The Philippines

Boracay Environmental Infrastructure Project

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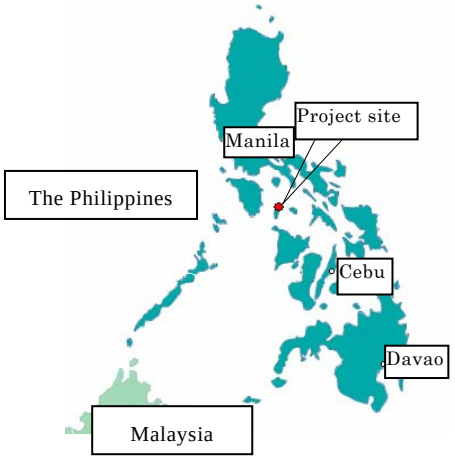
Field Survey: December 2005-January 2006

1. Project Profile and Japan's ODA Loan



Map of project area

The beach on Boracay Island

1.1 Background

The Philippines is a beautiful, tropical island country that consists of approximately 7,000 islands and has a great many beach resorts. Revenue from the tourism industry, which makes the most of the country's natural allure, comprised 3% of the Philippines' gross domestic product (GDP) back in 1992, making a contribution to its economic growth.

Situated in the Western Visayas, Boracay Island is one of the regions of the country in which natural ocean resources still remain. At the time of appraisal, the number of tourists to Boracay Island was around 3% of the number to the Philippines as a whole. The number of tourists with their sights set on the ocean is increasing, as evidenced by the 230% increase in the number of foreign tourists between the years 1987 and 1991, and priority has been placed on the tourism sector. However, in the wake of the vitalization of economic activities, negative effects on the environment have become a problem. These negative effects include water shortages due to the increase in the population (water salination of groundwater as a result of pumping groundwater), pollution of groundwater and oceans due to sewage, and increases in the amount of waste generated. Developing infrastructure such as that for water supply and sewage and waste disposal was a pressing issue in terms of preserving the natural environment along with

expanding tourism development on the island in a sustainable manner. This project was implemented against such a background.

1.2 Objective

The project's objective was to address the water shortages, pollution of groundwater and oceans by sewage water, and increase in the amount of waste generated by developing the facilities of water supply, sewage, and solid waste disposal facilities, and thereby contributes to conserving the natural environment along with promoting the development of tourism on Boracay Island in Western Visayas.

1.3 Borrower/Executing Agency

Philippine Tourism Authority (PTA)/Philippine Tourism Authority (PTA)

1.4 Outline of Loan Agreement

Loan Amount Disbursed Amount	1,352 million yen 1,350.5 million yen
Exchange of Notes Loan Agreement	July 1995 August 1995
Terms and Conditions - Interest Rate (Consultants' Portion) - Repayment Period - (Grace Period) - Procurement	 2.5% p.a. 2.1% p.a. 30 years 10 years General Untied
Final Disbursement Date	December 2002
Main Contract	Japanese and local enterprises
Consulting Contract	Consultants for Engineering (Philippines) Science and Technology Inc. (Philippines)/Engineering and Development Corp. of the Philippines (EDCOP) (Philippines)/Nippon Jogesuido Sekkei Co., Ltd. (NJS) (Japan)
Feasibility Study (F/S) etc.	1993 Philippine Government F/S

2. Evaluation Result

2.1 Relevance

2.1.1 Relevance at the time of appraisal

The Philippine Strategy for Sustainable Development (PSSD) (1987–1995) emphasized the sustainable use of the nation's natural resources, and was aiming to expand management programs to protect its diverse range of ecosystems. The Medium-Term Philippines Development Plan (MTPDP) (1993-1998), aimed to promote tourism development, while also protecting social and cultural assets and the environment.

At the time, the Philippines' tourism industry was an important industry to the country's economy. The Boracay Island Development Master Plan (BIDMP) (Department of Tourism (DOT), 1991) dealt with tourism development policies aimed at promoting development of the island while ensuring the protection and nurturing of the natural environment with maximizing the participation of and collaboration with the private sector in planning. Development guidelines for the management and regulation of the island as a whole were formulated for these objectives while taking into consideration the conservation of the natural environment. The development of stable water supply systems and sanitary sewage were incorporated into part of this.

