

People's Republic of China

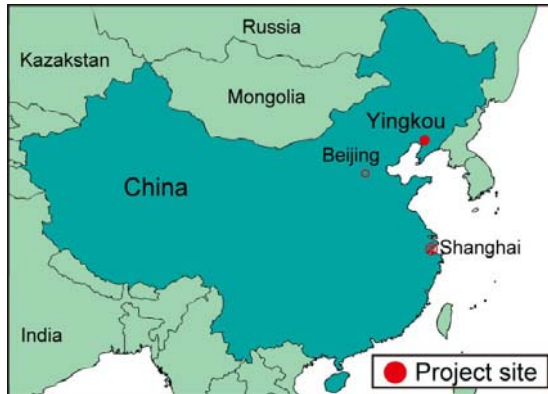
## Yingkou Water Supply Project

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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



Yangjiadian 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 1999, was 217ℓ/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 1985, 89% in 1990, and 96% in 1999. On the other hand, following the rapid economic development in large cities in coastal areas, suburban areas along coastal regions and 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.

Yingkou city<sup>2</sup> has a population of 2.3 million in 2004 (equivalent to that of Miyaghi Prefecture in Japan). In Yingkou City, water had been supplied from water plants,

<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. Yingkou city is a prefecture-level city, which belongs to Liaoning Province, and has 4 districts including Zhanqian, Hongqi, Laobian and Bayuquan, and 2 county-level cities (equivalent to cities in Japan) including Dashiqiao and Gaizhou.

which have water resources in ground water and surface water in Liaohe River. However, due to increase of water demand with the improvement of living standard and the rapid urbanization, water supply was restricted. In addition, water was supplied only eight hours per day due to the lowering of the ground water level with the insufficiency of rain fall in recent years, as well as due to the underutilization of the water plant facilities with the pollution of Liaohe River. In the target area of this project, the average water usage per person as of 1999 was 70ℓ/day, which was half of the same scale cities (150ℓ/day) or one third of the national average (217 ℓ/day). Therefore, it was essential to cope with the increasing water demand.

### 1.2 Objective

The project objective is to meet the increasing water demand in Yingkou City along with economic development and urbanization, and to provide safe and stable water supply, by constructing a purification plant with a capacity of 120,000 m<sup>3</sup>/day in the four districts in Yingkou City<sup>3</sup>, thereby contributing to the improvement of the quality of life. The location of the project site is shown in Figure 1.

