

People's Republic of China

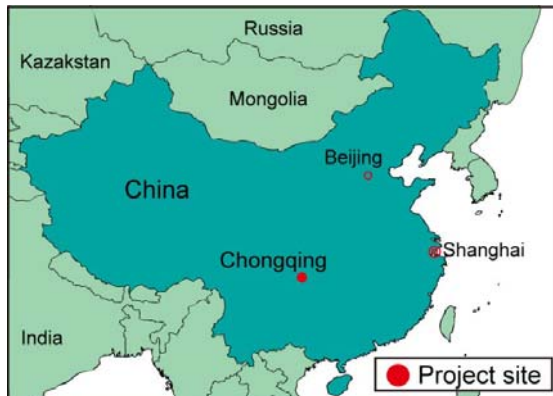
## Chongqing Water Supply Project (CXXI-P121)

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Study Period: April 2009 to December 2009<sup>1</sup>

### 1. Project Profile and Japan's ODA Loan



Location of Project Site



Fengshouba Water Plant

#### 1.1 Background

Under China's reform and open-door policies which commenced in 1979, construction and improvement of waterworks facilities, especially in large cities along coastal regions, has been implemented as a part of actions to improve the investment environment for attracting enterprises. The average water usage per person as of 1998, was 214.1ℓ/day in urban areas, and it was equivalent to that of Japan (200 to 250ℓ/day). The coverage of the water supply system in urban areas has been steadily improving at rates of 81% in 1980, 89% in 1990, and 96% in 1998. On the other hand, following the rapid economic development in coastal areas, inland's medium to large cities have been suffering from the water supply and demand gap caused by the rapid increase based on the rapid industrialization and urbanization which started in mid 1990s.

Chongqing city<sup>2</sup> became a government-ruled city in 1997. It has a population of 30 million with a total land area of 82,000 m<sup>2</sup> (equivalent to that of Hokkaido), and is a center of economy, transport and trade in the upper stream area of Changjiang river. It is

<sup>1</sup> Field surveys were conducted in June and August 2009.

<sup>2</sup> China's administrative division consists of levels of province, prefecture, county, township, and village.. In correspondent to each administrative level, the densely inhabited districts in provinces, prefectures, and counties are called municipalities, prefecture-level cities, county-level cities, respectively. In addition, areas with densely populated urban district in municipalities or prefecture-level cities are called city-ruled districts. Chongqing city is a municipality, which is directly controlled by the central government and has 19 city-level districts including Shapingba, Jiulongpo and Dadukou, 17 prefecture-level cities and 4 autonomous prefectures.

also historically famous as an industrial city. In the urban areas of Chongqing, water is supplied from 16 water plants, which have water resources in Changjiang and Jialing rivers , with a total capacity of 1.035 million m<sup>3</sup>/day. The central peninsula area, the target of this project, is provided with water from 7 water plants (with a supply capacity of 545,000 m<sup>3</sup>/day ). However, due to increase of water demand with the rapid urbanization, water supply was some times restricted. Thus, it was essential to cope with the increasing water demand in the southwestern area of the central peninsula, which has been developing.

### 1.2 Objective

The project objective is to meet the increasing water demand from the newly developed areas and the enhancement of the quality of life by constructing a purification plant with a capacity of 300,000 m<sup>3</sup>/day in the upper Chongqing river region, thereby contributing to the development and improvement of the life and social infrastructure. The location of the project site is shown in Figure 1.

