People's Republic of China

Tangshan Water Supply Project

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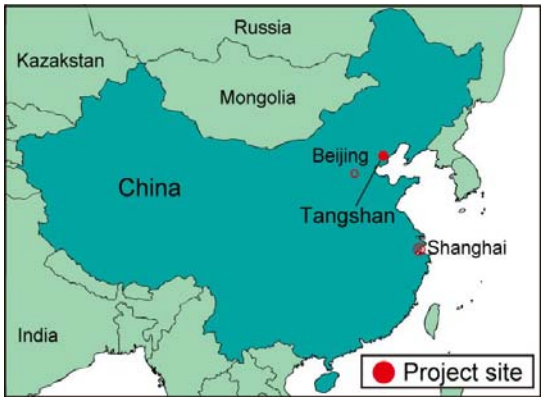
Study Period: April 2009 to December 2009[1]

1. Project Profile and Japan's ODA Loan



Location of Project Site

Water Plant in Qian'an

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.

Tangshan city[2] is the fourth largest city in Hebei Province with a population of

[1] Field surveys were conducted in June and August 2009.

[2] 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. Tangshan city is a prefecture-level city, which belongs to Hebei Province, and has 6 districts, 2 county-level cities (equivalent to cities in Japan) and 6 counties (between prefecture and county in Japan). The project target areas include 2 districts (Guye and Fengnan), 1 country-level city (Qian'an) and 3 counties (Qianxi, Luannan and Tanghai).

7.19 million (2006) (equivalent to that of Saitama Prefecture in Japan). The city is a center of energy (coal and oil), industry and agricultural production in Huabei and Dongbei regions.

After the large scale earthquake in 1976, on the one hand, water plants with a total capacity of 500,000 ㎥/day were constructed to supply water to the three major urban districts in the city[3] (outside the project scope), where reconstruction was mainly undertaken. On the other hand, regarding the six project target areas, there were water plants only with a total capacity of 95,000 ㎥/day in Guye District and with a total capacity of 10,000 ㎥/day each in other counties. Thus, most households had to depend on self-drilled or community wells. In the areas where facilities were limited, there were a number of problems such as unplanned digging of self-drilled wells, unsafe quality of water, and subsidence of water resources. Therefore, it was essential to address these issues, to provide safe and stable water supply, and to cope with the increasing water demand along with the future economic development and urbanization, thereby improving living environment.

1.2 Objective

The project objective is to meet the increasing water demand in Tangshan City along with economic development and urbanization, and to provide safe and stable water supply, by constructing water plants with a total supply capacity of 210,000 ㎥/day in the six districts/counties[4] (Guye District, Luannan County, Qian'an City[5], Qianxi County, Tanghai County, Fengnan District[6]) in Tangshan City, thereby contributing to the improvement of the quality of life. The location of the project site is shown in Figure 1.

[3] Kaiping District, Lubei District and Lunan District.
[4] At appraisal, there was also a need for water supply in the other areas, but those areas which had sufficient own funds such as Leting County and Fengjun District were not selected as project target areas.
[5] Qian'an City was Qian'an County at appraisal.
[6] Fengnan District was Fengnan County at appraisal.

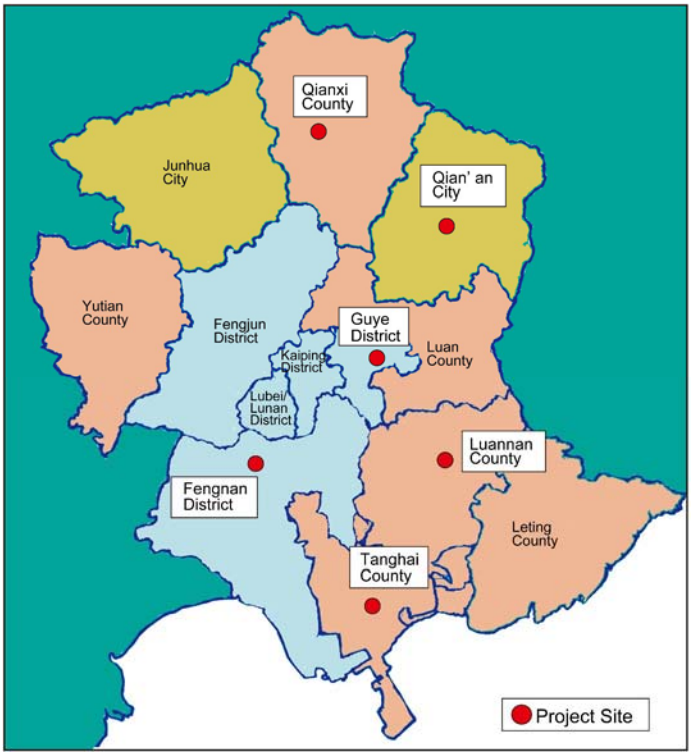


Figure 1 Location of Project Site

1.3 Borrower/Executing Agency

Government of the People's Republic of China / Tangshan Municipal People's Government[7]

1.4 Outline of Loan Agreement

Loan Amount/Disbursed Amount	2,841 million yen / 2,835 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	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 Shanghai Municipal Engineering Design & Research Institute (February 2000)

[7] Actual implementation was carried out by each water supply company of the target areas.