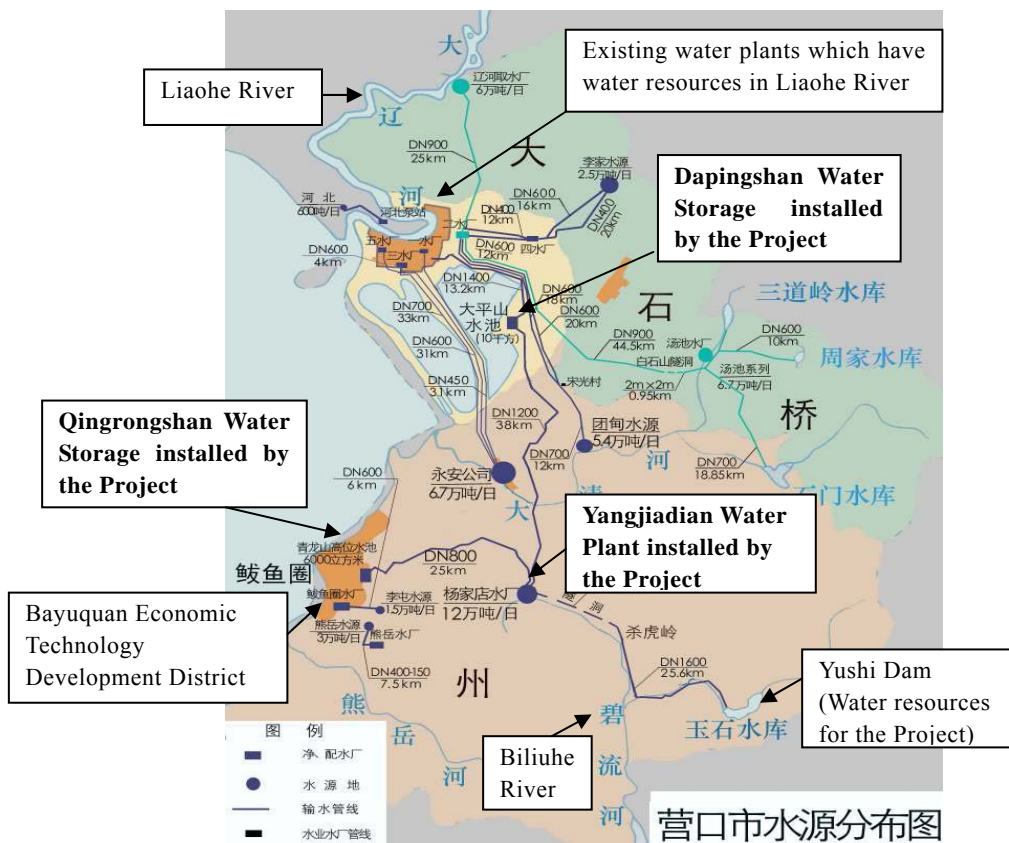


Figure 1 Location of Project Site

### 1.3 Borrower/Executing Agency

<sup>3</sup> Zhanqian District, Honqi District, Laobian District and Bayuquan Economic Technology Development District.

#### 1.4 Outline of Loan Agreement

Loan Amount/Disbursed Amount	2,541 million yen / 2,414 million yen
Date of Loan Agreement/ Exchange of Notes	March 2001 / March 2001
Terms and Conditions -Interest Rate -Repayment Period (Grace Period) -Procurement	1.3% p.a. 30 years (10 years) General untied
Date of (Disbursement) Completion	September 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 Liaoning Province 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 nationwide water supply by 40 million m<sup>3</sup> per day
2. raise the coverage of the water supply system in urban areas to 96%
3. increase average water supply per person by 40ℓ per day

Furthermore, the Yingkou City's 9<sup>th</sup> Five-Year Development Plan (1996-2000)/Long-term Plan for 2010 targeted the increase of water supply capacity of Bayuquan Economic Technology Development District (hereinafter Bayuquan District) by 120,000 ton/day and the increase of the water supply capacity of overall Yingkou City to 591,000 ton/day. Therefore, the Project had high compatibility with the national and

municipal plans.

From the development needs viewpoint, as mentioned earlier, in order to respond to insufficient water supply with the improvement of living standard and urbanization, construction of a new water plant in the project area was needed at the same time when a water supply dam from water resources in Biliuhe River was constructed by the Department of Water Resources of Yinkou City.

### 2.1.2 Relevance at the time of evaluation

The current National 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 priority agenda under the Yingkou City’s 11<sup>th</sup> Five-Year Plan (2006-2010) is to increase the average water usage per person to 180ℓ/day by 2010. In order to realize the policy, the Plan emphasizes sending water from the water sources in the East to West by the implementation of “*Dongshui Xitiao*” projects. As the water quality of Liaohe River is not up to the water quality standard due to the pollution of Liaohe River, it is essential to construct a water purification plant which has other water resources. Therefore, the project with water resources in Biliuhe River is consistent with the development needs. Furthermore, there is still urgent needs to increase water supply capacity to support the Bayuquan District developing as the Economic Technology Development Zone.

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

## 2.2 Efficiency (Rating: b)

### 2.2.1 Outputs

The project scope at the appraisal stage was as follows. All facilities except the intake facility were constructed as planned. Intake facility was built into the design of the Yushi Dam, from water resources in Biliu He River, constructed by the Department of Water Resources of Yingkou City in December 2002. Therefore, the intake facility was

removed from the output of the project. The output of the project is shown below.