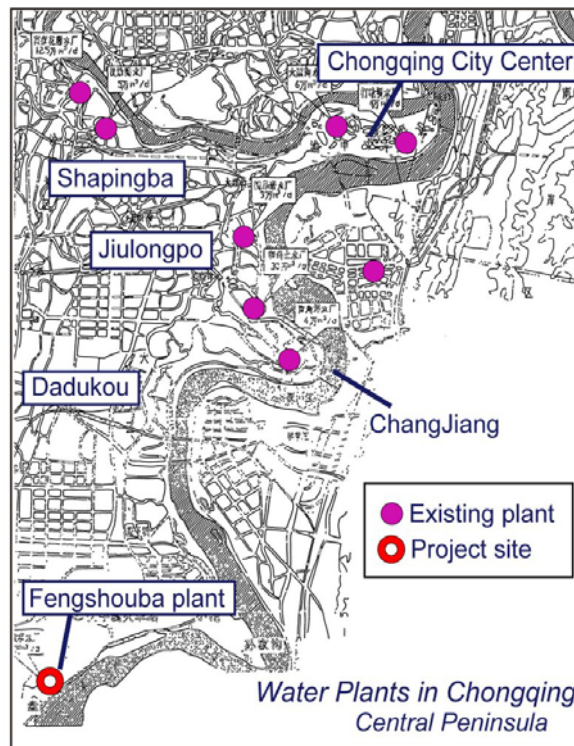


Figure 1 Location of Project Site

### 1.3 Borrower/Executing Agency

Government of the People's Republic of China / Chongqing Municipal People's Government (Later changed to Chongqing Water Supply Holding Company)

### 1.4 Outline of Loan Agreement

Loan Amount/Disbursed Amount	6,244 million yen / 3,589 million yen
Date of Loan Agreement/	March 2000 / March 2000

Exchange of Notes	
Terms and Conditions -Interest Rate -Repayment Period (Grace Period) -Procurement	1.7% p.a. (civil work) 30 years (10 years) General untied
Date of (Disbursement) Completion	July 2006
Main Contractors (More than 1 billion yen only is stipulated)	none
Consultant Services (More than 100 million yen only is stipulated)	none
Feasibility Study	F/S by Central and Southern China Municipal Engineering Design & Research Institute (August 1998)

## 2. Evaluation Results (Rating: A)

### 2.1 Relevance (Rating: a)

#### 2.1.1 Relevance at the time of appraisal

Since the mid 1990s, China has been suffering from water supply and demand gap caused by the rapid industrialization and urbanization, and enhancement of capacity of water supply facilities has been required. In addition, issues of contamination of river water, which is the water source, and lowering of water table level were noted, and assurance of water sources and countermeasures to water conservation were required.

Under such condition, China's 9<sup>th</sup> Five-Year Development Plan (1996-2000) emphasized waterworks infrastructure in rural cities, specifically with the following targets;

- ① increase of nationwide water supply by 40 million m<sup>3</sup> per day
- ② raise accessibility ratio to portable water in urban areas to 96%
- ③ increase average water supply per person by 40ℓ per day

From the development needs viewpoint, the southwestern area of the Chongqing central peninsula was covered only partially by public waterworks. Since with recent economic development, population has been increasing and expected to be further increased, and thus countermeasures to cope with the increasing water demand was essential. In addition, increase of water demand due to the economic development and enhancement of the quality of life, and increase of non-farming population due to urbanization have resulted in the supply-demand gap. In order to meet the increasing water demand, enhancement of supply capacity is essential and construction of a new water plant in the project area was needed.

### 2.1.2 Relevance at the time of evaluation

The current 11<sup>th</sup> Five-Year Development Plan (2006-2010) aims at two numerical targets: 1) the economic growth rate be 7.5%/annum during the period, and 2) reduce energy consumption per unit of GDP by 20 percent during the period. In order to achieve these goals, the government established five principles/plans and one of them is “to accelerate well-balanced development among regions (to accelerate active and steady urbanization and to generate ripple effects by megalopolises)”. With respect to the overall urban planning, consistency with the regional economic development plan, labor markets, urban infrastructure and public works would be taken into consideration. Particularly, a priority would be given to enforcement of control and conservation of sources for drinking water and increase of water supply facilities. One of 5 priority agenda under the Chongqing’s 11<sup>th</sup> Five-Year Plan is: Water purification plants will be newly constructed; the share of water supply from public water plants will be increased; and rehabilitation of degraded water pipes will be accelerated.

According to the Chongqing water supply plan, the southwestern part of the central peninsula area will be developed as an important industrial zone focusing on metallurgy, construction and light industries. Moreover, in order for the southwestern part to be developed focusing on construction materials, high-tech industries and mechanical industries, increase of the water supply capacity needs to be urgently made. In the central peninsula area, increase of population due to the economic development is still continuing, and thus the project, which addresses increase of water demand and enhancement of the quality of life, is consistent with the development needs at this moment.

This project has been highly relevant with China’s national policies and development needs both at the time of appraisal and at ex-post evaluation.

## 2.2 Efficiency (Rating: b)

### 2.2.1 Outputs

The project scope at the appraisal stage was as follows. All facilities for water intake, purification and transmission/distribution were constructed as planned.