2. Evaluation Results (Rating: B)

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 9th 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 ㎥ 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

The Tangshan City's 9th Five-Year Plan (1996-2000) is planning to keep the coverage of the water supply system in urban areas at 100% and to achieve 95.2% in counties by 2000. It is also targeting to expand the water supply capacity of 1.23 million ㎥/day in urban areas and 280,000 ㎥/day in counties. Thus, it could be said that this project contributed to the realization of the five year plan.

From the development needs viewpoint, as mentioned earlier, the construction of new water plants in the project area was needed, in order to address the issues including unplanned digging of self-drilled wells, unsafe quality of water and subsidence of water resources, to provide safe and stable water supply, to cope with the increasing water demand along with increasing economic development and urbanization, and to improve living environment.

2.1.2 Relevance at the time of evaluation

The current 11th 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.

The following priority agenda were articulated in the Tangshan city's Long-term Plan 2010: the coverage of the water supply system in urban areas would be kept at 100%; the coverage of the water supply system in counties would be increased to 100%; the water supply capacity would be increased to 1.44 million ㎥/day in urban areas and 0.58 million ㎥/day in counties. Thus, it could be said that this project contributes to the realization of the long-term plan.

In light of the above, 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

All the outputs were constructed and installed as almost planned. Table 1 shows the total outputs of the project (planned and actual), and Table 2 shows the outputs of each county (actual) respectively.

Table 1 Total outputs of the project (planned and actual)

Item	Planned	Actual
1. Intake wells（numbers）	70	Almost as planned（69）
2. Conveyance lines (total length: km)	57	Almost as planned（54）
3. Water plant（Capacity：unit 1,000 ㎥/day）	21	As planned
4. Distribution lines（total length: km）	104	Almost as planned（115）

Source: Calculated based on the data from each water supply company

Table 2 Outputs of each county (actual)

County	Intake wells (number)	Conveyance lines (Km)	Water plant (0,000 ㎥/day)	Distribution lines (Km)
Guye	11	10 (+4)	5	14 (+2)
Luannan	20	11	5	39
Qian'xi	7	3	3	18
Qian'an	4	2	3	15
Tanghai	11(-1)	17(-1)	2	10(+8)
Fengnan	16	12(-6)	3	18
Total	69(-1)	54 (-3)	21	115 (+11)

Source: Each water supply company

Note: The figures of () shows the amount of increase/decrease from the planned.

Table 3 shows the reasons for the revision of the outputs for Guye District, Tanghai County and Fengnan District.

Table 3 Reasons for the revision of the outputs
in Guye District, Tanghai County and Fengnan District

County	Output	Reasons
Guye	Conveyance lines	The total length of conveyance lines was increased because the water plant was transferred to the east of the planned area.
	Distribution lines	As the planned areas for installing distribution lines crossed with railways, the design was modified, thus the length of distribution lines was increased.
Tanghai	Intake wells	The total actual number of intake wells was eleven against the target of twelve. According to the design, two intake wells are one pair. However, one location could not have a pair due to geological conditions and technical problems such as piston and steel pipes although they tried drilling at three different locations (all the east, west and north side of the first drilled well).
	Distribution lines	In response to the urbanization, the Tanghai county government made a decision to extend the total length of distribution lines to the newly developing area.
Fengnan	Conveyance lines	Although it was planned to construct the water plant at the southern area of the city, it was constructed at the north west of the city which is closer to the intake wells. Therefore, the total length of the conveyance lines was decreased.

Water storage constructed by the Project in Luannan County

Signboard in Tanghai Water Supply Company. It says that the water plant (20,000 ㎥/day) was constructed with the loan from former JBIC (JICA), Bank of China and government bond[8].

2.2.2 Project period

The project period was much longer than planned. The planned project period at appraisal was from March 2001 (Loan Agreement signing) to December 2002 (commencement of operation) with a total period of twenty two months.

In Tanghai City where the actual project period was the shortest among the project target areas, the actual period was from March 2001 to November 2004 (commencement of operation) with a total period of forty five months (204% of the planned period). Meanwhile, in Guye District where the actual period was the longest among the target areas, the actual period was from March 2001 to January 2008 with a total period of eighty three months (377% of the planned period).

Major reasons for delays which are common for all the counties are as follows;

[8] Similar signboard was also observed at the water plant in Qian'an City.