Table 1 Output (planned and actual)

Items	Planned	Actual
Water intake facilities	Intake volume: 120,000 m <sup>3</sup> /day Intake pipelines: approximately 20m x 2	Cancelled
Water conveyance facilities	Total length: approximately 26km, Total length of tunnel: approximately 11km	Almost as planned (Total length: approximately 26km, Total length of tunnel: approximately 11.3km)
Water purification facilities	Purification volume: 120,000 m <sup>3</sup> /day, floc formation pond, sedimentation pond, and filtration pond (rapid sand filtration method)	As planned
Water transmission facilities	Total length: approximately 65km	Almost as planned (approximately 66.2km)
Water distribution facilities	Regulating pond x 2 Total length: approximately 29km	Almost as planned (Regulating pond x 2 , Total length: approximately 27km)



Water Purification Plant



Monitoring Room

### 2.2.2 Project period

The actual project period was the same as planned from March 2001 (Loan Agreement signing) to December 2003 (commencement of operation) with a total period of two years and ten months (100% of the planned period).

### 2.2.3 Project cost

The total project cost estimated at appraisal was 5,778 million yen, among which the Japanese ODA loan amount was 2,504 million yen and the rest was to be locally funded. The actual total project cost was 6,458 million yen and the Japanese ODA loan disbursed was 2,414 million yen and the rest was locally funded. The total project cost was increased by 12% than planned (112% of the planned cost). The cost for the intake facility decreased to zero due to its cancellation. On the other hand, cost for other facilities such as conveyance facilities, purification plant and distribution facilities were increased. Main reasons for cost increase of the conveyance facilities are as follows:

- 1) the price of the materials drastically increased from the original price;
- 2) the road for civil works required for installing conveyance facilities was added;
- 3) the volume of civil works for installing conveyance facilities deeper under small and medium scale rivers increased from the original plan;
- 4) the soil replacement works, which was not expected before the project started, were added.

Main reasons for cost increase of the water plant facilities are as follows:

- 1) the actual price of civil works for the plant and that of the installation of equipment were higher than those at appraisal;
- 2) sludge processing facility was added;
- 3) installation of electric wire outside the water plant and additional civil works for access road in front of the water plant was added;

Main reasons for increase of the distribution facilities are the increase of the price of materials and additional civil works due to the geological conditions.

Although the project period was as planned, the project cost slightly exceeded the plan; therefore, the evaluation for efficiency is moderate.

## 2.3 Effectiveness (Rating: a)

### 2.3.1 Enhancement of water supply capacity

#### (1) Water Supply Capacity by the Project

Water supply capacity by the project is shown in Table 2. Upon completion of this project, the water supply capacity was increased by 120,000 m<sup>3</sup>/day as planned, and the facility utilization rate has also been increasing steadily since the operation in 2004 and reached 100 % in 2008.

Table 2 Water supply capacity by the Project

Indicators (unit)	2004	2006	2007	2008
Water supply capacity (1,000 m <sup>3</sup> /day)	12	12	12	12
Average water supply amount (1,000 m <sup>3</sup> /day)	5	7	8	12
Facility utilization rate (%)	41.7	58.3	66.7	100

Source: Yingkou Water Supply Company Limited

#### (2) Water supply capacity in the project target area and the role of project

The water demand and supply capacity in the project area are shown in Table 3.

Table 3 Demand and supply capacity in the project target area (actual)

Indicators (Unit)	1999 Baseline	2004	2005	2006	2007	2008

Population served (1,000 persons)	72.2	82	83.6	85	86.3	87.6
Demand of water supply (1,000 m <sup>3</sup> /day)	23.3	30.8	30.9	31	31.1	35.5
Supply capacity (1,000 m <sup>3</sup> /day)	23.3	35.3	35.5 <sup>4</sup>	35.5	35.5	35.5
Shortfall (1,000 m <sup>3</sup> /day)	0	4.5	4.6	4.5	4.4	0

Source: Yingkou Water Supply Company Limited

Note 1: The Project was completed in December 2003. The existing plant increased its capacity in 2005.