Table 1 Output (planned and actual)

Item	Planned	Actual
Water intake facilities	intake volume: 300,000 m <sup>3</sup> /day	as planned
Water purification facilities	purification volume: 300,000 m <sup>3</sup> /day, rapid sand filtration method	as planned
Water transmission and distribution facility	total length: approximately 135km, pressurized pump, regulating pond 20,000 m <sup>3</sup>	as planned



Chlorine dosage facility at Fengshouba Plant



Receiving well of Fengshouba Plant

### 2.2.2 Project period

The planned project period at appraisal was from March 2000 (Loan Agreement signing) to June 2004 (construction completion) with a total period of four years and five months. The actual period was from March 2000 to April 2006 (construction completion) with a total period of six years and two months, resulting in about twenty-one months delay (140% of the planned period).

The main reasons for delay are: Chongqing Municipal Government had to reorganize institutional set-up to establish a new Project Management Office (PMO) for the project and it took 18 months; and delay in completion of detailed designs (approximately 20 months). Following countermeasures were taken to make up for the delay in commencement of works; 1) applied strict schedule control so that the procurement process by International Competitive Bidding (ICB) and National Competitive Bidding (NCB) would not be further delayed; and 2) employed the staff who was familiar with the procurement guidelines of JICA to implement procurement activity and process more effectively. Due to delay in project implementation, Chongqing government applied one-year extension of the loan closing date through Ministry of Finance of China and the one-year extension was approved by JICA.

### 2.2.3 Project cost

The total project cost estimated at appraisal was 18,661 million yen, among which the Japanese ODA loan amount was 6,244 million yen and the rest was to be locally funded. The actual total project cost was 11,428 million yen and the Japanese ODA loan disbursed was 3,589 million yen and the rest was locally funded. The total project cost was reduced by 40% and the Japanese ODA loan disbursed was lower than planned by 42%. Cost reduction was made because of substantial reduction of taxes and administration expenses (reduced by 76%). Its main reasons for reduction are:

- 1) Project Management Office (PMO) staff were reduced from originally planned 80 to 20;

- 2) works which are generally done by consultants were switched to the force account system;
- 3) a tendering company was not employed and instead procurement was processed by own staffs; and
- 4) reduced extra miscellaneous expenditures

The main reason for the decrease in foreign currency (Japanese ODA loan portion) is lowered bided prices of construction materials, equipment, and facilities. At the appraisal stage, cost estimation was made referring to actual prices used in the previous water supply projects, and those used were mostly imported goods. However, in the Fengshouba water plant project, most of goods (materials, equipment, and facilities) were locally procured, and those locally procured were paid by local currency as much as possible.

Table 2 Project Costs by Item (Planned and Actual)

Unit: million yen

Item	Planned			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Intake facilities	462	276	738	432	417	849 (15% increase)
Purification facilities	2,117	1,188	3,305	1,254	1,965	3,219 (3% decrease)
Transmission/ distribution facilities	2,742	2,777	5,519	1,903	3,729	5,632 (2% increase)
Tax, Management expenses	923	8,176	9,099	-	1,727	1,728 (76% decrease)
Total	6,244	12,417	18,661	3,589	7,838	11,428

Note 1: Planned figures taken from appraisal documents

2: Exchange rate: 1 yuan = 15 yen

The project period was longer than planned, but the project cost (in Japanese yen) was lower than planned. Therefore, the evaluation for efficiency is moderate.

## 2.3 Effectiveness (Rating: a)

### 2.3.1 Enhancement of water supply capacity in the central Peninsula area

The estimated demand and supply capacity in the central Peninsula area are shown in Table 3. Upon completion of this project, the water supply capacity (300,000 m<sup>3</sup>/day) was increased. However, since the population of the area to be water-supplied (demand for water supply) was increased as well, water shortfall still remains. Currently, two additional purification plants are being constructed. One is Jingkou plant with water supply capacity of 550,000 m<sup>3</sup>/day and the phase I construction work (water supply capacity: 200,000 m<sup>3</sup>/day) is being implemented. Another one is Yuelai plant with water

supply capacity of 600,000 m<sup>3</sup>/day and the phase I construction work (water supply capacity: 200,000 m<sup>3</sup>/day) is being implemented. The lack of water supply will be resolved by the time when both phase I works have been completed,

