively low – hence sewage discharge is hard to curb. (Tuojiang River Pollution Incident: the inflictor: Sichuan Chemical Group of Chengdu caused an economic loss of 200 million yuan, but only paid 12 million yuan for compensation and fine.)
- Mentality of "treatment after pollution" is yet to be changed.
- Pro-GDP orientation of local authorities leads to conspiracy with discharge enterprises. (Huaihe River Pollution, Taihu Lake Pollution)
- Governance default: 9 dragons manage water. The water sector administration is separated. The ruling is not consistent, while vested interests is inevitable.
- Market default: the relevant water management bodies are public utility bodies, not enterprises. Water is not managed according to market rules, and investment was hard to introduce. Efficiency was very low.
- Pricing mechanism default: sewage pricing much lower than sewage treatment cost: 67%.

National Policy—law building

- Water Law (Oct 2002) on water protection and use, sewage discharge is forbidden in the drinking water source area. Govs at various levels are charged to improve water drinking conditions for the urban and rural people. Water use must be permitted.
- Law Environment Influence Evaluation (Oct 2002)
- Environmental Quality Standards for Surface Water (1997)
- Quality Standards for Urban Water Supply (Feb 2005 Ministry of Housing and Urban-Rural Development, 103 items)
- Standards for Drinking Water Quality (2006, Ministry of Public Health, 106 items)
- Regulations on Levy and Use of Sewage Discharge Fees (July 2003) (specially used for discharge treatment, rules of accounting and auditing)
- Law on Water Pollution Prevention and Management (February 2008)(sewage discharge must be permitted, urban water pollution management, drinking water source protection, direct discharge forbidden etc. river basin permit limit introduced) (1984, 1996, 2000, 2008)
- Law on Urban and Rural Planning (Jan 2008)
- Environmental Protection Law (Dec. 1989)
- Rules on Urban Water Supply (Oct 1994)
- Regulations on Quality Management of Water Permit (Jan. 1996)
- Methods on Applying Water Administrative Punishment (Dec. 1997)
- Rules on Quality Management of Urban Water Supply (May 2007)
- Pending: Rules on the Protection of Drinking Water Sources; Rules on Water Discharge Permit

National Policy--Planning

- Drinking Water Safety: 1st Priority of all the pollution control efforts.
- 11th five-year plan, enhancing the pollution control in the three rivers and three lakes, identify drinking water source protection zone, enhancing prohibition of direct discharge of sewage in major rivers and lakes, resolutely banning direct discharge outlet at the drinking water source zones, over-polluted sewage discharge in water bodies is forbidden. Enhancing sewage treatment facilities in cities, levying sewage treatment fee universally, at least 70% of urban sewage shall be treated by 2010.
- -2005, State Council: Circular on Enhancing Drinking Water Safety and Safeguard, covering planning compilation, rural water safety, urban water safety, drinking water source protection and water pollution control, monitoring mechanism, reserved water resource and emergence response system, etc.
- -2007, five ministries, National Development and Reform Commission, Ministry of Water Resource, Ministry of Housing and Urban-Rural Development, Ministry of Public Health, Ministry of Environment Protection, "Planning of National Urban Drinking Water Safety and Safeguard"

Objectives:

By 2020, improve drinking water safety in all cities and county-level townships, establish a complete drinking water safe-guard system. By 2010, solve drinking water safety problems identified in 205 cities and 350 county level townships with striking water safety problem. By 2010, cut COD by 10%, including reducing 3 million tons through increase urban sewage treatment capacity by 45 million tons per day; reducing 1 million tons by industrial sewage treatment.

Approaches

- Drinking water source protection and water pollution control in the source area
- Water saving efforts combined with expansion and restoration of existing water projects;
- Upgrading water cleaning and transferring facilities and, build water quality inspecting capacity;
- Improving monitoring and information system of water safety

Give market a role

- Starting from 2002, government opened the water market for private enterprises and foreign capital.
- The water market is big (1 trillion yuan market in the 11th five-year period)
- The water market is open
- Foreign investment is burgeoning (case of 2007, French Veolia, buying a series of water plants with premium price)
- Internal investment is coming up (case of Beijing Capital Group, help Hunan Province in developing around 200 water projects.)

A Successful Story of Beijing -- A. Basic situation

- Annual water demand is 3.4 billion m3, rainfall provides 2.6 billion, ground water 400 million m3, shortage 600 million.
- Drinking water sources (Miyun, Huairou reservoirs) and ground water quality remains stable.
- City proper Surface water systems polluted in various degrees.

Quality Survey of Beijing Water Systems (2005)



A Successful Story of Beijing -- B. river-basin management

2001, river-Basin and Cross-river-Basin Management: Plan for Sustainable Use of Water **Resources in the Capital Area in Early 21st** Century. Program Coordinating Group under direct leadership of Ministry of Water Resources, comprising Ministry of Finance, Commission of Development and Reform, Ministry of Housing and Urban-Rural Development, Ministry of Environ. Protection, Department of Forestry, Shanxi Provincial Gov. Hebei Provincial Gov, etc.

