

China

GUIYANG WATER SUPPLY PROJECT
(L/A No. CXVIII-P87)

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Field Survey: March 2007

1. Project Profile and Japan's ODA Loan



Site Map: Guiyang City



Site photo: Western Suburbs
Water Purification Plant

1.1 Background

Guiyang City is located inland, about 2,000km southwest of Beijing. It is the capital of Guizhou province. Topographically, it is a basin surrounded by the mountains of the Yungui Plateau, high in the north, and low in the south. The weather is warm with large amounts of rainfall, but the fast underground drainage of its Karst topography makes it difficult to use groundwater, and surface water resources of the city's outskirts are limited, resulting in serious water shortages in Guiyang City which are known throughout China.

In the 1990s, the total treatment capacity of Guiyang City's six water purification plants was 380,000m³/day, but it could not catch up with the continual growth in demand, which exceed treatment capacity with a maximum water distribution of 460,000m³/day. Thus, worsening stability of supply and quality of tap water were urgent problems. In particular, water supply shortages resulted in chronically low water distribution pressure, and water outages became normal in high elevation districts, and in upper floors of office and apartment buildings. Thus residents woke up

in the early morning and stored water in order to obtain household water. Time and energy was spent on carrying water by bicycle after work and during days off work. In addition, overuse of well water led to progressive subsidence (sinking) of the ground, and uneven subsidence even led to damage such as cracks and collapse of buildings.

Traditionally, Guiyang City has received water from multiple small and medium dams on its outskirts. During heavy rains, it was necessary to let water flow out at these dams to prevent floods. The government was adjusting reservoir levels, but it was difficult to manage both flood adjustments and securing of urban water resources at the same time.

1.2 Objective

The project aims to construct water supply facilities in Guiyang City with Hongfeng Lake as a water resource, to improve the water supply situation in the city and thereby contribute to relieve the tightening water supply and demand as well as to respond to the future increase of water demand in Guiyang City.

1.3 Borrower/Executing Agency

People's Republic of China government/Ministry of Construction
(Guiyang City Construction Committee)

1.4 Outline of Loan Agreement

Loan Amount	5,500 million yen
Disbursed Amount	4,798 million yen
Exchange of Notes	December 1996
Loan Agreement	December 1996
Terms and Conditions	
- Interest Rate	2.1%
- Repayment Period (Grace Period)	30 years (10-year)
- Procurement	General untied
Final Disbursement Date	September 2004
Main contractors	Local company
Consultant Services	—
Feasibility Study (F/S) etc.	1995: China Urban Government Projects Southwest Design Research Institute

2. Evaluation Result (Rating: A)

2.1 Relevance (Rating: a)

In China's National Ninth Five-Year Plan (1996 to 2000) which established its national policies, it was planned to increase water supply capacity by 40 million m³/day nationwide by 2000, and raise the urban population served ratio to 96%. Also, there was a 380,000m³ water supply capacity to meet 570,000m³ of demand in Guiyang City of Guizhou Province at the time of appraisal (1995) resulting in serious water shortages. Furthermore, water demand was growing by between 6% and 8% per year, and was forecast to reach 680,000m³/day in the year 2000.

At the time of appraisal, this project played an important role in national policy, as part of the National Urban Purified Water Supply Capacity Increase Plan. At the same time, the project's goal of securing a new water resource in the outskirts which is dedicated to urban use made it one of the most important projects in the Urban Development Plan, as it aimed at improving Guiyang City's severe water shortage problem, the problem of subsiding ground due to overuse of groundwater, and at improving the supply/demand problem which is essential for development of industry and improvement of living infrastructure. Thus the project plan was extremely urgent and relevant.

At the time of evaluation, increasing city water supply capacity was still one of the important goals in national policy including the National Tenth Five-Year Plan (2001-2005), and in policies of both Guizhou Province and Guiyang City. To achieve a more stable water supply and a good quality water environment, Guiyang City also plans to carry out further development of water resources and water conservation, along with rehabilitation and expansion of deteriorated water purification plants and the water distribution network.