Table 3 Estimated demand and supply capacity in the central Peninsula area

Indicators	1997 Baseline	2005	2006	2007	2008
Population in the area to be water- supplied (million person)	1.35	1.86 (1.55)	1.92 (1.59)	1.99 (1.62)	2.07 (1.66)
Demand for water supply (000 m <sup>3</sup> /day)	680	1,120 (941)	1,160 (975)	1,210 (1,009)	1,260 (1,043)
Supply capacity (000 m <sup>3</sup> /day)	545	645 (845)	945 (845)	980 (845)	980 (845)
Shortfall (000 m <sup>3</sup> /day)	135	475	215	230	280

Note 1: Purification facilities were completed in December 2005, and transmission/distribution facilities in December 2006. Heshangshan<sup>3</sup> purification facility (water supply capacity: 250,000 m<sup>3</sup>/day) was completed in 2008.

Note 2: Figures in ( ) are planned figures at appraisal

### 2.3.2 Stable water supply of safe and clean water

Monitoring results of water quality at Fengshouba Water Plant as of June 1, 2009 is shown in Table 4. The quality of treated water at purification plant fulfills all of the national standard requirements, and thus, it proves its adequacy as tap water. The water quality of Changjiang, the source for intake water, has been regularly monitored by the monitoring station, which was established by the Fengshouba water company in collaboration with environmental divisions of neighboring local government for monitoring the Changjiang on the real-time basis.

Table 4 Monitoring Results of Water Quality at Fengshouba Water Plant

Item	Intake water	Transmission/ distribution water after treatment	National standard for transmission/ distribution water after treatment
Ph	7.9	7.6	6.5-8
Turbidity (NTU)	64	0.1	1
Clarity	<15	<5	<15
Odor	none	none	None
Bacteria count (CFU/L)	1.7103	0	0
Coli form count (CFU/100mL)	2.0x10 <sup>4</sup>	0	0
Aluminum(mg/L)		.004	0.2

<sup>3</sup> One of existing plants, of which capacity was planned to be expanded at appraisal.

With respect to the stable supply of water, at the appraisal stage, water supply was insufficient as water supply was limited particularly in summer by setting time, day, and area to be served. Upon completion of the project, in the target area where water is supplied from Fengshouba Plant including Dadukou (where the water plant is located) in the central Peninsula and part of Shapingba, and Jiulongpo, no water interruption has been observed in the past three years. Thus, the project has achieved its original purpose.

The quantity of water intake and water supply of the completed Fengshouba Water Plant is shown in Table 5. The amount of water actually supplied for the past three years was compared with the planned water supply amount, assumed for calculation of FIRR in the Feasibility Study report. The supply achievement ratio in 2008, two years later upon project completion was 75% and thus, the project more or less accomplished the original target. The operating ratio (actual water supply/supply capacity) of Fengshouba water plant is currently 50% and there still remains allowance of water supply. However, it is not possible to transmit the excess water to the areas beyond the targeted coverage area due to geographic conditions (existence of rivers/valleys) of Chongqing city.

Table 5 Quantity of water intake and supply of the completed Fengshouba Water Plant

Indicators	2006	2007	2008
Intake (000 m <sup>3</sup> /day )	74	117	160
Population Served (000 person) Note 1	120	180	250
Actual Water Supply (000 ton/day)	70	110	150
Planned Water Supply (000 ton/day) Note 2	150	200	200
Supply Achievement Ratio (%) Note 3	47	55	75

Note 1: Areas served include Central Peninsula Dadukou District, and part of both Jiulongpo and Shapingba Districts

Note 2: Planned water supply amount in each year upon completion, assumed for calculation of FIRRs in the Feasibility Study report.

Note 3: Actual water supply ÷ Planned water supply

### 2.3.3 Internal rate of return

Financial internal rate of return (FIRR) at appraisal was calculated with conditions that the total project cost and operation/maintenance costs, increased through the operation stage, are “costs” and that the income from water charges is “benefits” . FIRR at the post evaluation was recalculated using the same conditions adopted at the appraisal stage. The re-calculated FIRR at post evaluation was 6.31%. The main reason for increase of FIRR is due to lowered construction costs by 40% than planned. .

