China

Three Urban Water Supply Projects (10 cities)

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1 Project Profile and Japan's ODA Loan

1) Background

The reform and openness policies which began in China in 1978 have prompted the promotion of modernization policies in many cities. The resulting development of commerce and industry, urban concentration of population and improvement of living standards have created a sharp demand of water, causing water shortages in the city to emerge as a major social problem. The situation has also created other problems, such as water leakage and falling water distribution pressure due to inadequate distribution pipes, falling water tables due to excessive groundwater pumping, and deteriorating water quality due to overloading of water treatment facilities. The construction of water supply facilities with a total capacity of 3.17 million m^3/day was required to improve water shortages in ten cities judged to require particularly urgent action, and to meet future expansion in demand.

2) Objectives

The objectives of the three projects covered by this evaluation were to improve water shortages in ten cities judged to require particularly urgent action, and to meet future expansion in demand.

3) Project Scope

The project was aimed to develop water supply facilities with total capacity of 3.17 million m^3/day in ten cities (Nanjing, Chengdu, Xuzhou, Zhengzhou, Tianjin, Hefei, Anshan, Xiamen, Chongqing, Kunming). The ODA loan covered the entire foreign currency portion of the projects.

4) Borrower/Executing Agency

The People s Republic of China / Ministry of Construction, The People s Republic of China

5) Outline of Loan Agreement

① Four Cities Water Supply Project, Four Cities Water Supply Project (2) (Nanjing, Chengdu, Xuzhou, Zhengzhou)
② Three Cities Water Supply Project (Tianjin, Hefei, Anshan)
③ Three Cities Water Supply Project (Xiamen, Chongqing, Kunming)

Loan Amount/ Loan Disbursed Amount	① \8,050 million, \4,530 million / \8,050 million, \4,527 million (first and secondary for each) ② \8,866 million / \8,261 million ③ \10,403 million / \10,143 million
Exchange of Notes/ Loan Agreement	① July 1988, May 1989 / August 1988, May 1989 (first and secondary for each) ② November 1990 / November 1990 ③ September 1991 / October 1991
Terms and Conditions	①, ② Interest rate : 2.5%, Repayment period : 30 years (grace period : 10 years), General Untied (Partially Untied for consulting services) ③ Interest rate : 2.6%, Repayment period : 30 years (grace period : 10 years), General Untied
Final Disbursement Date	① August 1996, May 1997 ② December 1995 ③ November 1998

2 Results and Evaluation

1) Project Implementation

1. Project Scope

The scope of the three whole projects went mostly as planned except a couple of changes in major aspects such as water treatment capacity. The reduction in the 95 groundwater wells in Zhengzhou was prompted by a cut in the demand forecast. Water quality problems were found with the water pumped from groundwater sources in the north of Zhengzhou, necessitating new filtration equipment. As a result, the project has not yet been completed (the situation is being resolved with Chinese funding).

2. Implementation Schedule

The implementation schedule for the ten cities covered was 1~7 years delay in a few of the cities (seven years and six months in Zhengzhou, four years in Nanjing, three years and eight months in Chengdu, three years and eight months in Chongqing, three years in Tianjin, two years and six months in Kunming etc.). With the exception of Zhengzhou, where the plan of the project was changed, the reasons for the delays were the same in all cases. The rising prices which accompany China s rapid economic growth necessitated extra allocations of local currency budget, and the time required to obtain the necessary funding under austere public finances delayed the projects.

In Zhengzhou, additional filtration equipment had to be installed. The design of the equipment and the budgetary measures took time, and, as a result, construction of the project was not fully completed at the time of the evaluation.

3. Project Cost

The foreign currency portion of the projects for the ten cities remained within the value provided, but the local currency portion increased dramatically. The increase was around double in most cases, and up to sixfold in some cases (Zhengzhou). The more the project concerned was delayed, the more its cost increased. The executing agency gives the general rise in prices in China as the reason for the project cost increase. The rising costs necessitated supplementary budget allocations to cover the resulting funding shortfall, and the project delays resulted from the time taken to secure those allocations. The delays caused further cost increases, leading to further budget allocation processes, which meant more delays, in a vicious circle.

2) Project Implementation Scheme (Operation and maintenance during and after implementation)

1. Implementation Scheme

The central government supervisory agency for this project was the Department of Construction (equivalent to the Ministry of Construction), and the practical executing agencies were the public works departments of each municipality, or the Water Supply Corporation attached to the municipal management office. There were no problems with the performance of theWater Supply Corporation.

For the civil and construction works, contractors were chosen by domestic tender from the local currency portion of the cost. There were no notable problems with the performance of the contractors.

