

Ex-ante Evaluation

1. Name of the Project

Country: The People's Republic of China

Project: Ningxia Water Environmental Improvement Project

(Loan Agreement: March 30, 2007; Loan Amount: 8,432 million yen; Borrower: The Government of the People's Republic of China)

2. Necessity and Relevance of JBIC's Assistance

In China, the rate of water supply in urban areas reached 89% in 2004. However, given, among other things, the sharp increase in urban population and the fact that the clean water sources are concentrated in the southwestern part of China, there are regional factors that cause water shortages. Also, there are many cities beset with the problem of having their water supplied from deteriorating sources.

The wastewater treatment rate in urban areas has leveled off at 48% (2005), while in rural areas sewerage system itself has not spread very much. Consequently, the water pollution of rivers and contamination of seawater as typified by the frequent outbreak of red tide, have become a serious problem. In the 11th Five-Year Plan (2006–2010), to tackle the problem of water pollution, the Government of China has set the goal of raising the wastewater treatment rate to 70% in all principal cities across the country. To achieve this goal, it is important to develop sewerage system.

In its 11th Five-Year Plan for Environmental Protection (2006–2010), the Government of China designates river basins as prioritized conservation targets with the view to raising the water quality of the designated river basins to the required level through, among other things, prevention of contamination of the said rivers, which are also important sources of drinking water, and conversion of sources of clean water. Furthermore, the Government of China promotes the creation of water-saving cities by implementing administrative measures such as regulating the amount of groundwater that can be pumped up and introducing technologies for recycling treated wastewater.

Yinchuan City (population: 1.38 million [equivalent to the population of Shiga Prefecture]; land area: approx. 9,170 km² [equivalent to the land area of Kagoshima Prefecture]) and Shizuishan City (population: 730,000 [equivalent to the population of Shimane Prefecture]; land area: 4,454 km² [equivalent to the land area of Yamanashi Prefecture]), the largest and second largest cities in the Ningxia Hui Autonomous Region, are located in the upper reaches of the Yellow River in the Ningxia Plain. In these cities, industrialization and urbanization have increased demand for water to a level beyond their water supply capacities (Yinchuan City: water supply capacity of 200,000 m³/day against water demand of 440,000 m³/day; Shizuishan City: water supply capacity of 96,000 m³/day against water demand of 280,000 m³/day). While private wells, which are self-developed, are currently filling in the gap, the random digging of private wells has raised concern about the depletion of groundwater. Concerns have also been raised about the deteriorating quality of groundwater as inadequate wastewater treatment capacities (Yinchuan City: wastewater volume of 288,000 m³/day against wastewater treatment capacity of 140,000 m³/day; Shizuishan: City wastewater volume of 185,000 m³/day against wastewater treatment capacity of 30,000 m³/day) leave untreated wastewater seeping through soil into groundwater.

To cope with these problems affecting the water environment, the Government of the Ningxia Hui

Autonomous Region intends to improve the region's water environment by (1) strengthening water source management through tightening regulations on private wells, developing new sources of groundwater, and increasing the reuse of wastewater, and (2) implementing measures against water pollution through improvement of the wastewater treatment capacity.

The project addresses environmental conservation, one of the priority areas designated in the Economic Cooperation Program for China prepared by the Government of Japan and the Medium-Term Strategy for Overseas Economic Cooperation Operations of JBIC (FY2005–FY2007). Thus, JBIC's support for this project is highly necessary and relevant.

3. Project Objectives

The project aims to ensure stable and safe supplies of water and reduce discharge of polluted water in the Yinchuan and Shizuishan Cities by constructing water supply facilities, sewerage system, and reclamation facilities. It will thereby help improve the living conditions of their populations.

4. Project Description

(1) Target Area

Yinchuan and Shizuishan Cities, Ningxia Hui Autonomous Region

(2) Project Outline

The project involves the construction of water supply facilities, sewerage system and reclamation facilities, and procurement of materials and equipment in Yinchuan and Shizuishan Cities, as well as implementation of an overseas training program .