Upon completion of this project, the water supply capacity (120,000 m<sup>3</sup>/day) was increased as planned, and the project facility is responsible for approximately one third of the total capacity of the project target area. As the water demand is still increasing in Bayuquan District, two more new water plants are under construction<sup>5</sup>. Table 4 illustrates the population in the area to be water-supplied, accessibility ratio to portable water and other indicators.

Table 4 Population served, coverage of the water supply system and other indicators in the project target area (Planned and Actual)

Indicators (Unit)	1999 (Baseline)	2008 (Target)	2008(Actual)
Population served (0,000 persons)	72	93	87
Average water usage per person (ℓ/day)	70	95	102
Coverage of the water supply system (%)	100	100	100
Water leakage ratio (%)	24	15	22

Source: Yingkou Water Supply Company Limited

The actual population served as of 2008 was 870,000 persons, which was below the target of 930,000 persons. However, average water usage per person reached 102 ℓ/day, which exceeded the target of 95 ℓ/day for 2008. In addition, accessibility ratio to portable water also reached 100%. Main reasons why water leakage ratio could not reach the target for 2008 are as follows: 1) distribution pipelines outside the project became obsolete; and 2) 24 hour water supply as well as increase of water pressure by the project is accelerating the deterioration of the obsolete distribution lines. In spite of these, water leakage ratio is decreasing in the past two to three years along with the replacement of old distribution lines; therefore, it is expected that the water leakage ratio will decrease further in the near future.

### 2.3.2 Response to the increasing water supply

As shown in Table 3, water demand drastically increased from 233,000 m<sup>3</sup>/day at appraisal in 1999 to 308,000 m<sup>3</sup>/day in 2004, then to 355,000 m<sup>3</sup>/day in 2004. It can be said that the project covered the increase of water supply demand by adding the capacity

<sup>4</sup> At the appraisal, it was expected that the existing water plant would increase its capacity by 44,000 m<sup>3</sup>/day by the improvement of water quality of Liaohe River, which is outside the scope of the Project. However, it increased only by 2,000 m<sup>3</sup>/day.

<sup>5</sup> One plant with the capacity of 70,000 m<sup>3</sup>/day is being constructed with the loan from the World Bank, and another plant with the capacity of 250,000 m<sup>3</sup>/day with the loan from the central government. Both plants are planned to be completed in December 2010.

of 120,000 m<sup>3</sup>/day. Meanwhile, Table 5 illustrates water usage by purpose in the project target area.

Table 5 Water usage by purpose in the project target area

Purpose	Unit	2001	2004	2005	2006	2007	2008
Living use	1,000 m <sup>3</sup> /day	5.6	7.9	7.9	7.9	7.9	8
	%	23.9	25.5	25.4	25.4	25.3	22.4
Industrial use	1,000 m <sup>3</sup> /day	10.3	14.4	14.5	14.6	14.7	19
	%	44.1	46.8	46.9	47.1	47.3	53.5
Commercial use	1,000 m <sup>3</sup> /day	7.5	8.6	8.6	8.5	8.5	8.5
	%	32	27.8	27.6	27.5	27.4	24.1
Total	1,000 m <sup>3</sup> /day	23.3	30.8	30.9	31	31.1	35.5

Source: Yingkou Water Supply Company Limited

Water demand is increasing in all the categories, particularly in living use and industrial use. Therefore, it is deduced that the project responded to the increase of water demand particularly for living use and industrial use.