Table 6 Financial internal rate of return



stage	FIRR
At appraisal	4.1%
At post evaluation	6.31%

#### 2.3.4 Qualitative impact

##### (1) Response to the increasing demand of water

The project has achieved its initial objective, which would cope with the increased demand for water in Dadukou District upon completion of Fengshouba Plant with a capacity of 300,000 m<sup>3</sup>/day . In addition, Fengshouba water plant is also supplying water to the neighboring Jiulongpo and Shapingba districts.

##### (2) Promotion of economic activities through improvement of the life quality and infrastructure

According to responses to the questionnaire to Chongqing, upon completion of the project, stable and high quality water supply has been achieved. The improvement in the business and living environment in Dadukou District has attracted a number of domestic and foreign investments, and economic development in the district has been further promoted. The growth rate of GDP has been stable and GDP has been more than 11%. The year 2007 even recorded a GDP growth of 18.1%. The generated investment amount in the Shapingba Industrial Development Zone is prominent. The local government of Dadukou District has an ambition to make the district the most beautiful and comfortable district in Chongqing city.

##### (3) Stable supply of clean water

Before the completion of the project, water supply was insufficient as water supply was limited particularly in summer (average temperature was 34 centigrade in July and August) by setting time, day, and area to be served. Upon completion, the project has achieved stable water supply.. In the summer of 2007, when Chongqing city was hit by the extreme high temperature (more than 40 centigrade), the central peninsula area did not suffer from any interruption of water supply and the water pressure was sufficient and stable. No interruption in water supply was experienced in Dadukou District in 2007, 2008 and 2009.

Therefore, this project has largely achieved its objectives, and its effectiveness is highly satisfactory.

#### 2.4 Impact

##### 2.4.1 Improvement of the life quality and infrastructure

Since upon completion of the project, the water supply became stable in the project subject area, Dadukou, the project attracted numerous domestic and foreign investment

and has recorded the GDP growth rate with more than 11% every year. The average per capita income (in 2007) in the project target areas (Dadukou, Jiulongpo and Shapingba) has increased by approximately 40%, compared with that in 2000 as shown in Table 7. According to the results of beneficiary surveys, 75% of respondents do not necessarily perceive project's contribution to increase of the household income, but 93% do to promotion of regional economic activities. Thus, it is perceived that the project somehow contributes to enhancement of the quality of life. Changes in average per capita income are shown in Table 7.

Table 7 Average income per person

Unit: Yuan

Year	Supplied Area by this project
2000	6,980
2001	8,340
2002	9,863
2003	12,440
2004	14,357
2005	16,630
2006	19,215
2007	23,098

Beneficiary surveys through interviews were conducted in the project target areas. The total number of respondents was 130 and the classification of respondents by sex was 34% female and 66% male. Survey results are summarized below.

- 1) stable water supply achieved: 97%
- 2) water supply is sufficient: 99%
- 3) water pressure has been strengthened than before: 97%
- 4) water quality has been improved than before: 99%
- 5) appropriateness of water charges : 63% reasonable (37% high)
- 6) impact on enhancement of the quality of life : 89% (improved)
- 7) time for doing house work has been reduced: 58% (shortened)
- 8) increase of household income: 75% no impact on household income
- 9) improvement of environment: 71% (improved)
- 10) satisfied with the services provided by the water company: 93%
- 11) the regional economic activities: 93% (promoted)
- 12) negative impact by the project: 99% no negative impact

Regarding improvement of the quality of life, about 60% of local residents evaluate that the time for home works was reduced since the stable water supply was achieved and the water pressure was strengthened. Thus, the project contributes to the

improvement/development of the life and social infrastructure.



Settling tank of Fengshouba Plant



Fengshouba Water Plant Water Storage (Underground)

#### 2.4.2 Environmental and social impacts

##### (1) Impacts to the environment

A water supply project is related to an environmental protection, and thus it does not cause any environmentally and socially negative impacts. Any particular negative impact issues by construction of a water plant have not been noted (from monitoring results by Dadukou environmental protection division).