The DOT considered Boracay Island to be one of its priority development regions. This project for promoting tourism development on Boracay Island and strengthening the preservation of the natural environment had a high degree of priority.

2.1.2 Relevance of the plan at the time of ex-post evaluation

As goals for sustainable development, the Philippine Agenda 21 (1996, ongoing) aims at: the proper supply of water that is of good quality; the management of sewage and waste which takes the environment into consideration; ocean protection which includes the coasts; and the sustainable use and protection of ocean resources. In the MTPDP (2004–2010), strengthening the protection of ecosystems, especially those of the coasts and the sea, as well as enlarging the scope of protection were set as goals. The promotion of tourism development is also an ongoing priority area in the plan.

The BIDMP from the time of appraisal is ongoing as of now. This project was deemed as having ongoing importance for responding to the challenges continuing from the time of appraisal.

2.2 Efficiency

2.2.1 Outputs

The plan and actual output of the water supply system are as follows.

Water supply system	Plan	Actual
1) Intake facilities	・ install infiltration wells at 16 locations along the Nabaoy River	・ intake plants and intake pump condensed into one location
2) Water treatment facilities	・ water treatment plant: water treatment capacity of 4,000m^3/day ・ chlorination facilities	・ water treatment plant: water treatment capacity of 6,000m^3/day ・ equipment procurement: chlorination facilities, set of generators, electricity supply facilities, water meters
3) Transmission facilities	・ transmission pipelines: extension of 6,500lm, inner diameter of 250mm, PVC ・ submarine pipeline crossing: extension of 1,000lm, inner diameter of 250mm	・ transmission pipelines: extension of 1,945lm, inner diameter of 200mm, PVC ・ submarine pipeline crossing: extension of 960lm, inner diameter of 250mm, PVC
4) Distribution facilities	・ distribution pipelines: extension of 16.7km, inner diameter of 75-300mm ・ ground reservoirs: (concrete) capacity of 2,600m^3 (Brgy. Manoc-Manoc), capacity of 100m^3 (Brgy. Yapak)	・ distribution pipelines: extension of 29.07km, inner diameter of 50-400mm ・ ground reservoirs (concrete): capacity of 2,000m^3 (Brgy. Manoc-Manoc), capacity of 550m^3 (Brgy. Yapak)
5) Booster pump stations	・ 1 in the vicinity of the water treatment plant, 1 in Brgy. Balabag	・ as planned
6) Water supply equipment	・ 1,900 service connections (1,500 residential, 400 commercial)	・ service connections: 717 residential, 188 commercial (following project completion the Philippine Tourism Authority (PTA) has been expanding service connections with their own funds: there are currently 1,693 residential and 368 commercial connections in operation) (as of January 2006)

As shown above, aside from the booster pump stations the outputs were changed. The main reasons for the changes were that due to upward revision of demand forecast as a result of a review of the feasibility study and fluctuations in the exchange rate caused by factors such as the Asian currency crisis (the peso fell roughly 60% against the dollar) which made it difficult to procure imported items and resulted to procure equipments within the planned project cost. Furthermore, the inner diameter and length of transmission pipelines and distribution pipelines

were changed as a result of taking the conditions for water quality and geological features into consideration. Due to the water quality, some of the pipes were changed to pipes with stronger resistance to alkalis. These reasons also affected the sewage system described later.

Aside from these, as a result of a review of the feasibility study concerning the water treatment capacity of the water treatment plant, the capacity was deemed too small given the projected increases in the island's population and the number of tourists. As such, the 4,000m^3/day of the initial plan was revised upwards to 6,000m^3/day. The actual number of service connections installed was about half the number in the initial plan. This was the result of an increase in the project cost caused by the drop in the peso wherein the number which could be installed through the planned project cost range decreased, as well as delays in the project wherein the number which could be installed within the project period decreased. Moreover, regarding the submarine pipeline, the results of a bedrock excavation survey performed prior to lying the submarine pipeline proved that the geological conditions of the site planned for the burial of the pipeline were unsuitable so that a material of the transmission pipeline was changed from the initial plan.