### 2.3.3 Stable supply of safe and clean water

Water from Yangjiadian Water Plant is purified by the chlorine dosage facility. The water quality is regularly monitored in the water quality inspection room. Monitoring results of water quality at Yangjiadian Water Plant as of June 2009 and the national standard requirements (revised in 2006) are shown in Table 6. The quality of treated water at purification plant fulfills all of the national standard requirements; and thus, it proves adequacy as tap water.

Table 6 Monitoring Results of Water Quality at Yangjiadian Water Plant

Item	National standard water quality after treatment (GB5749-2006)	Water quality before treatment	Water quality after treatment
Ph	>=6.5, <8.5	7.23	7.12
Turbidity (NTU)	<1	1.2	0.6
Odor	None	None	None
Bacteria count (CFU/L)	<100	4	1
Coli form count (CFU/100mL)	None	None	None
Iron (mg/L)	<0.3	0.03	0.02
Manganese (mg/L)	<0.1	0.06	<0.006
Aluminum (mg/L)	<0.01	<0.0007	<0.0007

Source: Yingkou Water Supply Company Limited





Chlorine dosage facility



Water quality inspection room

With respect to the stable supply of water, at the appraisal stage, water supply was insufficient as water supply was limited to three times a day (morning, day time and evening) in total of eight hours per day. Upon completion of the project, safe water is supplied for 24 hours to most households, commercial facilities and factories in the project target area<sup>6</sup>. However, some old residential areas where water interruption is still observed as the old distribution lines have not been replaced.

Regarding water pressure, according to Yingkou Water Supply Company Limited, the water pressure was between 0.08MPa<sup>7</sup> (non-peak time) and 0.2MPa (peak time), which forced three-story and higher buildings to use pumps for adding pressure before the project was completed. Since the completion of the Project, the water pressure has been kept at 0.3MPa, and only buildings with more than four floors require pressure pumps. According to the interviews with one of beneficiaries in Laobian District, as water pressure was not sufficient before the project completion, there were not so many buildings higher than four story, while sufficient water pressures are now secured so that more high buildings are observed in the district.

#### 2.3.4 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, from the operation stage are “costs” and that the income from water charges is “benefits”. FIRR at the ex-post evaluation was recalculated using the same conditions adopted at the appraisal stage. The re-calculated FIRR at the ex-post evaluation was 3.8%, almost as planned. The

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<sup>6</sup> According to Yingkou Harbor Bureau, it was required to install water tanks to store water for ships at the wharf previously, but upon the project completion, there is no longer need to store water. According to the Yingkou Second Technology College, it used to store water, but it is not necessary now. Factories of plastics, textiles and hosiery were forced to stop their operations at the peak time in order to secure supply to households previously, but such problems have been solved upon the project completion.

<sup>7</sup> Unit for pressure. 1(bar)=0.1MPa (Mega Pascars).

main reason for slight decrease in FIRR is due to increased construction costs by 12% than planned.

Table 6 Financial internal rate of return

Stage	FIRR
At appraisal	4.3%
At ex-post evaluation	3.8%

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

## 2.4 Impact

### 2.4.1 Improvement of the life quality

Beneficiary survey through interviews was conducted in the project target area (all the four districts). The total number of respondents was 110, and the classification of respondents by sex was 45% female and 55% male. According to the survey, while respondents had to wake up early morning in order to store water in basin for living use, they do not need to do so thanks to 24 hour water supply upon the completion of the project. In addition, thanks to the stable water supply, approximately half of the self-drilled wells in the project target area were closed. As a result, the unplanned digging of wells by residents was reduced, which enabled the improvement of sanitary environment such as water quality.

Survey results of the beneficiary survey are summarized in Figure 2. The improvement was felt, with respect to the time of interruption of water supply, water pressure, color and smell, by the respondents respectively: 83%(91persons), 96%(106persons), 73%(80persons), 67% (74persons), 68% (75 persons). 87% (96 persons) of the respondents also felt that the time for water fetching was reduced, and 85% (94 persons) felt the living environment such as sanitation was improved. However, it was also heard that old distribution lines should be replaced because interruption of water supply is still observed in parts of old residential areas.