In the Guiyang City 11th Five-Year Plan (2006-2010), the Western Suburbs Water Purification Plant and water intake and water conducting facilities built in this project are part of the Development Plan for the Zhujiang River Water System, along with the Northern Suburbs Water Purification Plant which is currently being developed. This project also enabled water intake from Hongfeng Lake, a new water resource, thus reducing the use of groundwater in the city, in addition to alleviating the dependency on dams on the city outskirts which bear the dual roles of water resources and flood prevention. Thus it was also confirmed that this project has relevance from the perspective of this project's contribution to Guiyang City's stable water supply.

On the other hand, the project has achieved its goals of alleviating the severe water supply and demand situation and responding to the future water demand, but there was insufficient water distribution network development and renewal accompanying development of the water purification plant, so facility capacity can not be maximized for water supply volume, water pressure, water quality, etc. (refer to 2.3.1 below). Thus it is thought that at the time of appraisal, expanded scope of water distribution pipe development should have been planned. Furthermore, as mentioned above, Guiyang City cited the rehabilitation and expansion of water distribution network in urban areas as a remaining issue, and there are hopes that this will be handled in the future.

2.2 Efficiency (Rating: b)

2.2.1 Outputs

Table 1. Project Outputs (Comparison of Plan and Actual Performance)

Plan	Actual Performance
(1) Expansion of water intake facility: Maximum 5m ³ /second water intake capacity from Hongfeng Lake	(1) Expansion of water intake facility: As planned
(2) Installment of new water conducting pipes: Total length 24.5km (gravity flow type)	(2) Installment of new water conducting pipes: Almost as planned (Total length 23.7km, changed distribution pipe shapes)
(3) Water purification plant expansion: 400,000m ³ /day treatment capacity, rapid filtration method	(3) Water purification plant expansion: As planned
(4) Water distribution network: 7 adjustment tanks (Total volume 25,000m ³), water distribution pipes (84,550m with pipe diameter of 400-1,400mm)	(4) Water distribution network: Almost as planned (2 water distribution reservoirs developed, in place of adjustment tanks)
(5) Communications management facilities: Installment of small computers for water purification plant management	(5) Communications management facilities: Introduction of communications facilities, and computer management system for all water purification plants
(6) Water quality inspection facility, vehicles, implementation machinery, etc.	(6) Water quality inspection facility, vehicles, implementation machinery, etc.: As planned

As shown in Table 1, planned outputs of this project were generally as planned.

Regarding conducting facilities, greater efficiency was achieved by changing the water transport tunnel from a square to a round shape in order to reduce the excavation volume. Also, a combination of multiple water-carrying pipe shapes was planned; however, standardizing all of them increased efficiency of purchasing and implementation.

In the water distribution network development, the initial plan for seven

adjustment tanks (total capacity 25,000m³) was changed, and water distribution reservoirs (total capacity 20,000m³) were built. In contrast to pressure adjustment as the main goal of adjustment tank facilities, water distribution reservoirs enable about 12 hours of water distribution management, enabling a response to changes through the day of water demand, for stable water supply. The initial design had adjustment tanks due to budget restrictions, with a plan to develop water distribution reservoirs in the future, but it is thought that implementing this change enabled a reduction in long term costs.

As described above, each of these changes are thought to be highly relevant.

2.2.2 Project period

The implementation period planned at the time of appraisal was December 1996 to December 2001, with actual performance as planned. During the initial implementation, domestic funding took some time, and material purchases and start of construction were slightly delayed. But construction was carried out efficiently, so completion was within schedule¹. After various inspections and trial operations, the facility began operation in June 2002.

2.2.3 Project cost

Total project cost planned at time of appraisal was 14,887 million yen (of this, the entire foreign currency portion was a 5,500 million yen ODA loan), but the actual amount was 16,191 million yen (of this, the entire foreign currency portion was a 4,797 million yen ODA loan). Comparing the planned and actual project cost, there were savings in the foreign currency portion due to efficient purchasing and changes in the scope. On the other hand, the local currency portion increased due to additions to the scope, etc. As a result, the total project cost exceeded the planned amount if evaluated on a yen basis, mainly due to exchange rate fluctuations² (109% of the planned amount).

¹ After construction completion, loans were provided until 2003 for additional pipe purchasing, etc.

² One yuan = 12 yen at time of appraisal, 1 yuan = 14.4 yen at time of evaluation. The yen was on a decreasing trend.