Nabaoy intake plant

Water treatment plant

The plan and actual output of the sewage system are as follows.

Sewage system	Plan	Actual
1) Sanitation (installation of toilets)	・ 3 communal toilets with septic tanks, 402 simplified pour flush toilets	・ 3 public toilets, simplified pour flush toilets 115
2) Sewer pipelines	・ sewer collection pipelines: extension of 16km, diameter of 150mm, extension of 5,425m, diameter of 300mm ・ 3 pump facilities	・ sewer collection pipelines: extension of 185.05lm, diameter of 350mm (primary sewage collection), extension of 1,492.01lm, diameter of 250mm

		(primary sewage collection), extension of 5,975lm, diameter of 200mm (secondary), extension of 2,555lm, diameter of 200mm (primary sewage collection), extension of 884lm, diameter of 100mm (project directly managed by the PTA: primary sewage collection) ・ 1 pump facility, 7 lift facilities
3) Sewerage treatment plant	・ installation of a sewerage treatment plant (2.5ha): anaerobic pond, maturation pond, chlorination pond, facultative pond, regulating pond ・ discharge conduit: extension of 1,000m, inner diameter of 300mm	・ 14,198m^3/day oxidation ditch disposal site development and management (generator set, laboratory, distribution panels): grit chamber, pump station, 2 sedimentation tank units, 2 oxidation ditch units, disinfection tank, power distribution lines, sludge thickener, vacuum truck, sludge drying bed: 6 chambers ・ discharge conduit: extension of 840m, inner diameter of 250mm, CLEC steel pipe

The main reasons for the changes in the output are the aforementioned currency rate fluctuations, changes in design associated with a review of the demand forecast. The decrease in the number of simplified toilets installed was due to a drop in demand due to progress in the installation of home toilets during implementation of the project.

Sewerage treatment plant

Sewerage treatment plant

The plan and actual output of the solid waste disposal are as follows.

Solid waste disposal	Plan	Actual performance
	・ landfill site (2.4ha) ・ attendant facilities	・ landfill site (1.2ha) (drying area for sewage sludge) ・ attendant facilities

The reason for the changes in the output by way of the surface area for the landfill site being reduced from 2.4ha to 1.2ha was due to the fact that the land that could be physically acquired on the island during the land acquisition stage was only 1.2ha.

Consulting services were also implemented in addition to the items above. Although there were changes in the service period, there were no change in the M/M itself, which went as planned.

A summary table of the main plan and the actual outputs is indicated on the last page.

2.2.2 Project period

This project was planned to be completed in September 2000, but in fact, it was delayed by two years and six months and ended in March 2003. The main reason for the delay was due to the fact that the plans and design for each output mentioned above was changed. The results of a bedrock excavation survey performed prior to lying the submarine pipeline indicated that bedrock and coral rock had to be removed for the installation of the submarine pipeline, which caused a six-month delay. In addition, owing to the drop in the peso the contractor became unable to procure imported equipment as planned. The procurement of other equipment and requests for additional budget accompanied this resulted in delays.

What is more, there were delays in procedures necessary to issue the Environmental Compliance Certificate (ECC) from the Department of Environment and Natural Resources (DENR) required for implementing projects in areas regulated for environmental protection. In addition, delays arose in land acquisition due to the occurrence of resident relocation which was not projected at the time of appraisal. Moreover, heavy rains, typhoons, and seasonal winds during the rainy season (June-November) created delays in the installation work of the submarine pipeline from Aklan to Boracay Island, as an example. Since consideration was given to tourists in the construction, such as by not spoiling the island’s scenery and atmosphere during the peak tourist season (March-June), the period was delayed.

2.2.3 Project cost

The actual project cost for this project rose to 1,961 million yen, compared to the 1,803 million yen from the initial plan. This was due to the previously mentioned substantial drop in the peso and the results of a review of the feasibility study, the construction plans and designs having been changed, and increases in the costs for equipment procurement and consulting services.