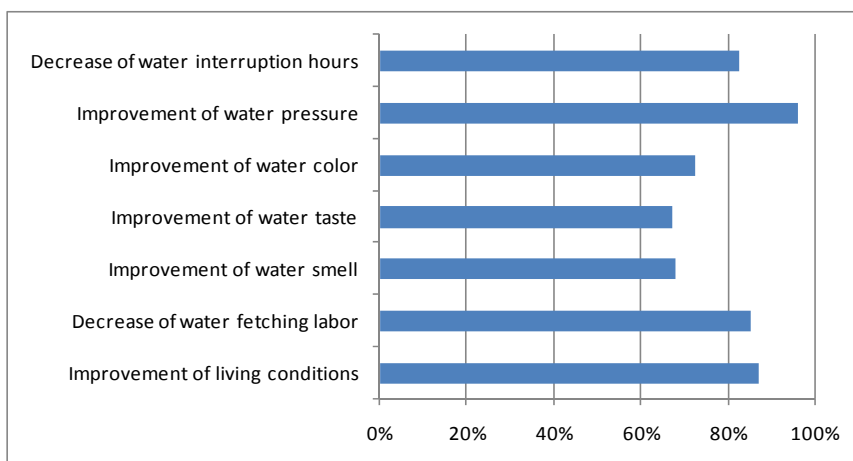


Figure 2 Result of Beneficiary Survey

Water charges are 2.65 yuan/m<sup>3</sup> for household, 7.05yuan /m<sup>3</sup> for business, 14.1 yuan/m<sup>3</sup> for others including car wash and massage centers. All the above charges are considered as average compared with those of other same scale cities. According to the beneficiary survey, 83% (91 persons) feel that the water charge is appropriate; 8% (9 persons) expensive; and 9% (10%) cheap respectively.

Thus, it is deduced that the Project contributed to the improvement of quality of life.

#### 2.4.2 Contribution to economic activities through the improvement of living and social infrastructure

In the aspect of living infrastructure, there is a possibility that the time for storing water in households was reduced by 24 hour water supply while the time for economic activities and leisure increased, which results in the possible economic effects.

In the social infrastructure aspect, according to the interviews with the executing agency and the result of beneficiary survey, it is highly possible that stable and sufficient water supply for production activities enabled Chinese and foreign capital companies to start their business in Yingkou City. Such enterprises include Angang Steel Company and China Steel Group. Such explanation is also supported by the fact that the water for industrial use in the project target area increased by 1.5 times from 103,000 m<sup>3</sup>/day at appraisal to 144,000 m<sup>3</sup>/day in 2004 (see Table 5). Meanwhile, GDP in Yingkou City is also steadily increasing, and the GDP growth rate in 2004 was 21.2%, which is much higher than the national average (10.1%)<sup>8</sup>. Furthermore, as shown in Table 8 and 9, the number of enterprises in Bayuquan District and the cargo handling volume of Yingkou Harbor have been increasing particularly since 2003; thus it can be said the stable water supply is contributing to the economic development of the Bayuquan District.

<sup>8</sup> China Statistical Year Book

Table 8 Number of enterprises in Bayuquan District (unit: number of companies)

Year	2001	2002	2003	2004	2005	2006	2007	2008
Number of enterprises	3,216	3,468	4,125	4,356	4,356	4,570	4,787	4,971

Source: Yingkou Statistical Bureau

Table 9 Cargo handling volume of Yingkou Harbor (unit: ton)

Year	2001	2002	2003	2004	2005	2006	2007	2008
Volume	2,520	3,127	4,009	5,978	7,537	9,477	12,206	15,085

Source: Yingkou Statistical Bureau

### 2.4.3 Environmental and social impacts

#### (1) Impacts to the environment

No environmental problem has been observed. Yingkou Water Supply Company Limited drafted an environmental monitoring plan in May 2004 and is monitoring properly in accordance with the plan. As mentioned earlier, no particular water quality issue has been observed. In January 2005, environmental monitoring and inspection center of Liaoning Province produced the environmental protection monitoring and inspection report for project completion, and no problem was pointed out in the report.