2.3 Effectiveness (Rating: a)

2.3.1 Water supply achievements in Guiyang City³ and role of this project

Actual water supply achievements are shown in Table 2. Both average and maximum water supply volumes were below forecasted demand (1996-2000) at time of planning (1995). This is thought to be due to (1) a fall in demand for industrial water due to the move of factories to the suburbs, (2) Progress of water conservation measures at factories and companies, (3) Results from Guiyang City government calls for water conservation by city residents, and implementation of water conservation measures (switch from joint meters to household meters, etc.), (4) Not many residents moved to the new economic zone (Jinyang New District, planned population 500,000) so water demand did not rise there, etc. Due to these reasons, demand for industrial water had already started decreasing from 1996, and there was a 100,000m³/day gap between residential water forecasts and actual use, so judging from results until now, one can only say that they were excessive forecasts. However, in the present year 2007, Guiyang City is continuing development of the economic district where the Western Suburbs Water Purification Plant supplies 30,000m³/day of tap water, and there are plans to use pumps to add pressure to 100,000m³/day of water distribution in the near future. This project's excess capacity can be treated as being considered in this plan, so the project can be evaluated as sufficiently effective.

³ Guiyang City is comprised of 6 districts, 1 city, and 3 counties. This project covered Nanming District and Yunyan District by a pipeline network.

Table 2. Planned and actual water supply in Guiyang City

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Water supply capacity (10,000m ³ /day)	Plan	43	48	48	50	50	—	—	—	—	—	—
	Actual	43	48	48	55	60	60	95	95	100	100	—
Maximum water supply (10,000m ³ /day)	Plan	62	64	65	67	68	—	—	—	—	90	—
	Actual	—	—	—	52	53	53	54	54	53	53	53
Average water supply (10,000m ³ /day)	Plan	48	49	50	51	52	—	—	—	—	72	—
	Actual	—	45	45	45	46	47	47	50	47	49	49
Residential water (10,000m ³ /day)	Plan	26	26	27	28	28	—	—	—	—	50	—
	Actual	17	16	—	18	19	19	21	23	22	22	—
Industrial water (10,000m ³ /day)	Plan	12	12	12	12	13	—	—	—	—	17	—
	Actual	9	8	—	8	8	7	6	6	6	6	—
Facility utilization rate (%) ^{Note 1)}	Maximum	—	—	—	95	88	88	57	57	53	53	—
	Average	—	—	—	84	77	78	49	52	47	49	—

Source: Guiyang Water Supply General Company

Note 1): “Maximum” facility utilization rate is (maximum water supply volume)/(supply capacity).

“Average” is (average water supply volume)/(supply capacity).

The Western Suburbs Water Purification Plant developed by this project currently has a low facilities utilization rate (Table 3). A reason for this is the problem of water delivery capacity of the water distribution network. Water distribution from the Western Suburbs Water Purification Plant to the city center is carried out by the gravity flow method, but deteriorated narrow diameter distribution pipes remain, so to keep water pressure from rising too high, water supply volume is always controlled, which also impacts water supply volume. This situation is thought to be temporary, because as a response to new demand in new economic district, Guiyang City is currently developing infrastructure such as the water distribution network. In particular, the Western Suburbs Water Purification Plant supplies the western area including new economic district, so one can predict that the utilization rate of the plant will rise through future development.

Table 3

Actual water supply of the Western Suburbs Water Purification Plant

	2001	2002	2003	2004	2005	2006
Water supply capacity (10,000m ³ /day)	0	20	20	40	40	40
Maximum water supply (10,000m ³ /day)	0	14.3	13.7	22.3	22.0	23.0
Average water supply (10,000m ³ /day)	0	4.5	10.2	15.3	17.3	15.5
Facility utilization rate (maximum) (%)	0	71.6	68.6	55.6	55.0	57.8
Facility utilization rate (average) (%)	0	22.5	50.1	38.3	43.3	38.8
Degree of dependence on this purification plant (%)	0	26.5	25.4	42.0	41.5	46.9

Source: Guiyang Water Supply General Company

Dam water and groundwater are both used for water supply in Guiyang City, with two large dams (Hongfeng Dam, Baihua Dam), three medium dams (Aha Dam, Huaxi Dam, Songbai Mountain Dam), and 152 small dams as water resources. The total capacity of these dams is 1,090 million tons, but water supply in the city is mainly from three medium dams (Aha Dam, Huaxi Dam, and Songbai Mountain Dam), and groundwater taken from the “Wangjiada” well.