Moreover, due to rising land costs and increases in the population, the costs for land acquisition for water supply and sewage infrastructure development increased. In addition, resident relocation for land acquisition occurred which was not foreseen at the time of appraisal, and relocation and resettlement costs were added. Moreover, the landfill sites for waste disposal were initially supposed to be provided by local government units (LGUs) free of charge. The obligation arose for the Philippine Tourism Authority (PTA) to provide payments to the LGUs in the end, causing the cost for land acquisition for the disposal sites to increase.

2.3 Effectiveness

2.3.1 Addressing water shortages and water quality through developing the water supply

The planned and actual values for the water supplied population are as follows.

Table 1. Water Supplied Population

(Unit: people)

Year	Plan	Actual performance
2003	16,019	8,961
2004	16,151	11,640
2005	16,284	14,431

Source: Data from the operation and maintenance agency

The actual performance value for FY2003 was roughly half that of the planned value. Yet as was previously described, following completion of this project the number of service connections has expanded, owing to the independent efforts of the PTA and, at the time of evaluation, the Boracay Water Supply and Sewerage System (BWSS). In FY2005 the actual performance value had reached 89% of the planned value. As of January 2006 the number of connections was 2,075 (commercial: 382, residential: 1,693). The actual facility utilization rate is 60%

(2005 actual performance)[1] compared to the target value of 77%, and 3,600m^3 of the maximum water supply capacity of 6,600m^3 is being used. According to the results of a water quality test by the Metro Iloilo Water District (MIWD), aside from the water at the intake plant (Nabaoy River) prior to distribution to Boracay Island, both bacteria and residual chlorine were within the standard values set by the DENR. At the time of evaluation in January 2005 coliform groups were detected in the Nabaoy River. However, no coliform was detected in the water distributed to and treated at Boracay Island. The non-revenue water rate was 18% (2004 actual performance)[2]. The reason for failure in water charge collection is that there are no manuals which lay down the measures for the service charge recovery of water supply and sewage and the users who fail to pay the service charges because the articles and relevant rules governing the service for water supply and sewage collection are yet to be prepared.

2.3.2 Preventing the pollution of groundwater and the ocean by developing the sewage system

The planned values and actual performance for the population with sewage treatment are as follows.

Table 2. Population with sewage treatment (Unit: people)

Year	Plan	Actual performance
2003	16,019	681
2004	16,151	1,732
2005	16,284	3,328
2006/01	-	3,338

Source: Created by the external evaluator based on data from the operation and maintenance agency

The planned values for the population with sewage treatment were high because they were calculated based on the projected census for 1993 and anticipated a 100% connection rate. However, as will be described later, since the sewage coverage rate is low, the actual figures are less than a quarter of the planned

[1] The facility utilization rate has not reached the target value due to the competition with other water suppliers and continuous usage of wells.

[2] Non-revenue water rate = average daily water supply that is not to be charged ÷ average daily water supply × 100. The non-revenue water rate of 18% is not high compared to that of in the other developing countries, and this figure has been halved from that of 36 % in 2002 when the operation was started.

figures. As of 2005, the number of sewage connections was 657 (commercial: 359, commercial: 298). The actual performance values for the amount of wastewater treated are as follows.

Table 3. Amount of Wastewater Treated (Unit: m^3/day)

Year	Plan (Note)	Actual performance
2003	515,703	-
2004	519,944	465,627
2005	524,240	566,725

Source: Data from the operation and maintenance agency

Note) Estimates for the amount of wastewater treated came from using: [population × 70 liters/person × 365/1,000]

The actual amount of wastewater treated in 2005 exceeded the planned figure, even though the population with sewage treatment came to less than a quarter of the planned value. This was caused by the establishment of 12 large hotels which had not been foreseen at the time of the F/S, and the fact that the influx of rainwater into the sewer pipelines was not properly anticipated. Furthermore, as will be described later, the amount of wastewater treated increased because water supplied by other water supply companies also flows through the BWSS's sewer pipelines.

The results[3] of a water quality test at a discharge site on the ocean's bottom 300m from the shore are as follows.