In the Project facilities, countermeasure to sludge is undertaken for environmental protection. At appraisal, it was planned to bury sludge in the approved site in the neighboring city, Gaizhou. However, a processing facility for sludge, which is one of the additional outputs, was installed in the Yangjiadian water plant. The amount of processed sludge is minimal (every ten days in summer time and once a month for winter time by ten-ton truck). Therefore, processed sludge has been buried within Yingkou City or provided to farmers for free of charge. The reason why the amount of sludge is minimal is that the intake water from Yushi Dam is very clean.



Processing facility for sludge

While the Project has increased the water supply capacity in Yingkou City, it also increased the city's discharged waste water. Although there is no waste water treatment plant at the present, a waste water treatment plant with a treatment capacity of 200,000 m<sup>3</sup>/day is planned to be completed by 2010 with the loan from the World Bank.

There was no particular issues related to land acquisition, and there was no resettlement of houses.

## 2.5 Sustainability (Rating: a)

### 2.5.1 Operation and maintenance system

In December 2003, Yingkou Water Supply Company (which was originally planned to be responsible for operation and maintenance) merged with Yingkou Yushi Dam Construction Management Company (responsible for the management of Yushi Dam, used as water resources by the project). As a result, Yingkou Water Company Limited was established. As of now, Yingkou Water Company Limited is responsible for operation and maintenance of the water facilities constructed by the Project. The company consists of seven divisions (planning, production/technology, finance/inspection, personnel, security, purification facility, pipeline management). Out of 36 employees working for the operation and management of the project, 30 employees including 2 university graduates, 10 college graduates, 15 technical school graduates, and 3 others are working in the newly installed water purification plant. Half of these employees have technical certificates (3 engineers, 6 assistant engineers, and 5 technicians).

### 2.5.2 Technical capacity in operation and maintenance

Yangjiadian Plant provided training to all the new staff before their replacement. They received training for three months at the Second Water Plant (which was constructed with the assistance by the World Bank in 1993 and has the same rapid filtration system as that of the project), and for one month at other plants in Dalian, Jinzhou and Chengdu. Technical staff also receives on-the job training every year. Furthermore, the staff to be employed for the Sixth Water Plant to be completed by 2010 is now receiving training at

Yangjiadian plant, and it is highly possible that the operation and maintenance skills acquired from the project plant will be disseminated to other water plants.

### 2.5.3 Financial status on operation and maintenance

#### (1) Cash flow status of Yingkou Water Supply Company Limited

The cash flow of the Company is shown in Table 10.

Table 10 Cash flow of Yingkou Water Supply Company Limited

(Unit: million yuan)

Item	2006	2007	2008
Revenue from water charges	93.10	99.05	153.47
Other revenue	7.7	0.78	0.84
Total revenue	100.80	106.85	161.89
O&M cost	91.78	94.5	125.64
Financial expenses	27.25	40.78	55.64
Total cost	119.03	135.28	181.28
Profit	-18.23	-28.43	-19.39

Source: Yingkou Water Supply Company Limited

Although the table shows that profit is minus, revenue from water charges is increasing steadily. The company has also been receiving subsidy of a total amount of 1,800 million yuan from the city government every year. Therefore, it could be said that the operation and maintenance cost is secured. Regarding the cost for replacement of deteriorated distribution pipelines, the company has already received subsidy of 800 million yuan from the Chinese government for FY 2009, and for the coming years after 2010, the budget of 11,800 million yuan is secured for the replacement of pipelines in the Shimen Dam Project (with the loan from the World Bank).