1. the time required for preparatory work including land acquisition and detail design, and for bidding process was not sufficiently estimated; and
2. each water supply company was responsible for the selection of contractors and the procurement of minor equipment while the Project Office of Water Supply Works Using Japanese ODA Loan of Tangshan Municipal People's Government (the "Project Office" hereinafter) was responsible for the procurement of major equipment. However, the commencement of the civil works and its progress were different from county to county, thus complicated coordination resulted in serious delays.

Delays of each county are shown in Table 4.

Table 4 Major reasons for delays of each county

County	Major reasons for delays
Guye	1. More time was required than planned for land acquisition and revision of detail design because the water plant was shifted to the east of the planned area. 2. As the planned areas for installing distribution lines crossed with railways, the revision of detail design took time.
Luannan	1. More time was required to obtain local currency from county government 2. More time was required for bidding process of contractors
Qianxi	1. More time was required for land acquisition(i.e. approval from authorities concerned) 2. Procedures and civil works were tentatively suspended due to the epidemic of SARS from winter in 2002 to summer in 2003
Qian'an	1. More time was required for bidding process than planned 2. Change of design 3. Procedures and civil works were tentatively suspended due to the epidemic of SARS from winter in 2002 to summer in 2003
Tanghai	1. More time was required for bidding process than planned 2. More time was required for land acquisition than planned
Fengnan	1. More time was required for detail design than planned 2. Although it was planned to construct water plant in the southern area of city center at appraisal, as the city areas developed towards North West, the water plant was also constructed near the newly developed areas.

2.2.3 Project cost

The total project cost estimated at appraisal was 6,197 million yen, among which the Japanese ODA loan amount was 2,841 million yen and the rest was to be locally funded. The actual total project cost was 5,254 million yen and the Japanese ODA loan disbursed was 2,835 million yen and the rest was locally funded. The total project cost was 85% of the planned. Reasons for the decrease include the reduced cost due to the decreased length of conveyance lines in Fengnan Distrct and slightly reduced cost for unknown reasons in all the provinces except Guye District.

Although the project cost was lower than planned, the project period was much longer than planned; therefore, the evaluation for efficiency is moderate.

2.3 Effectiveness[9] (Rating: b)

2.3.1 Enhancement of water supply capacity

(1) Water supply capacity by the project

Table 5 shows water supply capacity increased by the project in each county.

Table 5 Water supply capacity increased by the project in each county

(Two years after the project completion)

Indicators (unit)	Guye (2008) Note1	Luannan (2006)	Qianxi (2005)	Xian'an (2005)	Tanghai (2004)	Fengnan (2006)
Capacity of the project facilities (1,000 ㎥/day)	5	5	3	3	2	3
Average water supply amount by the project (1,000 ㎥/day)	3.5 Note2	0.64	0.6	0.92	0.92	0.85
Facility utilization rate (average) (%)	70	13	20	31	46	28

Source: Each water supply company

Note1: The figure with () shows the year of project completion (commencement of water supply)

Note2: In Guye District, the latest data is that of 2008.

Note3: The facility utilization rate (average) is (average water supply volume)/(supply capacity).

Upon completion of the project, the total water supply capacity of all the target areas was increased by 210,000 ㎥/day as planned. However, two years after the completion of each target county, in the five counties out of the six target areas, facility utilization rate (average) remains lower than 50%. Particularly in Luannan and Qianxi, one of the reasons for the low facility utilization rate is that households are still using self-drilled wells. One positive prospect is that the water supply amount is increasing year by year in Qianxi by restricting the use of self-drilled wells through the enforcement of regulations for closing self-drilled wells. Regulations for closing self-drilled wells in each county and those enforcement situations are summarized in Table 6.

Table 6 Regulations for closing self-drilled wells in the target areas and enforcement situations[10]

County	Enforcement situations of regulations for closing self-drilled wells
Guye	Trying to introduce a regulation this fiscal year.
Luannan	Although a regulation for closing self-drilled wells took effects in 2005, a number of residents still use self-drilled wells. Therefore, there is a need to enforce the regulation more strictly in the near future.
Qianxi	A regulation for closing self-drilled wells was enacted in 2008. As far as the water supply company knows, 105 out of 170 wells were closed, and more to be closed in the near future.
Tanghai	A regulation for closing self-drilled wells was enacted in 2004 even before the project completion and enforced strictly. It is considered that this enforcement resulted in the

[9] This project does not target all the areas of Tangshan City, but only some parts of six prefectures/districts. Therefore, evaluation is to be conducted in light of indicators for each prefecture/district.

[10] Unknown for Qian'an Prefecture and Fengnan Prefecture.

	steady increase of facility utilization rate of the project after 2005.