The funding from the ODA loan was mainly used for imported equipment (pumps, motors, meters, pipes etc.) and the employment of consultants (for Four Cities Water Supply Project). The consultants carried out the detailed designs, reviewed tender documents and provided the water supply facilities with technical guidance. Of the four cities which employed consultants, Xuzhou had to reduce the M/M due to the high fees charged by the consultants.

2. Operations and Maintenance

The organization and composition of Water Supply Corporation varied with the scale of the project group and its policies on matters such as multi-faceted projects. As each city was either the provincial capital or a major city representing its province, the project groups were large. For maintenance in particular, Water Supply Corporation set up a repair works office within its head office organization to enable repairs to pumps, motors, meters and valves. Each repair works office had 30~50 staffs, and the organizations were adequate for ordinary maintenance work.

Water quality analysis offices were set up for the maintenance of water quality at each water treatment plant, and a water quality analysis center and a monitoring center was set up in each Water Supply Corporation . This is an adequate system which was able to analyze and monitor the points specified under the Water Supply Law.

3. Operational Performance

The total planned capacity of the water supply facilities built for this project was 3.17 million m^3/day, and that plan was largely fulfilled by the actual capacity of 3.14 million m^3/day. As a result, current water demand is covered, and the cities developed facilities with water supply capacity able to cover future demand to varying degrees.

In nine cities (the exception being Chongqing), the leakage rates rose because the improved water supply caused higher pressure in the pipes, and also because more precise metering made it possible to measure the effective water supply volume more accurately.

3) Project Effects and Impacts

In nine cities (the exception being Tianjin) the household water supply volume increased due to greater water usage by the population as their living standards improve. The increased water supply capacity led to an improvement in the water supply system, which was becoming strained, and that is believed to have enhanced the residential public health environment.

Water Supply Corporation in nine cities (the exception being Tianjin) report that the completion of this project improved water quality. Seven cities stated that the improvement was due to the high quality of water treated in the water treatment plants.

3 Lessons Learned

1) The importance of project monitoring beyond the scope of the loan

The development of the terminal water distribution network, which is beyond the scope of the loan, has been delayed with the result that the effects of the project have not yet been fully realized in some of the cities. Project monitoring must be

extended to portions beyond the scope of the loan to ensure the full realization of project effects.

2) An appropriate supply and demand plan must be established

Water demand forecasting is strongly influenced by future economic growth, which makes forecasting in the medium and long term particularly difficult in the development countries. Information gained from sources such as the country s medium-term development plans should be investigated in as much detail as possible to find an appropriate relationship between those plans and plans for demand and for investment in the expansion of facilities.

3) Charges must be revised appropriately

Loss-making operations must secure an appropriate level of charges in order to safeguard their financial sustainability.

4) The burden of exchange risks must be allocated correctly

At present the burden of exchange risks on loan repayment falls on local governments, but the risk should be transferred to a more appropriate agency, such as the central bank which manages foreign exchange, in order to stabilize the finances of regional governments and project executors.

4 Recommendations

■ The quality of water supply services must be improved

Interviews with the users of water supplies revealed a particularly high level of dissatisfaction with water quality. This shows how the needs of Chinese consumers have shifted from quantity to quality. Therefore further efforts are required to improve water quality.

■ Stronger countermeasures are required against leakage

Examination of changes in leakage rates before and after the project showed that they approximately doubled in nine of the cities. This is believed to be due to increased pressure within the pipes, and also due to more accurate measurement of the effective water supply volume enabled by more precise meters.

Comparison of Original and Actual Scope

Note: *out of the scope of ODA loan

Item	Plan	Actual
① Project Scope (Nanjing)	Water treatment facilities 600,000m³/day, Water pump Water intake facilities Intake pump Water distributing facilities Distributing reservoir (20,000m³×2)*, Pressure pump, Water pipe Consulting Service Experts, study group, training	Same as left Same as left Distributing reservoir : 20,000m³×3 Same as left

Item	Plan	Actual
(Chengdu)	Water treatment facilities 400,000m³/day Water intake facilities Intake pipe Water conveyance facilities Service pipe line Water distributing facilities Distributing reservoir*, Pressure pump, Water pipe Consulting Service Experts, study group, training	Same as left Same as left Same as left Same as left Same as left
(Xuzhou)	Water treatment facilities 200,000m³/day, Water pump Water intake facilities Intake pump Headrace facilities Headrace pipe Water distributing facilities Distributing reservoir*, Pressure pump, Water pipe (1600mm×16km) Consulting Service Experts (15M/M), study group (10M/M), training (30M/M)	Same as left Same as left Same as left Water pipe (600～1200mm×15km, East), (600～1200mm×8km, West) Experts (12M/M), study group (40M/M), training (120M/M)
(Zhengzhou) Surface waters	Water treatment facilities 200,000m³/day, Water pump Water intake facilities Intake pump, Silt basin*, Regulating pondage* Headrace facilities Headrace pump, Headrace pipe, Rehabilitation of headrace pipe* Water distributing facilities Water pipe Consulting Service Experts, study group, training	Same as left Same as left Same as left Same as left
95 groundwater sources	Water intake facilities Wells (100,000m³/day, 60 wells), Intake pipe Headrace facilities Headrace pipe Water distributing facilities Water distributing plant Consulting service Experts, study group, training	Wells (70,000m³/day, 46 wells) Same as left Same as left Same as left
Groundwater sources in the north (Under construction)	Water intake facilities Wells (200,000m³/day), Intake pipe Headrace facilities Headrace pipe Water distributing facilities Water distributing plant Consulting service Experts, study group, training	(Same as left) (Same as left) (Same as left) Same as left
(Tianjin)	Water treatment facilities 500,000m³/day Headrace facilities Headrace pipe Water conveyance facilities Water conveyance pump Water distributing facilities Water distributing plant, Service center,Control center	Same as left Same as left Same as left Same as left