There is no environment issues related to the sludge disposed from the water purification plant since the sludge produced from the Fengshouba Plant is minimal, which was originally concerned. The reason why the amount is minimal is that the intake water from the river at the Fengshouba Plant is very clean. The reason for improved water quality of Changjiang is that the central environment authority has recently enforced the supervision and monitoring on the environmental protection especially after completion of the Three Gorges Hydroelectric Power Station including the following actions: i) more strict measures on illegal disposal and discharge have been taken to reduce the silt and sludge contents in the Yangtze River and ii) any factories affecting the natural environment have been closed. Enforced supervision and monitoring for environmental protection contributes not only to improvement of environment but also to reduction of maintenance costs for plants (the number of regular excavation work was reduced and the cost for work of clearing sludge was reduced).

While the project has increased the supply capacity in the central peninsula area, it also increased the city's discharged waste water. In order to address this issue, a Jiguanshan Waste Water Treatment Plant has been constructed and is now in operation with a treatment capacity of 600,000 m<sup>3</sup> per day.

## (2) Land acquisition and resettlement

The acquired land area was about 150,000 m<sup>2</sup>, which is less than planned (200,000 m<sup>2</sup>). The reasons for the cut of acquired area are: 1) facilities originally planned to be installed on the ground were partially changed to multi-level structures; and 2) approach roads to the plant were constructed under the general public works. The number of resettled households was 5 as planned and the compensation paid was about 20.5 million yuan. Since a house was rebuilt with the compensation paid, the quality of life of resettled inhabitants has improved and they have been provided with safe and clean water from the Fengshouba plant without interruption. They enjoy benefits from the project.

## 2.5 Sustainability (Rating: a)

### 2.5.1 Operation and maintenance system

As originally planned, under Chongqing Water Company (under Chongqing Water Holding Group Co.), the Fengshouba water plant is responsible for operation and maintenance. Chongqing Water Company holds 7 other plants other than Fengshouba water plant. The Fengshouba plant consists of 5 divisions (operations and maintenance, finance, administration, transmission and distribution, and water charge collection) with a total of 130 employees including 3 senior management staff, 7 engineers, 18 technical managers, 29 technical operators, 28 clerical staffs, and 45 others.

At the commencement of the project, the executing agency was changed from the Chongqing Municipal People's Government to Chongqing Water Supply Holding Company. This change was made since the water supply and sewage department of the municipal government was restructured to the company entity. The staffing and organization has been almost unchanged and no issues have been reported in actual operation.

### 2.5.2 Technical capacity in operation and maintenance

There are 27 staff in charge of operation of the plant, among which 7 are university graduates, and 20 technical school graduates. There are 16 administration staff, among which 6 are university graduates, and 10 college graduates. Fengshouba Plant provides numerous training programs to the staff. The training module is diverse and staff receives training on laws and regulations on safety operations, quality control, labour law, the company's operation and maintenance rules and regulations, the technical manuals, operational manuals, and maintenance manuals of all the equipment. The following trainings are regularly undertaken:

Class 1 Training: Team-level training, at least twice each month;

Class 2 Training: Plant-level training, once each quarter;

Class 3 Training: External exchange training, once each year.

Apart from the training program mentioned above, the following measures are taken to enhance technical knowledge and skills: sharing and exchange of professional staff; recruitment of skilled staff from other entities; recruitment of university graduates and training through on-job-training. Results of reviewing the qualification of staff and training accomplishment after recruited, the technical level of staff working at the plant is considered appropriate for implementing operation and maintenance of the plant.

### 2.5.3 Financial status on operation and maintenance

#### (1) Financial status of Fengshouba water plant

The financial status of the Fengshouba water plant is shown in Table 8. Currently, the Fengshouba water plant has sufficient sales revenue to cover water plant's operation and maintenance. Moreover, sales revenue is expected to increase due to increasing water demand from the expected population growth. Operating expenses have been increasing every year and the increasing rate for the past two years was about 10%. Compared with increasing rate of revenues (about 41%), it is lower and the share of operating expenses among the revenue and expenses status will be lowered. Because of increase of water supply volume to 180,000 ton/day by 2010, it is expected that revenue will rise up to 600 million yuan and the net cash flow will reach 50 million yuan in 2010. In addition, Chongqing city is considering to raise water charges by 0.6 yuan/m<sup>3</sup> (already publicly announced). In 2009, revenue is expected to increase by 30 million yuan, which will turn net loss into net profit and it is expected that the business operation would be stable.