(a) Yinchuan City

(i) Construction of water supply facilities: No. 5 Purification Plant (additional construction: 40,000 m³/day), No. 7 Purification Plant (new construction: 50,000 m³/day), No. 8 Purification Plant (new construction: 50,000 m³/day), development of raw water transmission and distribution pipes (121 km), construction of wells

(ii) Construction of sewerage system: No. 5 Wastewater Treatment Plant (new construction: 50,000 m³/day), No. 6 Wastewater Treatment Plant (new construction: 50,000 m³/day), development of sewer pipes and drainage canal (147 km), renovation of a pumping station (1 location)

(iii) Construction of reclamation facilities: Reclamation facilities of the No. 3 Wastewater Treatment Plant (new construction: 30,000 m³/day), development of distribution pipes of reclaimed wastewater (15 km)

(b) Shizuishan

(i) Construction of water supply facilities: Huinong Purification Plant (new construction: 80,000 m³/day), Huinong Intake Facility (new construction: 180,00 m³/day), development of raw water transmission and distribution pipes (53 km)

(ii) Construction of sewerage system: No. 3 Wastewater Treatment Plant (new construction: 40,000 m³/day), sewer pipes (76 km)

(iii) Construction of reclamation facilities: Reclamation facilities of the No. 2 Wastewater Treatment Plant (new construction: 30,000 m³/day), reclamation facilities of the No. 3 Wastewater Treatment Plant (new construction: 20,000 m³/day), development of distribution

pipes of reclaimed wastewater (38 km)

(c) Training: Training for management and reclamation technology

(3) Total Project Cost/Loan Amount

18,247 million yen (Yen Loan Amount: 8,432 million yen)

(4) Schedule

June 2007–July 2012 (62 months). The definition of project completion is “when the term of warranty expires.”

(5) Implementation Structure

(a) Borrower: The Government of the People’s Republic of China

(b) Executing Agency: Ningxia Hui Autonomous Regional People’s Government

(c) Operation and Maintenance System:

(i) Yinchuan City

Water supply facilities: Yinchuan Water Supply Company

Sewerage system and reclamation facilities: Yinchuan Sewage Treatment Company

(ii) Shizuishan City

Water supply facilities, sewerage system and reclamation facilities: Shizuishan Xinghan Group Company Runze Water Supply and Drainage Company

(6) Environmental and Social Consideration

(a) Environmental Effects/Land Acquisition and Resident Relocation

(i) Category: B

(ii) Reason for Categorization

This project is classified as Category B according to the “Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations” (established in April, 2002). This categorization is assigned because this project does not correspond to sectors and regions described in the said guidelines as being sensitive to negative impact, and because it is not deemed to have a significant harmful impact on the environment.

(iii) Environmental Permit

The Environmental Impact Assessment (EIA) report related to the project was approved by the Environmental Protection Bureau of the Ningxia Hui Autonomous Region in January, 2007.

(iv) Anti-Pollution Measures

Wastewater from sewerage system will be treated and released into the river in a state and manner that meets the wastewater standards established in China. Thus, no significant adverse impact is foreseen. Additionally, sludge generated in wastewater treatment plants will be appropriately disposed of in reclaimed repository sites.

(v) Natural Environment

The project site is not located in or around sensitive areas, such as national parks, and so

adverse impact on the natural environment is assumed to be minimal. Additionally, while groundwater is used as a clean water source in Yinchuan City, given the location of the aquifer, the planned water volume, and so on, the well construction is unlikely to have any major adverse impact on the environment.

(vi) Social Environment

The project already owns the right to use the planned site of the project. Thus, it does not involve neither land acquisition nor resident relocation.

(vii) Other/Monitoring

In the project, the Environmental Protection Bureau of the Ningxia Hui Autonomous Region will monitor water quality and the like.

(b) Promotion of Poverty Reduction

The poor make up 6.2% of the population in Yinchuan and 9.3% in Shizuishan Cities (based on the family budget survey conducted in the two cities included in the target area). The poverty rates in both cities exceed the national average of 2.8%. To help the poor, both cities introduce lower fee for water supply., and it will be applied to this project as well.

(c) Promotion of Social Development (e.g. Gender Perspective, Measures for Infectious Diseases Including AIDS, Participatory Development, Consideration for the Handicapped, etc.)

None

(7) Other Important Issues

In the project, Shimane University provided expertise on conducting a survey to determine the current situation regarding the use of reclaimed wastewater, and on formulating training programs and the like.

Additionally, regarding the training in Japan, training courses are being planned in Shimane Prefecture, Fukuoka City, and Kitakyushu City with the cooperation of Shimane University. These courses will draw on the experience and knowledge Japan has in the field of water conservation and the use of reclaimed wastewater.