Item	Plan	Actual
(Hefei)	Water treatment facilities 250,000m³/day Water intake facilities Intake pipe Headrace facilities Headrace pump、Headrace pipe Water conveyance facilities Water conveyance pump Water distributing facilities Water pipe	 Same as left Same as left Same as left Same as left Same as left
(Anshan)	Water treatment facilities 200,000m³/day Water intake facilities Water intake tower, Tunnel, Intake pipe Headrace facilities Headrace pump, Headrace pipe, Headrace tunnel Water conveyance facilities Water conveyance pump, Service pipe line Water distributing facilities Distributing reservoir、Water pipe	 n.a. n.a. n.a. n.a. n.a.
(Xiamen)	Water treatment facilities 120,000m³/day Water intake facilities Intake pump Headrace facilities facilities Headrace pump, Headrace pipe (2000mm×41km) Water distributing facilities Water pump, Water pipe	 Same as left Same as left Headrace pipe (2000mm×39km) Same as left
(Chongqing)	Water treatment facilities 200,000m³/day Water intake facilities Intake pump, Intake pipe Headrace facilities Headrace pipe (cast iron pipe) Water conveyance facilities Water conveyance pump、Service pipe line Water distributing facilities Distributing reservoir、Water pipe (34km) Consulting service Study group	 n.a. n.a. Headrace pipe (steel pipe) n.a. Water pipe（45.7km） Same as left
(Kunming)	Water treatment facilities 100,000m³/day×2 Water intake facilities Intake tunnel, Intake pump Headrace facilities Headrace pipe Water distributing facilities Water pump, Distributing reservoir Consulting service Study group	 Same as left Same as left Same as left Same as left Same as left

Item	Plan	Actual
② Implementation Schedule		
(Nanjing)	Jul. 1988 ~ Dec. 1991	Nov. 1988 ~ Dec. 1995
(Chengdu)	Jun. 1988 ~ Dec. 1991	Jul. 1988 ~ Aug. 1995
(Xuzhou)	Jul. 1988 ~ Sep. 1990	Dec. 1988 ~ Oct. 1991
(Zhengzhou)	Jul. 1988 ~ Jun. 1992	Jul. 1988 ~ Dec. 1999
(Tianjin)	Jan. 1989 ~ Dec. 1992	Jun. 1989 ~ Dec. 1995
(Hefei)	Apr. 1990 ~ Dec. 1993	Same as left
(Anshan)	Jun. 1990 ~ Feb. 1994	Same as left
(Xiamen)	Jan. 1991 ~ Mar. 1995	Nov. 1989 ~ Aug. 1996
(Chongqing)	Jul. 1991 ~ Dec. 1994	Jan. 1992 ~ Aug. 1998
(Kunming)	Oct. 1990 ~ Dec. 1994	Jun. 1992 ~ Jun. 1997

③ Project Cost	Foreign currency (\ million)	Local currency (million yuan)	Total (\ million)	Foreign currency (\ million)	Local currency (\ million)	Total (\ million)
(Nanjing)	4,042	129	8,480	3,804	191	
(Chengdu)	2,400	70	4,808	2,696	143	5,920
(Xuzhou)	2,096	48	3,747	1,925	129	5,304
(Zhengzhou)	4,042	49	5,728	4,042	300	10,462
(Tianjin)	3,291	148	8,396	2,933	274	7,913
(Hefei)	2,433	73	4,953	2,218	146	4,870
(Anshan)	3,142	97	6,478	3,110	2	
(Xiamen)	3,325	155	7,378	2,552	417	9,774
(Chongqing)	4,430	233	10,521	4,759	483	12,873
(Kunming)	2,648	53	4,046	2,648	116	4,608

Water Intake Pump Station (Tianjin)

Silt Basin (Tianjin)

Fast and Slow Filtration Facility (Nanjing)