Table 4. Water Quality Improvement Status for Water Discharge Sites (Unit: mg/L)

	DENR's standard values (maximum permitted values)	April 2005 actual performance
BOD concentration	30	32
COD concentration	60	72
TDS concentration	1,000	994

Source: Data from the operation and maintenance agency

At the time of the tests in April 2005 (refer to Table 4) both the concentrations

[3] Biochemical oxygen demand (BOD), suspended solids (SS), chemical oxygen demand (COD), and total dissolved solids (TDS) are indicators that denote the state of organic pollutants. At the time of the ex-post evaluation, water quality tests were conducted at the water discharge site at the ocean's bottom, as well as the grit chamber, oxidation ditches, and disinfection tank. At each site, it was confirmed that there were no problems with the water quality.

for BOD and COD at the discharge sites were above the DENR's standard values. However, it was confirmed through tests conducted in other months in 2005 that both concentrations were within the standard values. 14 m^3/day of sludge (5,100 m^3 in a year) is evacuated from the sewage treatment plant, and is conveyed to the waste disposal site twice a day. It is then dried and is used as fertilizer by the government of Aklan Province and the Malay LGU.

Actual performance for the sewage charge collection rate in FY2004 was 60%. The BWSS has adopted a method for determining sewage charges[4] based on the amount of water supplied. However, some users make use not only of the water supply provided by the BWSS that was developed through this project, but also water from other companies in conjunction with it. In such cases water supplied by the BWSS and the other companies is discharged together as sewage water in a mixed condition in which it is difficult to accurately calculate service charge. For this reason, the sewage charge collection rate is low.

2.3.3 Addressing disposal for the expanding amount of waste

At the waste disposal site developed through this project, 100% of the sludge discharged from the sewage treatment plant is disposed of. General waste is disposed of by the LGUs through already-existing waste disposal sites, and disposal of general waste is not performed by the PTA. Due to enactment of the Ecological Solid Waste Management Act (RA9003) of 2000, unsealed landfill disposal was prohibited and the LGUs became the parties responsible for managing the disposal of waste. Owing to this, waste disposal by the PTA was suspended. Waste disposal came to be carried out by the LGUs (in each barangay) through the use of already-existing waste disposal sites. This law also encourages the barangays to recycle waste. Following these, the PTA and LGUs are reviewing leasing 1.0ha of the waste disposal site (1.2ha) developed through this project to the LGUs, which is to say the island's three barangays, to use this site as a materials recycling facility (MRF: facility where waste which is recyclable is collected and sorted, also functioning as a repository where traders can purchase recycled products). Deliberations for this are currently in progress. The remaining 0.2ha of the site is currently being used by the BWSS as a sediment drying area for sewage treatment.

2.3.4 Economic Internal Rate of Return (EIRR)/Financial Internal Rate of Return (FIRR)

[4] Sewage service charge is set on the basis of: [amount of water supply × 70% × 20 pesos/m^3].

When the Economic Internal Rate of Return (EIRR) was recalculated at the time of the ex-post evaluation it was 7.66%, having fallen compared to the EIRR at the time of appraisal of 18.57%. This was due to the substantial fluctuations in the exchange rate (the peso fell roughly 60% against the dollar).

When the Financial Internal Rate of Return (FIRR) was recalculated at the time of the ex-post evaluation it was 10.02%, or almost the same as the 10.92% from the time of appraisal.

2.4 Impact

2.4.1 Conservation of the natural environment

According to the results of water quality tests on ocean water along the coasts, as Table 5 shows the concentrations for both BOD and COD were within the standard values from the DENR.

Table 5. Water Quality in the Ocean along the Coast (Unit: mg/L)

	DENR's standard values (maximum permitted values)	2005 actual performance
BOD concentration	30	28
COD concentration	50	46

Source: Data from the operation and maintenance agency

In terms of land use on Boracay Island, in the BIDMP measures like development in the northern part of the island, which is a nature preserve, and within a range of 25m from the coastline were prohibited, as was the construction of buildings three storey or taller along the coast. However, authority related to regional development was shifted to the LGUs through the Local Government Code (1991), since which time the LGUs have not adhered to this master plan. As a result, the construction of large-scale foreign-financed hotels is progressing in some of the areas which have been stipulated as nature preserves within the master plan. In addition, according to press reports, other problems are arising owing to this, such as fires caused by the proliferating electrical connections and air pollution resulting from the increase in tricycles.