Before this project, water supply in the city mainly took water from Baihua Dam, and small and medium dams in the near outskirts, but due to the restriction that when there is heavy rainfall, water has to be released for flood prevention, securing the reservoir volume and stable supply of purified water was difficult. This project enabled conducting of water from Hongfeng Dam, increasing the stability of the water supply for Guiyang City overall.

2.3.2 Elimination of water shortages and water outage rate

At the time of appraisal, there were considerable water shortages in Guiyang City. There were frequent water outages in the city center. There were places with water supply only at night in the eastern area of the city. There were insufficient water pipes in the northwest area. Through implementation of this project, water shortages were eliminated in the city’s high elevation northern area (Ergezhai, Longdongbao, and Bagongli

areas), where there were frequent water outages. Water supply has also begun for Jinyang New District which Guiyang City planned in order to expand its economic activities, and for surrounding factories and farmland.

As shown in Table 4, water outage hours have been reduced to about half when compared to before the project, and it is thought that this project made a large contribution. According to explanations of the Western Suburb Water Purification Plant, since 2002, there were no water outages except for repairs and inspections. Regarding this point, dramatic improvements were confirmed by many beneficiaries at a local symposium with beneficiaries (refer to 2.3.6.1 below). In particular, regarding residents who submitted a petition to the government at the time of planning, interviews confirmed that the problem was solved after water purification plant construction.

Table 4. Water outage hours

	1999	2000	2001	2002	2003	2004	2005
Annual average number of hours of water outages	120	125	120	120	62	66	64

Source: Guiyang Water Supply General Company

2.3.3 Improvements in water pressure and quality

Regarding water quality standards, judging from the water quality measurement results which were provided at the time of evaluation (37 factors), attention has to be paid regarding fluoride of this project's water output⁴, but it meets China's standards for all indices, and it is safe water without problems for drinking. Regarding water quality, there is no data from before project implementation, so a comparison cannot be made, but one can conjecture as to the contributions of this project from results of the beneficiary survey, etc. (refer to 2.4.1 below).

Also regarding the water quality of the water distribution network, major water quality standards are met at the seven inspection locations provided, and one can say that there are no particular safety problems. However, in comparison with water output from the purification plant, water quality is seen to worsen in some locations, and there are locations where pre-existing water distribution pipes have a small diameter, restricting possible water supply volume to adjust water pressure, so continued renewal and

⁴ Fluoride is thought to be linked with the wastewater from factories near the water source

development of the distribution network is necessary.

Also, comparing the water purification plant's input and output water quality, water quality is clearly improved after treatment. The situation has been improved from when untreated water was supplied due to lack of capacity at the water purification plant, and it is thought that this project holds great significance for the aspect of capacity to supply safe water to residents.

2.3.4 Superiority of the Western Suburbs Water Purification Plant

The Western Suburb Water Purification Plant utilizes the special topography of Guiyang City, with the characteristic that water is conducted by the gravity flow method for distribution. The purification plant is highly automated with high labor efficiency, so unit production costs are the lowest among all water purification plants in the city (Table 5). Thus, following the development of water distribution network, Guiyang City plans to preferentially operate this plant in response to the rising demand.

Table 5
2006 Production cost Per unit and various expenses (yuan/m³)

	Western Suburbs Purification Plant (this project)	Hebang Purification Plant	Zhongcao Purification Plant	Southern Suburbs Purification Plant	Eastern Suburbs Purification Plant	Northern Suburbs Purification Plant
Unit production cost	0.14	18.58	0.45	0.41	0.47	0.50
Power cost	0.06	8.18	0.16	0.12	24.92	0.13
Wages	0.02	2.91	0.04	0.05	3.00	0.16
Employee benefit expense	0.00	0.41	0.01	0.01	0.42	0.02
Depreciation*	0.00	4.99	0.14	0.17	6.87	0.00
Maintenance & repair costs	0.01	0.55	0.02	0.01	0.81	0.03

Source: Made from Guiyang Water Supply General Company data

*: For Western and Northern Suburbs Purification Plant, depreciation has not been recorded since it was the first year in operation.