Source: Each water supply company

In Fengnan, one of the reasons for the low facility utilization rate is that the construction of the north west newly developing area (where rapid increase of water demand was expected at appraisal) was started as late as in 2005 and consequently the resettlement of government buildings, enterprises and schools has not been completed at the time of the evaluation[11].

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

The total water supply capacity in the target area is shown in Table 7.

Table 7 Water supply capacity in the project target area

Indicator (unit)		Guye (2008) Note 1	Luannan (2006)	Qianxi (2005)	Xian'an (2005)	Tanghai (2004)	Fengnan (2006)
Water supply capacity (1,000 ㎥/day)	Capacity of existing facilities (1999)	9.5	0.52* Note 2	0	1.3	1.8*	1
	Capacity of the project facilities	5	5	3	3	2	3
	Total capacity (2008)	14.5	5	3	4	2	4
	Average water supply two years after completion (Plan) Note 3	9.67	3.22	1.89	2.21	1.17	2.27
	Average water supply two years after completion (Actual)	6.27	0.64	0.6	1.53	0.92	1.05
	Achievement ratio (%) Note 4	65	20	32	69	79	46

Source: Each water supply company
Note 1: The figure with () shows the year of project completion (commencement of water supply)
Note 2: At appraisal, it was planned that the facility with * would be abolished.
Note 3: The figures for "Plan" are those which were calculated based on the figures specified in the appraisal document: baseline in 1999, estimated figures for the completion and for the target year.
Note 4: Average water supply (actual)/average water supply (plan)

Before the project completion, all the facilities except Guye had less than 20,000 ㎥/day, and there was no public water supply system in Qianxi. As shown in Table 7, the increase of water supply capacity in all the counties was brought only by this project. The project facility is the first and only water supply system in Qianxi. Likewise, the project facilities are only the water supply system in Luannan and Tanghai as their old

[11] According to the Fengnan Water Supply Company, if the resettlement, population increase and commercial development (hotels, department stores, restaurants, etc) make those progresses as planned at appraisal, it is expected that the facility utilization rate will double in two years and reach its maximum capacity by 2015.

facilities were abolished as planned upon the project completion. Meanwhile, compared with the planned figures for average water supply at the time of two years after the completion, there are three counties in which the actual figures are above 50% and three counties in which those are below 50%.

2.3.2 Stable supply of safe and clean water

Before the project completion, water supply was limited to three times a day (morning, day time and evening) in total of six hours a day (eight hours a day in Tanghai). According to the interviews with water supply companies and the beneficiary survey, it was confirmed that clean water is supplied for 24 hours upon the completion of the project.

Average water use per person increased and its targets were achieved in four counties. Table 8 shows average water usage per person in six counties.

Table 8 Average water use per person by county (planned and actual)

Indicator (unit)		Guye	Luannan	Qianxi	Xian'an	Tanghai	Fengnan
Average water usage per person (ℓ/day)	Baseline (1999)	100	267	NA	138	178	77
	Target (2007)	127[12]	145	122	145	145	150[13]
	Actual (2007)	178[14]	101	152	144	260	113
	% against the target	140%	70%	125%	99%	179%	75%

Source: Each water supply company

Meanwhile, the rate of pass for water quality test is 100% in all the counties and it proves safety and cleanness of water. According to Luannan Water Supply Company, many households used to use self-drilled wells, which were contaminated by small animals and insects, causing sanitary problems, but upon the project completion, safe and clean water has been supplied to each household.

Water from the water plant installed by the project is purified by the chlorine dosage facilities. The water quality is regularly monitored in the water quality inspection rooms. For example, monitoring results of water quality at Qian'an Water Plant as of June 2009 and the national standard requirements (revised in 2006) are shown in Table 9. The quality of treated water fulfills all of the national standard requirements; and thus, it proves adequacy as tap water.

[12] For Guye, the target is for 2003.
[13] For Fengnan, the target is for 2010.
[14] As Guye District started to operate in 2008, the figure is the actual one in 2008.

Table 9　Monitoring Results of Water Quality at Qian'an Water Plant

Item	National standard for water quality after treatment (GB5749-2006)	Water quality after treatment
Ph	>=6.5, <8.5	7.12
Turbidity (NTU)	<1	<1
Odor	None	None
Bacteria count (CFU/L)	<100	20
Coli form count（CFU/100mL)	None	None
Iron (mg/L)	<0.3	<0.3
Manganese (mg/L)	<0.1	<0.1
Aluminum (mg/L)	<0.01	<0.01

Source: Qian'an Water Supply Company

Chlorine dosage facility installed by the project in Qianxi County

Water quality inspection room in Tanghai County

2.3.3　Response to increasing water supply

In all the target areas, the project responded to the increased water demand, but the served population did not increase as estimated. Table 10 shows the served population in the target areas.