5. Outcome Targets

(1) Evaluation Indicators (Operation and Effect Indicator)

City	Sub-Project	Indicator	Baseline (2005)	Target (2014, 2 years after project completion)
Yinchuan	Water supply facilities	Percentage of population served (%)	90.6	91.1
		Population served (10,000 persons)	71.6	101.2
		Amount of water supply (10,000m ³ /day)	20	34

	Sewerage system	Population treated (10,000 persons)	57.7	93.1
		Amount of wastewater treated (10,000m ³ /day)	13.2	32.1
		Percentage of wastewater treatment (%)	0	87
		Effluent quality (BOD concentration: mg/L)	180–200	30
		Effluent quality (COD concentration: mg/L)	350	100
	Reclamation facilities	Amount of reclaimed water supplied (10,000m ³ /day)	0.2	5.2
		Ratio of amount treated (%)*	1.4	16.2
Shizuishan	Water supply facilities	Percentage of population served (%)	45	83
		Population served (10,000 persons)	12.5	34.4
		Amount of water supply (10,000m ³ /day)	9.0	17.6
	Sewerage system	Population treated (10,000 persons)	12.5	34.4
		Amount of wastewater treated (10,000m ³ /day)	2.7	17.1
		Percentage of wastewater treatment (%)	0	38
		Effluent quality (BOD concentration: mg/L)	200	30
		Effluent quality (COD concentration: mg/L)	400	100
	Reclamation facilities	Amount of reclaimed water supplied (10,000m ³ /day)	0.2	9
		Ratio of reclaimed wastewater (%)*	6.3	52.6

*The ratio of reclaimed wastewater to wastewater treatment volume (= amount of reclaimed wastewater / amount of wastewater treated)

(2) Number of Beneficiaries

- (a) Development of water supply facilities: Approx. 1.36 million
- (b) Development of sewerage system: Approx. 1.28 million

(2) Internal Rate of Return (Financial and Economic Internal Rate of Return)

Based on the conditions given below, the financial internal rate of return (FIRR) is as follows:

- (a) Yinchuan City
Water supply facilities: 11.3%; sewerage system: 5.8%; reclamation facilities: 7.1%
- (b) Shizuishan City
Water supply facilities: 8.3%; sewerage system: 6.4%; reclamation facilities: 7.4%

[FIRR]

- (a) Cost: Project cost, operation and maintenance expenses
- (b) Benefit: Income from fees, subsidy
- (c) Project Life: 30 years

6. External Risk Factors

1. Delays in construction due to site changes caused by changes in road maintenance areas, development areas, etc. in urban planning
2. Impact on operation and maintenance due to shortages in financial funds or collected fees due to changes in the policies relating to the fee sharing principle

7. Lessons Learned from Findings of Similar Projects Undertaken in the Past

From the ex-post evaluation of ODA loans granted in the past, it has been learned that it is important (1) to set an appropriate fee schedule that takes into consideration operation and maintenance costs, investment costs, payment ability of beneficial residents, and ability for financial burden, and (2) to formulate technical standards for maintenance frequency such as operation and maintenance, and evaluation of the necessity for the replacement of facilities. Based on this lesson, efforts will be made in the project, through interim monitoring and supervision, etc. to ensure the establishment of an appropriate fee schedule and technical standards.

8. Plans for Future Evaluation

(1) Indicators for Future Evaluation

(a) Development of water supply facilities

- (i) Percentage of population served (%)
- (ii) Population served (10,000 persons)
- (iii) Amount of water supply (10,000m³/day)
- (iv) FIRR (%)

(b) Sewerage system

- (i) Population treated (10,000 persons)
- (ii) Amount of wastewater treated (10,000 m³/day)
- (iii) Percentage of wastewater treatment (%)
- (iv) Effluent quality (BOD concentration: mg/L)
- (v) Effluent quality (COD concentration: mg/L)
- (vi) FIRR (%)

(c) Reclamation facilities

- (i) Amount of reclaimed water supplied (10,000m³/day)
- (ii) Ratio of reclaimed wastewater (%) (= amount of reclaimed wastewater / amount of wastewater treated)
- (iii) FIRR (%)

(2) Timing of Next Evaluation

After project completion