2.3.6 Internal Rate of Return (IRR)

2.3.6.1 Financial Internal Rate of Return (FIRR)

FIRR was calculated using fee revenues for benefits, using construction

costs, operation and maintenance costs, and taxes for costs, and assuming a 20-year project life. This resulted in a 6.85% FIRR at the time of appraisal (based on JBIC data). This contrasts with 4.04% at the time of evaluation, a little lower compared to at the time of appraisal.⁵

Table 6

Actual and forecast revenues, and operations & maintenance cost of this project
(unit: 10,000 yuan)

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Revenues	2,763	2,607	4,495	4,910	3,849	3,849	3,849	3,849	3,849	3,849
Operation & maintenance cost	2,103	2,006	3,547	3,551	4,682	4,682	4,682	4,682	4,682	4,682

Source: Guiyang Water Supply General Company

2.3.6.2 Economic Internal Rate of Return (EIRR)

EIRR was not calculated at the time of appraisal, but at the time of evaluation, the economic internal rate of return was calculated using the Willingness to Pay (WTP) for higher water pressure and improved water quality resulting from this project. WTP was calculated by a beneficiary survey of residents, service businesses, and industrial businesses⁶. This survey covered water supplied by the Western Suburbs Water Purification Plant, including improvements in water pressure and water quality, to derive the benefits of this project. Also, a forecast was obtained of higher future utilization rates, so similar to at the time of FIRR calculation, the calculation assumes a 0.5 yuan/m³ higher fee, and an average water supply volume increasing by 2% per year until it reaches an 80% facility utilization rate. The above resulted in an estimated 9.52% EIRR, producing the evaluation that there are sufficient benefits.

2.4 Impact

2.4.1 Beneficiary awareness of water pressure and quality

Resident and enterprise beneficiaries (industrial companies, service companies, government related institutions) were visited to perform an

⁵ Calculation assumption: 2% annual growth until it reaches an 80% utilization rate, and a 0.5 yuan/m³ higher fee for 2007 onwards (based on a response by an implementer of the Guiyang City Western Suburbs Water Purification Plant that 0.5 yuan/m³ price rise is already under review).

⁶ In the beneficiary survey, WTP used responses to “How much would you pay to avoid water pressure/quality returning to the situation before the project?” (as a percentage of current water supply fees).

individual interview survey. There were 299 responses from residents, and 99 from enterprises. 51% of residents responded that after this project “water quality improved”, and 13-19% of residents replied that mineralogical fur, smell, taste, color, and miscellaneous quality factors improved. Many opinions were heard from residents about clearer water, no more chlorine smell, etc. These results indicate that increased water quality is recognized by residents.

Comparing responses to the question “Are water pressure and water flow sufficient?” before and after the project, 50% of residents and enterprises responded that they were sufficient before the project, which increased by about 12% after the project to 62%. There was also a lower percentage of responses such as water flow is weak (10% before the project, which improved to 2% after the project), there are occasional water outages (7% before the project, which improved to 4% after the project), etc., so one can say that this project made a certain contribution to a stable water supply for Guiyang City.

Column: Resident opinions at a symposium

Beneficiaries were invited to a symposium, and the following responses were obtained when residents were asked about purified water after the project.

- Water volume increased, water pressure is higher, and water quality improved.
- The serious water outage problems before the project were eliminated (according to the water purification plant, even on New Years' Eve which is the day of maximum demand, there is no flood of phone calls complaining of water outages as there was before the project, stable water supply is being provided, and there are currently no water outages except for during inspections)
- Before the project, water outages were very frequent, so many went to bath-houses, but after the project they could use the showers in their own homes, making their lives easier.
- Before the project, children could not take baths after 6pm, but now parents can work overtime, and the housework burden is lighter.
- Before the project, water quality was bad and people bought bottled water, but that became unnecessary after the project, easing economic burdens.
- After the project, water quality and pressure improved, enabling cleaning within supermarkets which improves hygiene, and customers increased.
- After the project, water quality and pressure improved, so hotel customer satisfaction improved.

2.4.3 Environmental and social impacts

No particular deforestation or soil pollution were seen due to the project. To protect water resources, there are restrictions on construction of new factories in the surroundings, and water pollution improvement measures are being implemented for existing factories.

2.5 Sustainability (Rating: a)

2.5.1 Organization responsible for operation and maintenance

At the time of appraisal, it was assumed that the Guiyang City Water Source Group would be the operation and maintenance institution, but at the time of evaluation, its name had changed to Guiyang Water Supply General Company.