Table 10　Population served in the target area (estimate and actual)

Indicator (Unit)	Year	Guye	Luannan	Qianxi	Qian'an	Tanghai	Fengnan	Total
Population served (1,000 persons)	1999 (Baseline)	28	1	NA	3	3	5	40
	2007 (Estimate)	34	13	8	12	5	9	81

	2007 (Actual)	18.5[15]	5.5	5.4	11	3.83	5.5	49.73
	% against the estimate	54%	42%	68%	92%	77%	61%	61%

Source: Each water supply company

Three major reasons why the actual served population served did not reach the target could be as follows; 1) the number of population did not increase; 2) many residents are still using self-drilled wells even after the project completion; and 3) the estimate of population served in Luannan and Qianxi for 2007 at the time of appraisal was calculated based on the total population served in those counties while the actual population served in 2007 is limited to the densely populated central areas in those counties.

With respect to water usage by purpose, the proportion of living use is the highest among various purposes in all the target areas. Actual water usage by purpose in the target areas as of 2007 is shown in Table 11.

Table 11 Water usage by purpose in the project target area (2007)[16]

Purpose	Unit	Guye	Luannan	Qianxi	Qian'an	Tanghai
Living use	1,000 ㎥/day	4.7	0.46	0.24	0.9	0.47
	%	75	87	40	61	47
Industrial use	1,000 ㎥/day	1.3	0.005	0.18	0	0.29
	%	20	1	30	0	29
Commercial use	1,000 ㎥/day	0.3	0.06	0.18	0.6	0.24
	%	5	12	30	39	24
Total	1,000 ㎥/day	6.3	0.5	0.6	1.5	1.0

Source: Each water supply company

As shown above, it is clear that approximately eighty percent of water is used for living use in Guye and Luannan. In Qian'an, sixty percent is used for living use and forty percent for commercial use. In Qianxi and Tanghai, 40-50% is used for living use, 20-30 % each for industrial and commercial use. In Tanghai, where rapid economic development is observed, water supply for living use steadily rose from 3,000 ㎥/day in 2001 to 5,000 ㎥/day in 2007, and water supply for commercial and industrial use drastically increased from 800 to 3,000 ㎥/day and from 200 to 3,000 ㎥/day respectively.

Based on the facts that proportion of water supply for living use is relatively high

[15] The figure of Guye District is the actual of 2008.
[16] Not available for Fengnan Prefecture. For Guye District, the amount also includes the water from other water plants.

among others in all the target areas and that the average water supply for living use per person increased than before in all the target areas except Luannan county, it could be said that this project mainly responded to the increase of water demand for living use in all the target areas. In addition, this project is also considered to have responded to the increase of water demand for commercial and industrial use in Tanghai City.

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". As it was not possible to obtain water charges only from the project facilities, it was not possible to re-calculate.

Therefore, this project has produced certain effects in the followings: 1) increase of water supply capacity (including average water use per person); 2) stable supply of clean and safe water (pass rate of water quality test at 100% and no interruption of water supply); and 3) response do water demand. However, considering the slower increase in the project facility utilization rate (average), achievement rate of average water supply amount in the target area and population served in the target area, the effectiveness of the project is moderate.

2.4 Impact

2.4.1 Improvement of the life quality

Beneficiary survey through interviews was conducted in the project target area (Qianxi County and Qian'an City). The total number of respondents was 130, and the classification of respondents by sex was 38% female and 62% male. 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, taste and smell, by the respondents, respectively: 95% (123persons), 94%(122persons), 86% (112persons), 86% (112persons), 86% (112 persons). 85% (111 persons) of the respondents also felt that the time for water fetching was reduced, and 91% (118 persons) felt the living environment such as sanitation was improved. 87% (113 persons) also felt the project contributed to the economic activities.

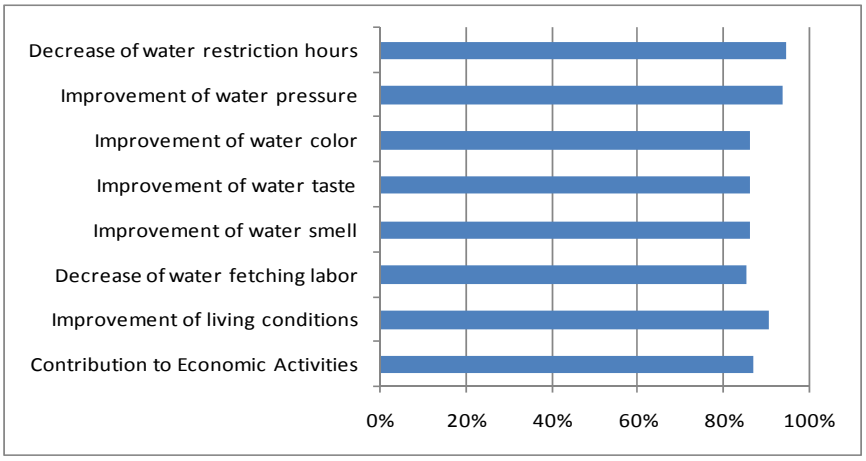


Figure 2 Result of Beneficiary Survey

The survey result also revealed that households no longer need to fetch water from self-drilled wells upon the project completion so that they can save their time; and that they no longer need to store water by using basin now that water is supplied for 24 hours.