Table 8 Financial status of Fengshouba Water Plant

(Unit: million yuan)

Item	2006	2007	2008
Revenue	39.92	58.41	79.05
Operating expenses	66.32	72.02	80.46
(Depreciation among operating expenses)	42.66	43.18	43.50
Tax	0.24	0.35	0.47
Operating expenses	0.81	1.24	2.50
Financial expenses	16.91	13.03	12.04
Non-business revenue	4.23	6.19	8.38
Profit	(40.12)	(22.04)	(8.05)
Net Cash Flow	2.54	21.14	35.54

The current water charges are 2.8 yuan/m<sup>3</sup> for households, 3.35 yuan/m<sup>3</sup> for industrial use, and 2.8 yuan/m<sup>3</sup> for commercial use, respectively. However, these charges include sewerage charges (0.7 yuan/m<sup>3</sup> for households, and 1.0 yuan/m<sup>3</sup> for industrial/commercial uses). Water charges in Chongqing city are average compared with

those at other cities. If the proposal for charge increase by 0.6 yuan/m<sup>3</sup> is approved by the city government, the financial status of the Fengshouba plant would be further improved.

## (2) Financial status of Chongqing Water Company

The financial status of Chongqing Water Company is shown in Table 9. The main reason why the revenue turned to be loss in profit in 2008 is due to change of exchange rates. The profit in 2008 was CNY5.375 million before loss of exchange rates. The financial capacity (net cash flow) of Chongqing Water Company is sound and stable. The revenue is expected to increase further with increase of customers and expected increase of water charges. The equity capital ratio (net asset ÷ total of liability and net asset) as of 2008 was about 43%, and financial status is stable.

Table 9 Financial status of Chongqing Water Company.

(Unit: million yuan)

Item	2006	2007	2008
Revenue	490.14	528.98	581.40
Operating expenses	394.59	405.37	525.26
(Depreciation among operating expenses)	84.31	91.38	108.31
Profit	90.04	66.63	- 22.13
Net Cash Flow	177.7 0	279.65	145.37
Total Asset	2,106.45	2,195.07	2,228.74
Total Debt	1,294.22	1,230.50	1,265.40
Net Asset	812.23	964.57	963.34

### 2.5.4 Status of operation and maintenance

Operation staff cleans the facilities everyday and regularly paints facilities and buildings. Routine maintenance for facilities and an annual comprehensive inspection are conducted so that safe operation is secured. The overhaul of facilities/equipment is entrusted to private companies who possess qualification and technical capacity. It was confirmed during the field inspection that facilities were cleaned and well maintained.

No major problem has been observed on capacity of the executing agency nor the operation nor its maintenance system, therefore, sustainability of this project is high.

## 3. Conclusion, Lessons Learned, Recommendations

### 3.1 Conclusion

This project has been highly relevant with China's national policies and development needs both at the time of appraisal and at ex-post evaluation. The project has largely achieved its objectives, and effectiveness is highly satisfactory. Regarding efficiency, the project period was longer than planned, but the project cost was lower than

planned. Therefore, the evaluation for efficiency is moderate. Sustainability of this project is high.

In light of the above, this project is evaluated to be highly satisfactory.

### 3.2 Lessons Learned

None.

### 3.3 Recommendations

None.

### Comparison between planned and actual

Component	Planned	Actual
Output:	<p>① Water intake facilities: intake volume: 300,000 m<sup>3</sup>/day</p> <p>② Water purification facilities: purification volume: 300,000 m<sup>3</sup>/day, rapid sand filtration method</p> <p>③ Water transmission and distribution facility: total length: approximately 135km, pressurized pump, regulating pond 20,000 m<sup>3</sup></p>	<p>as planned</p> <p>as planned</p> <p>as planned</p>
Period	March 2000 (L/A) – June 2004 (Construction completion) 4 years and 5 months (53 months)	March 2000 (L/A) – April 2006 (Construction completion) 6 years and 2 months (74 months)
Cost (Total Project Cost)		
Foreign currency	6,244 million yen	3,589 million yen
Local currency	12,417 million yen (827.82 million yuan)	7,838 million yen (522.254 million yuan)
Total	18,661 million yuan	11,428 million yen
Japanese ODA Yen loan	6,244 million yen	3,589 million yen
Exchange rates	1 yuan = 15 yen (as of July 1999)	1 yuan = 15 yen (March 2000 – July 2006)