#### (2) Financial status of Yingkou Water Company Limited

The financial status of Yingkou Water Company Limited is shown in Table 11.

Table 11 Financial status of Yingkou Water Company Limited

(Unit: million yuan)

Item	2006	2007	2008
<b>Financial performance</b>			
Total asset	764.43	946.61	1,715.84
Current asset	197.44	145.16	229.28
Current liabilities	136.84	214.48	278.55
Equity capital	354.83	428.64	752.93
<b>Financial indicator</b>			
Total asset turnover (times)	0.12	0.10	0.09
Equity ratio (%)	46%	46%	44%

Source: Yingkou Water Supply Company Limited

Equity ratio is between 44% and 46% in the past three years, and the financial condition is stable.

#### 2.5.4 Status of operation and maintenance

Routine inspection of the facilities is conducted every day, every week, every month or every three months depending on item in accordance with regulations as regulated. It was confirmed during the site visit that facilities were cleaned and well maintained.

No major problem has been observed on capacity of the executing agency nor its operation and 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 its effectiveness is high. Regarding efficiency, the project cost was slightly higher than planned, but the project period was as 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 (to Yingkou Water Supply Company Limited)

As there is still some water restriction in parts of old residential areas due to the old water distribution lines, it is recommended that replacement of water distribution lines is to be expedited in order to supply water from water plant constructed by the project to each household in stable manner.

### Comparison of Original and Actual

Item	Plan	Actual
1. Output		
1) Intake facilities	<ul style="list-style-type: none"> <li>• Total length: approximately 20m×2</li> </ul>	<ul style="list-style-type: none"> <li>• Cancelled (Built into the Yushi Dam Construction Project)</li> </ul>
2) Conveyance facilities	<ul style="list-style-type: none"> <li>• Total length of conveyance lines: approximately 26km</li> <li>• Total length of tunnel: approximately 11km</li> </ul>	<p>Almost as planned</p> <ul style="list-style-type: none"> <li>• Total length of conveyance lines: approximately 26km</li> <li>• Total length of tunnel: approximately 11.3km</li> </ul>
3) Water Purification facilities	<ul style="list-style-type: none"> <li>• Capacity 120,000 m<sup>3</sup> /day, (rapid sand filtration method)</li> </ul>	<p>As planned</p>
4) Transmission facilities	<ul style="list-style-type: none"> <li>• Total length of transmission lines: approximately 65km</li> </ul>	<p>Almost as planned</p> <ul style="list-style-type: none"> <li>• Total length of transmission lines: approximately 66.2km</li> </ul>
5) Distribution facilities	<ul style="list-style-type: none"> <li>• Two water storage</li> <li>• Total length of distribution lines: approximately 29km</li> </ul>	<p>Almost as planned</p> <ul style="list-style-type: none"> <li>• Two water storage</li> <li>• Total length of distribution lines: approximately 27km</li> </ul>
2. Project Period		
1) Intake facilities (Part of Yushi Dam)	January 2000- December 2001	October 2000- March 2002
2) Conveyance lines	July 1999- December 2002	July 1999- December 2002
3) Purification Plant	May 2000- December 2002	May 2000- June 2003
4) Transmission lines	May 2001- June 2003	January 2001- June 2003
5) Distribution lines	January 2001- June 2003	January 2001- June 2003
6) Test Run	July 2003- December 2003	July 2003- December 2003
3. Project Cost		
Foreign Currency	2,504 million yen	2,415 million yen
Local Currency	3,274 million yen (252 million yuan)	4,043 million yen (331 million yuan)
Total	5,778 million yen	6,458 million yen
Japanese ODA Loan Portion	2,504 million yen 1yuan = 13yen	2,414 million yen 1yuan = 14.3yen
Exchange Rate	(As of 2000)	(2001-2006 Average)