Thus, it could be said 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

It is highly possible that stable supply of safe water enabled enterprises to start their business in Tangshan City and contributed to industrial development. For example, Luannan county, it was confirmed that one of the Chinese largest dairy farms, *Mengniu*, started business in Luannan county in 2006 after stable supply of safe water was secured by the project. In the western developing area of Guye District, companies of various industries such as medicines, plastics, pharmaceutical products, cement and food began their production in the area. It was also pointed out that the project contributed to resolving water insufficiency issues.

It is considered that stable supply of safe water might also have impacts on the increase of the real-estate value in the project target area. For example, the price of the land around the Tanghai Water Supply Company used to be 0.16 million yuan/畝(*mu*[17]) in 2000, but it was increased to 2.1 million yuan/畝 by more than ten times in 2009.

The average per capita income (in 2008) in all the project target areas has

[17] Chinese 1 畝（mu） is equal to 6.667 a (666.7 ㎡)

increased by approximately two or three times, compared with that in 1999 as shown in Table 12. Table 13 illustrates that GDP in Tangshan City is also steadily increasing in the past three years, and the GDP growth rate has been much higher than the national average. It cannot be said that the increase of per capita income and of the GDP growth rate are economic effects brought only by stable water supply by the project, but it is considered that the project partially contributed to the economic development of Tangshan City.

Table 12 Average per capita income in the target area (unit: yuan)

County	1999	2008
Guye	4,850	12,064
Luannan	5,519	14,101
Qianxi	5,619	12,500
Qian'an	5,212	16,100
Tanghai	5,231	15,031
Fengnan	5,392	15,480

Source: Tangshan City Bureau of Statistics

Table 13 National average and Tangshan City of Growth Rate of GDP (unit:%)

	2006	2007	2008
National average	11.10%	11.4%	9.0%
Tangshan City	14.8%	15.20%	13.10%

Source: China Statistical Year Book

Thus, it can be said the stable water supply by the project is contributing to the social and economic development.

2.4.3 Environmental and social impacts

Any particular negative impact issues by construction of water plants have not been noted. In order to protect water resources, surrounding areas of the intake wells are designated as for protection and it is prohibited to construct chemical factories near the wells. Any particular negative impact issues such as chlorine leakage, noise/ vibration at water plants or sludge have not been observed. All the water supply companies are making efforts to improve surroundings of the water plants by planting grass and trees in large scale, thus contributing to the reduction of air pollution and the improvement of ecosystem. Furthermore, neither subsidence of ground water level nor that of ground level was observed.

As the project has increased the supply capacity in the target areas, waste water treatment plants were constructed so that discharged water could be treated properly. Table 14 shows the waste water treatment capacity in each project target area.

Table 14 Waste water treatment capacity in each project target area

County	Treatment capacity（0,000 ㎥/day）
Guye	4（Phase I）+　4（Phase II under planning）
Luannan	4
Qianxi	3
Qian'an	8
Tanghai	2（under construction）
Fengnan	5

Source: Each water supply company

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 (O&M) system

As planned, each water supply company in the project areas is responsible for O&M[18], and required number of staff is allocated for O&M. Table 15 shows the breakdown of employees of each company. In all the target areas, O&M is carried out in 3 shifts (4 shifts in Guye District). Particularly when the demand is low (late at night), non-operating pumps are maintained.

Table 15　Breakdown of employees（unit: person）

District/ county	Total (1+2+3)	1 Management/ General Affairs	2 Engineers/ Technicians	3 Others	Staff for water plants
Guye	368	57	61	250	50
Luannan	45	6	39	0	45
Qianxi	44	17	27	0	14
Qian'an	98	33	65	0	17
Tanghai	113	22	41	50	16
Fengnan	75	15	60	0	15

Source: Each water supply company

2.5.2　Technical capacity in O&M

In all the target areas, engineers and technicians with sufficient skills are assigned for O&M, and various training are conducted regularly and ad-hoc. In particular, Tanghai Water Supply Company's O&M skills are outstanding as known from the fact that it received O&M award (which is presented to excellent companies for those outstanding O&M skills), from Tanghai county government twice in 2008 and 2009. Training contents and frequency of each company are summarized in Table 16.