Outcome and Effects

- By 2006, 14.8 billion yuan investment, water saving irrigation area: 116,000 km2, soil erosion control 3829 km2, pollution spot management:68, urban sewage treatment plant: 19
- Integrated urban-rural water management.
- Water price lift: Beijing from 1.5yuan/m3 to 5.04yuan/m3; sewage treatment fee: 0.9-1.5yuan/m3
- Water transfer from Hebei and Shanxi to Beijing, 301 million m3 in 4 years.
- Water consumption per 10000 yuan GDP:104 m3 in 2001 to 50.7 m3 in 2005; industrial water re-use rate: 91%.
- 5 rivers rehabilitated in Beijing, urban sewage treatment capacity reached 2,480,000 tons per day, 70% of sewage was treated, deep treatment reclaimed water plants: 4, by 2005 260 million m3 of reclaimed water used, 30% of the reclaimed water. Guantin Reservoir water quality form >V upgraded to IV and V., etc

A Successful Story of Beijing -- C. Integrated water management Governance

2004, establishment of Beijing Water Bureau to integrate functions of the former water resources bureau, water supply, sewage discharge, and urban water saving functions of city administration commission, and the former tap water supply group, and sewage treatment group, receiving management from Ministry of Housing and Urban-Rural Development, Ministry of Water Resources, and Ministry of **Environment Protection.**

Governance Structure



北京市水务四级管理模式 Four lever of water management

Integrated water management Governance: Effects

- Universal and Whole-process management, including flood control, water conservation, supply, drainage, sewage treatment, use of reclaimed water, consistency is guaranteed in policy making for water conservation, development and use.
- Administrative efficiency is improved: external coordination became internal coordination. Example: use of reclaimed water, overcapacity of reclaimed water plant vis-à-vis inadequate user, water shortage of power plant, default of transfer pipes: the problem was solved in half a year.
- Establishment of Circular Water Management: sewage is resource.

A successful story of Beijing -- D. 11th Five-year Plan of water resource--Beijing

- By 2010, useable water quantity: 4.2 billion m3, including annual rain fall of 2.6 billion m3, 1 billion of south-north transferred water from Han River, and 600 milliom m3 of reclaimed water. Accessory projects of water plants and pipes in the city will be completed.
- A reserved water resource in Changpin to be established (finished already) and emergent water supply projects to be improved in Huairou, Pinggu and Zhangfang;
- Restore the water body of Guating Reservoir, (already improved, yet to be upgrade to type III.)
- A series of water plant will be established or rehabilitated or expanded.
- Establish or expand 9 reclaimed water plant. Lay reclaimed water pipe 470 km.
- Extensive use of reclaimed water in thermal power plant and irrigation area. Extend use of reclaimed water to 600 million m3 by 2010, 300 million for agriculture, 150 million in industry, and 150 million in municipal maintenance.
- Maintain the balance of water supply and demand, taking into account population increase, urbanization, and water saving capacity.
- By 2010, household 660 million m3, tertiary sector, 820; industrial 700, with 93% reused. Agriculture 1 billion, and environmental use 400 to 600 million.

A Successful Story of Beijing— E. Circular water management



(Pic Quoted Beijing Water Bureau: Circular water management)



Use of Reclaimed Water for Lawn Watering, irrigation, landscaping, and price









Gaobeidian Sewage Treatment Plant



m3/day, 5 to be established in the 11th five year period.

Sewage treatment

Since 2000, One sewage plant is established every year. Sewage treatment capacity improved form 320 million m3 in 2001, to 800 million m3 in 2007, 92% of the sewage is treated, COD reduction improved from 30% to 80%. From 2001 to 2007, 1.29 million tons of COD was reduced.

Use of reclaimed water

- Over 60 thermal power plant use reclaimed water 120 million m3;
- 500,000 mu irrigation area in Tongzhou, use 230 million m3 reclaimed water;
- Olympic Games central area, parks, use 100 million m3. reclaimed water.
- Watering in municipal maintenance: 30 million m3.
- Total: 480 million m3 in 2007
- 2008: 600 million m3.
- Pricing encouragement: 1 yuan/ton for reclaimed water against the actual cost of over 2 yuan, the gap is subsidized by the public budget.

A Successful Story of Beijing— F. Treat water in an ecological way (pics of Mr. Jiao Zhizhong, Former DG of Beijing Water Bureau)



rural areas, 27% of sewage is treated. Simultaneous treatment of sewage, garbage, toilets and river

怀柔红螺湖生物通道与CWT相结合的小型污水处理设施 Small ecological wastewater treatment in countryside

Ecological compensation policy is practiced in the up-ranges of rivers and drinking water source areas. Visible effect: water quality in Guanting Reservoir is improving. A dead lake will soon be restored to be a drinking water source.

are restored in an ecological way.

by the end of last year, water quality of 56% river courses in the city was categorized as type II or type III; 70% of lakes were up to standards
Biodiversity restored in many river

sections.