2.4.2 Economic growth through tourism development

From 1995 to 2005, the average rate of increase in the number of tourists was 24.5%. In 2005, the number of tourists to Boracay Island was 29.9% of the overall number of tourists to the Philippines. The decline in the number of tourists from

1996 to 1997 was due to the outbreak of a coliform problem.

Table 6. Number of Tourists

(Unit: people)

Year	No. of visiting tourists	Rate of increase
1995	81,197	
1997	151,307	-7.6%
1999	181,813	33.7%
2001	264,806	15.3%
2003	339,208	12.8%
2005/9	569,721	32.9%

Source: DOT

Tourism revenue from tourists visiting Boracay Island was US$620,000 in 1995, but in 2005 it had climbed to US$100,400,000, increasing by approximately 17 times. In addition, in 1995 the number of commercial establishments was somewhere around 200, but in 2005 it had climbed to 1,887, increasing by approximately 9 times. The island's population has also risen by some 3 times to roughly 15,000 people (2004) from the population in 1993. The island is registering a rate of population increase in the 6% range yearly, which is roughly twice the rate of population increase for the Philippines as a whole.

Prior to implementation of this project, the gross regional domestic product (GRDP) for Region VI which is located on Boracay Island was 55,490 million pesos (1993). After project implementation, however, this figure was 320,290 million pesos (2004). According to the beneficiary survey[5], before this project was implemented, the markets for vegetables, fruits, flowering plants, and fish and seafood were limited, and unit prices were also low for the value of agricultural and marine products. After implementation, however, the market for products expanded rapidly on the island, and unit prices also rose by an average of around 30%. It would be difficult to claim that the change in economic growth through this tourism development was a result produced solely by this project. However, the improvement of infrastructure from this project could be considered as having a certain degree of impact on the island's tourism development and economic

[5] The beneficiary survey were conducted with a focus on residents from 475 households who had lived on Boracay Island since 1993, and 98 business owners such as hotel, bar, and souvenir shop proprietors. The surveys used both questionnaire surveys and interviews.

growth.

2.4.3 Social impacts

According to the local office of the Department of Health, prior to the implementation of this project in 1990, many water-borne infectious diseases including 153 cases of acute gastroenteritis were reported. However, since the completion of the project in 2003 there have been no reports related to such diseases. It could be said that water-related illnesses has been decreased compared to before project implementation. It was reported in the beneficiary survey that prior to the implementation of this project the majority of business owners (many of whom are foreigners) would use mineral water to brush their teeth or shower due to a sense of unease in the water quality. Following the project, however, they feel comfortable in being able to safely use the tap water. According to the 98 restaurants and bars for which beneficiary surveys were performed, it is reported that there are no complaints related to water-borne illnesses. However, there were complaints from 433 of the 475 households (91.2%) and 21 of the 98 business owners (21.4%) targeted by the beneficiary surveys to the effect that the chlorine contained in the water is strong.

According to the beneficiary survey, while the monthly average salary for the 475 households on which the beneficiary surveys were conducted was 626 pesos prior to project implementation, after the project this figure rose to 1,603 pesos. Through the survey, it also came to light that a great deal of employment has been created through the substantial growth of the tourism industry and following project implementation the income of the average household grew by 2.6 times over the 10 year period. In 1995 the number of cases of criminal arrests by the local police was 27 throughout the year; however, in 2005 (January-October) the number of cases of criminal arrests by the local police was 540. According to an interview with the barangay chairman who manages the crime records for the barangays, out of the 540 criminal cases on Boracay Island the majority of theft and burglary crimes are committed by immigrants to the island. These immigrants are construction workers who have come to Boracay Island since the year 1998, when most of the hotels have been constructed for tourism development. At their peak, such people numbered more than 300, with many of them remaining on the island after construction work to wait for the next employment opportunity. It is understood that the crime rate is on an increasing trend in line with the advancement of tourism development.

The changes in land prices are as follows.