Table 16　Training contents and frequency of each water supply company

County	Training contents and frequency
Guye	1.　Technology/Management: Every month

[18] In Qianxi county, a part of the water management bureau was separated from the county government and became Qianxi Water Supply Company as planned.

	2. Safety control: Every three month
Luannan	1. Water quality inspection（Entrusted to Shijiazhung Water Supply Company[19], Tangshan City Water Supply Company and Tangshan City Bureau of Immunity）. 3 staff for one month training (completed in April 2005) 2. Entrusted to Safety Inspection Bureau of Luannan County training for managers and safety control staff (five days per year). 3. Engineers/technicians in charge of electric control receive training from the Power Bureau (three days every time). Engineers/technicians are obliged to obtain certificate for electric control prior to their placement.
Qianxi	1. It is obliged for engineers/technicians to take end-of-course exams after the one-week training course on safety control and operation prior to their placement 2. Electric control (at the Power Bureau). Engineers/technicians in charge of electric control are obliged to take exam by the water supply company after the above training twice a year.
Qian'an	1. Water quality inspection (National standard portable water training at Water Inspection Center in 2007) 2. Electric control (at the Power Bureau, once a year) 3. Taxation (Hebei Province Tax Payers Club, once a month）
Tanghai	1. Electric control (Irregularly) 2. Water quality inspection (3 staff three times at Hebei Province Water Inspection Center) 3. Safety control（Irregularly） 4. Inspection of transmission/distribution lines（Irregularly）
Fengnan	1. Safety control regulations 2. Operation of well pumps 3. Computer control 4. Water supply management (all the above are conducted irregularly) 5. Water quality inspection (4 staff at Tangshan Water Quality Center for two months)

Source: Each water supply company

2.5.3Financial status on O&M

(1) Cash flow status of water supply companies

Income statement of each company in the past three years was analyzed, and the status for FY 2008 is shown in Table 17.

Table 17 Income statement of each Water Supply Company (as of 2008)

(Unit: million yuan)

Item	Guye	Luannan	Qianxi	Xian'an	Tanghai	Fengnan
Revenue from water charges	22.07	3.1	2.5	6.53	8.14	4.33
Other revenue	1.44	0	0.14	0	0.02	0
Total revenue	**23.51**	**3.1**	**2.64**	**6.53**	**8.16**	4.33
Operating expenses	16.85	3.31	2.73	8.47	10.55	3.9
Financial expenses	6.6	4	1.46	1.04	1.83	1.31
Total expenses	**23.45**	**7.31**	**4.19**	**9.51**	**12.38**	**5.21**
Profit	**0.06**	**-4.21**	**-1.55**	**-.2.98**	**-4.22**	**-0.88**

Source: Each water supply company

Operating expenses of four companies (out of six) exceeded revenue from water charges in the past three years. However, revenue from water charges is increasing steadily. Water charge rates, which affect the amount of revenue, are lower than those of other large and medium cities such as Chongqing and Yingkou because the project target

[19] Capital of Hebei Province.

areas are counties and districts (equivalent to counties and cities in Japan). The rates are the same level of small cities (for example, the water rates for households in Guiyang City in Guizhou Province is 1.4 yuan in 2006). Water charge rates by county are summarized in Table 18[20].

Table 18 Water charge rates by county

(Unit : yuan /㎥)

County	Latest revision of water charge rate	Household	Commercial	Industry	Special
Guye	2006	1.7	4	2.2	15
Luannan	2003	1.05	1.8	1.8	NA
Qianxi	2005	1	2	1.2	6
Qian'an	2009	1.4	3.08	3.08	10
Tanghai	2004	1.3	2.3	3.5	8
Fengnan	2005	1.5	4.5	1.8	2.3[21]

Source: Each water supply company

(2) Financial status of water companies

The financial status of each water company is shown in Table 19.

Table 19 Financial Status of each Water Supply Company (as of Year 2008)

(Unit: million yuan)

Item	Guye	Luannan	Qianxi	Xian'an	Tanghai	Fengnan
Total asset	102.74	84.05	71.61	59.91	22.04	13.47
Current asset	22.42	3.69	24.70	11.49	13.62	0.72
Current liabilities	76.85	4.61	17.08	54.32	7.78	2.32
Capital	14.28	3.55	23.18	5.6	0.98	13.17

Source: Each water supply company

As mentioned earlier, the operating expenses of four companies (out of six) exceeded revenues in the past three years[22]. However, the revenues from water sales are steadily increasing. It is also expected that the financial status will recover due to the increase of facility utilization rate (with closing of more self-drilled wells) and the increase of water charge rates in the future. With regards to water charge rates, in Qian'an, the revision was approved by the Prices Bureau in 2009. Other water supply companies in Guye, Luannan and Qianxi have already requested Prices Bureaus to raise about 0.5yuan/㎥ and are waiting for decisions. In all the target areas except Qian'an, three to five years have already passed since their revision of water rates, thus it is highly possible

[20] In China, Prices Bureau of each cities or counties has authorities to decide water fees and to revise water fees based on the request from water supply companies.