2.5.2 Operation and maintenance system and technical capacity

Guiyang Water Supply General Company manages five subsidiaries, and one of them is Guiyang City Western Suburbs Water Supply Company, which is in charge of this project's operation and maintenance (water intake, conduction, purification, distribution, etc.). Also, other subsidiaries are responsible for inspection, customer service, fee collection, etc. Guiyang Water Supply General Company operated and maintained multiple water purification plants from before construction of the Western Suburbs Water Purification Plant. It has a wealth of experience and achievements, so no particular problems are foreseen for future operation and maintenance.

For the technical aspect, 12 technical workers who hold qualifications are assigned to operate and maintain the latest facilities at the Western Suburbs Water Purification Plant. Also, technical manuals and work guidelines have been developed for each workplace.

Table 7. Occupations of employees of the Western Suburbs Water Purification Plant

Occupation	Operation	Technical workers	Security	Office workers	Total
Number of staff	25	12	11	20	68

Source: Guiyang Water Supply General Company

Guiyang Water Supply General Company has a water supply management structure with a water quality management center located at the headquarters, and water quality inspection offices established at the purification plants. Specialists who have received higher education are employed at these inspection offices.

Also, the Water Supply Technician Training Center of Guizhou Province is located in the Western Suburbs Water Purification Plant. In this training center, the environment is prepared for technician development and qualification certification for water supply projects. This water purification plant is playing a leading role in development of technicians.

Due to the above, it is thought that there are no special problems with the structural or technical aspects of operation and maintenance.

2.5.2 Uncollected rate⁷ and leakage rate⁸

As shown in Table 8, the uncollected rate and leakage rate are steadily rising. The high leakage rate results from higher water pressure after completion of the water purification plant, in addition to deterioration of the pre-existing water distribution network. According to the purification plant, another cause is that maintenance has not caught up with distribution pipe extension and service area expansion, making it difficult to find leak locations. Another cause is that Guiyang City has a Karst topography, so leaks immediately sink into the ground, making it difficult to specify leak locations. Currently, Guiyang City is working hard to renew the deteriorated water distribution network, and future improvements are expected.

Regarding the uncollected rate, the leakage portion is included, so the uncollected rate excluding that portion is only a few percent, which is not high.

Table 8. Guiyang City water supply uncollected rate & leakage rate (unit: %)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Uncollected rate	24.8	30.63	30.6	31.4	32.7	32	33.9	33.3	32.3	35.3	34.8
Leakage rate	—	—	—	—	25.2	24.1	31.1	27.8	26.1	30.8	30.3

Source: Guiyang Water Supply General Company

2.5.3 Water rates

As shown in Table 9, there has not been much price adjustment of water fees in Guiyang City from the time of appraisal until the time of evaluation, and fees are still being kept at a low level at the time of evaluation. Of the 1.4 yuan residential water fee in 2006, 1.0 yuan is for water supply, and 0.4 yuan is sewerage fee, but this is set low relative to other cities. Water fees are decided by the Guiyang City Prices Bureau, Guizhou Province Prices Bureau, and public hearings, but as of March 2007, revision of prices are being studied in the Province Governor Council and City Mayor Council, and a 0.5 yuan price increase over current prices is expected from April 2007. If approved by the Civil Affairs Bureau low income households can obtain a discount up to a certain amount of water usage.

⁷ “Uncollected rate” indicates the ratio:

(water volume which did not bring fee revenue)/(purified water supplied).

⁸ “Leakage rate” indicates the ratio:

[leaked portion of the water volume which did not bring fee revenue (leaked volume)]/(purified water supplied).

Table 9. Guiyang City water rates (unit: yuan/m³)

Yuan/m ³	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Residential	0.45	0.45	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.4	1.4
Industrial	0.5	0.5	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.45	1.45
Commercial	0.65	0.65	2	2	2	2	2	2	2	2.2	2.2
Hotels	1.3	1.3	2.8	2.8	2.8	2.8	2.8	2.8	—	—	—
Bath houses	3	3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.6	1.6
Saunas	—	—	8	8	8	8	8	8	8	8.2	8.2

Source: Guiyang Water Supply General Company

2.5.4 Financial status

The financial status of Guiyang Water Supply General Company for 2003-2005 was as shown in Table 10.