[21] Special category includes car wash, public bath, beverage production companies, etc. For Fengnan district, there is no category for "special", but for "public facilities".

[22] Although Tanghai Water Supply Company's profit of FY 2008 is minus, that of FY 2006 and 2007 are plus. After the project completion, this company is expanding its business to consulting services related to water supply and is making efforts to cover O&M cost by increasing the revenue from consulting services in addition to the revenue from water charges.

that the water supply companies' request for raising water rates will be approved by Prices Bureaus.

In addition, Qian'an and Fengnan receive subsidies every year[23], and it is highly possible that they will continuously receive. With respect to Luannan and Qianxi, both of them are planning to borrow loans from banks by surety from their county governments and started initial steps of procedures for borrowing[24].

It cannot be said that profitability of their financial status are in desirable situations. However, it is expected that the revenue from water sales will increase in proportion with the increase of facility utilization rate and of water charge rates in the near future. Furthermore, as those companies are State Own Enterprises (SOEs) and sole entities for water supply in their areas, it is guaranteed that their deficit issues can eventually be solved either by subsidies or by bank loans. Therefore, there are no particular problems of financial sustainability.

2.5.4 Status of O&M

O&M manuals were developed[25] and routine maintenance for facilities is conducted in all the target areas. It was confirmed during the site visit that facilities were cleaned and well maintained. Most companies conduct weekly inspection of surroundings of intake wells, pumps, electric control board and distribution lines for possible contamination and daily inspection of voltage and water-level of intake wells[26]. In Guye District, electric supply for the water plant was not stable at the beginning, but with the assistance by the district government, transformers and electric lines were installed specially for the company in July 2009, bringing stable electric supply.

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

[23] Qian'an City has received subsidies from the government since 2008, and the received amount in 2008 was 1.74 million yuan. Fengnan District has received subsidies since 2004, and the amount in 2009 was 1.19 million yuan.
[24] Luannan Water Supply Company received 370,000 yuan from the prefectural Finance Bureau to pay for personnel expenses for their staff as a tentative measure.
[25] Tanghai Water Supply Company is revising O&M manual every year.
[26] Guye Water Supply Company conducts more strict inspection by monitoring intake wells by monitor display and by checking wells on foot every two hours.

Power distribution panel installed by the project in Guye District

Monitor for security installed by the project in Fengnan District

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 brought certain effects, and its effectiveness is moderate. Regarding efficiency, the project period was much 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 satisfactory.

3.2 Lessons Learned

In this project, the Project Office was responsible for the procurement of major equipment, and each water supply company was responsible for the selection of contractors and the procurement of minor equipment, but the commencement of the civil works and its progress were different from county to county; which required complicated coordination resulting in serious delays. In a similar water supply project in which a number of water companies across administrative regions carry out, it is desirable to conduct procurement capacity assessment for each water supply company and to entrust both the selection of contractors and the procurement of equipment if their capacity is judged to be sufficient.

3.3 Recommendations (to each county government)

In Tanghai county, a regulation for closing self-drilled wells was enacted in 2004 even before the project completion and enforced strictly. It could be said that this enforcement resulted in the steady increase of Facility utilization rate of the project after 2005. It is also desirable to enforce such regulation more strictly in each target area so that safe water from the intake wells constructed by the project is supplied to households

in stable manner.

Comparison of Original and Actual

Item	Plan	Actual
①Output	(Total of the project target areas)	(Total of the project target areas)
1) Intake wells	70	Almost as planned (69)
2) Conveyance pipelines	Total length: 57km	Almost as planned (Total length: 54km)
3) Water plants	Capacity:210,000 ㎥/day	As planned
4) Distribution pipelines	Total length: 104km	Almost as planned (Total length: 115km)
②Project Period		
1) Guye District	March 2001- December 2002	March 2001 – January 2008
2) Luannan County	March 2001- December 2002	March 2001 –March 2006
3) Qianxi County	March 2001- December 2002	March 2001 –June 2005
4) Qian'an City	March 2001- December 2002	March 2001 –July 2005
5) Tanghai County	March 2001- December 2002	March 2001 –November 2004
6) Fengnan District	March 2001- December 2002	March 2001 –November 2006
③Project Cost		
Foreign Currency	2,841million yen	2,835 million yen
Local Currency	3,354million yen (258million yuan)	2,419 million yen (168 million yuan)
Total	6,197 million yen	5,254 million yen
Japanese ODA Loan Portion	2,841 million yen	2,835 million yen
Exchange Rate	1yuan＝13yen (as of 2001)	1yuan＝14.42yen (2001 – 2006 average)