Table 10

Main financial data of Guiyang Water Supply General Company 2003-2005

Financial Data	2003	2004	2005
Current assets (10,000 yuan)	866,461,120	902,780,520	948,403,140
Fixed assets (10,000 yuan)	216,282,326	194,418,723	249,287,845
Total assets (10,000 yuan)	1,089,141,520	1,103,735,137	1,204,169,807
Current liabilities (10,000 yuan)	173,342,239	167,791,752	310,577,126
Total liabilities (10,000 yuan)	840,495,052	876,749,580	996,397,486
Net sales (10,000 yuan)	94,038,160	94,962,995	109,361,773
Net profit (10,000 yuan)	2,562,103	-22,672,266	-20,890,700
Depreciation (10,000 yuan)	18,813,125	—	17,713,200
Cash and equivalents at year end (10,000 yuan)	71,913,798	—	15,729,933
Current ratio (%)	500	538	305
Net profit margin (%)	3	-24	-19
Return on assets (%)	0	-3	-2
Net profit/(Net profit+depreciation) (%)	12	—	657
Depreciation/(Net profit+depreciation) (%)	88	—	-558

Source: Made from financial statements of Guiyang Water Supply General Company

Guiyang Water Supply General Company is the institution responsible for Operations and Maintenance. According to Table 10, as an index of financial safety its current ratio exceeded the ideal level of 200% from 2003-2005, so its financial status is recognized to have high financial stability. Regarding its profitability, net profit margin and return on

assets are extremely low, so it is thought that problems remain for profitability. Also, its extremely low net profit is a problem, but one reason is that the water fees of Guiyang City are set at a low level. As mentioned above, an increase in fees is planned from 2007, so improved net profit is expected. One cannot say that the safety and profitability of its financial status is in a desirable situation, but Guizhou Province is one of the poorer provinces in China, and the public aspect of water supply enterprises is emphasized. The city government plans to continually and actively provide financial support (from interview with people related to the Guiyang City Finance Department), so there are no particular problems of financial sustainability.

3. Feedback

3.1 Lessons Learned

In Guiyang City, calls for residents to conserve water achieved large results. For projects which develop water purification plants, measures such as water conservation are an important factor for providing an appropriate demand forecast in the project plan, so it is desirable that it be performed in an integrated way with the project.

Economic support from overseas is essential to implement a low profitability project, such as a water purification plant construction in an economically lagging area such as Guiyang City. The executing agency said that ODA loans have the best terms for aspects such as interest rates and restrictions, and many thanks were received from the executing agency for the ODA loan. Also, many residents recognize that Western Suburbs Water Purification Plant was built by the ODA loan project. One can see that it is important to provide aid with appropriate timing in response to strong needs, as in this project.

3.2 Recommendations

The deteriorated and low capacity distribution pipes are an obstacle to achieving project outcomes, so renewal of the water distribution network is becoming an issue. Guiyang City desires support due to its insufficient budget etc. As possible dramatic improvements are foreseen for the results of this project and cost effectiveness is speculated to be high, it is expected that this issue will be considered as a target for future support.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Outputs		
1) Expansion of water intake facility	Maximum water intake capacity from Hongfeng Lake: 5m ³ /second	As planned
2) Installment of new water conducting pipes	Total length: 24.5km (gravity flow type)	Almost as planned (Total length 23.7km, changed distribution pipe shapes)
3) Water purification facility expansion	400,000 m ³ /day treatment capacity, rapid filtration method	As planned
4) Water distribution network	7 adjustment tanks (total capacity 25,000m ³), water distribution pipes (84,550m with pipe diameter of 400-1,400mm)	Almost as planned (2 water distribution reservoirs developed, in place of adjustment tanks)
5) Communications management facilities	Installment of small computers for water purification plant management	Introduction of communications facilities, and computer management system for all water purification plants
6) Other	Water quality inspection facility, vehicles, implementation machinery, etc.	As planned
(2) Project Period	December 1996 to December 2001 (61 months)	December 1996 to December 2001 (61 months)
(3) Project Cost		
Foreign currency	5,500 million yen	4,797 million yen
Local currency	9,377 million yen (local currency: 781 million yuan)	11,394 million yen (local currency: 791 million yuan)
Total	14,877 million yen	16,191 million yen
ODA Loan Portion	5,500 million yen	4,797 million yen
Exchange rate	1 yuan = 12.00 yen (1995 average)	1 yuan = 14.63 yen (1996 – 2005 average)