Table 7. Land Prices

(Unit: peso/m^3)

	1995		2005	
Barangay	Coast-side (commercial districts)	Housing districts	Coast-side (commercial districts)	Housing districts
Manoc-Manoc	5,000	500	25,000	5,000
Balabag	10,000	1,000	30,000	5,000
Yapak	1,000	500	5,000	3,000

A rapid increase in land prices has been observed accompanying the tourism development. The average rate of increase for the three barangays is 333% for coast-side areas and 600% for housing districts.

Land acquisition for premises such as for water pump stations was implemented, and seven household were relocated due to this. This caused the delay in project implementation as mentioned above. Relocation of the residents was properly conducted, and compensation for them was appropriately provided along with the domestic law in the Philippines.

2.5 Sustainability

2.5.1 Executing agency

2.5.1.1 Technical capacity

There are no particular problems with the operation and maintenance of water supply and sewage system by the BWSS or of the waste disposal facilities by the LGUs. In accordance with the Ecological Solid Waste Management Act, the LGUs are conducting seminars related to recycling and waste disposal for stakeholders such as residents, business owners, and investors.

The project consultants provided technical assistance for the initial stages of operation and maintenance, improved the operation and maintenance manuals, and conducted training for the staff. Training courses such as the Baguio City Sewage Treatment Plan, operation and maintenance workshops, and water supply and sewage management training have been provided by the government and private sector. Efforts such as these measures have helped create adequate technical capacity.

2.5.1.2 Operation and Maintenance System

Operation and maintenance for water supply and sewage is conducted by the

BWSS, which was established in December 2001 as a wholly-owned subsidiary of the PTA. Initially, it was planned to establish a consortium comprised of the DOT/PTA, residents, land owners, LGUs, investors/entrepreneurs, and non-governmental organizations (NGOs) to which operation and maintenance of the facilities developed through the project would be consigned after the project. However, the consortium has not been realized yet due to a lack of any private investors that would consent to the long-term loan structure accompanying the financial burden. In the initial plan, the BWSS was supposed to be managed by this consortium.

The LGUs are the main entities responsible for operation and maintenance of the waste disposal sites, having been assigned authority for waste management through the Ecological Solid Waste Management Act. The BWSS manages the disposal of sludge from the sewerage treatment plant. At the water quality lab developed through this project, tests are conducted on BOD, COD, total suspended solids, and residual chlorine. Tests of total coliform are performed at Manila by transporting samples once a month.

2.5.1.3 Financial status

The actual operation and maintenance costs of the BWSS were 4.4 million pesos in 2002, 7.8 million pesos in 2003, and 49.6 million pesos in 2004. The financial balance is barely maintained since the BWSS is financially unable to proceed through revenue from the project alone and is subsidized by the PTA in excess of 10 million pesos. An approach was also made by a private sector water bureau inquiring if it would be able to provide support to the BWSS financially, but there has been no progress related to this move as of the time of ex-post evaluation. The operating revenue of the BWSS increased in FY2005 as a result of a revision to the water charge tariff. Following this raising of charges, the subsidies from the PTA have decreased and it is expected that subsidies will be reduced in the future as well.

2.5.2 Operation and maintenance status

Manuals related to basic operation and maintenance for the BWSS were improved upon (for technical sectors only) by the project consultants. Water supply and sewage operation and maintenance is being conducted by them in line with these manuals. They do not have any articles and relevant rules governing the services for water supply and sewage collection, and no manuals which lay down the measures for the service charge recovery of water supply and sewage and the

users who fail to pay the service charges are yet to be prepared.

3. Feedback

3.1 Lessons Learned

To avoid planning based on undervalued demand forecast, it is necessary to frequently review until the decisions are made for the planned values and specifications for construction work, especially for infrastructure development projects in which it is difficult to determine the potential demand, such as the tourism development.

In assistance for regional development projects in recipient countries where the transition to decentralization is occurring, it is advisable to ensure sufficient participation form local governments and raising a sense of ownership from the project planning stage so that it will improve collaboration among agencies and business entities during and after the project and utilization of facilities.

3.2 Recommendations

(1) Responses to project challenges through the initiative of the PTA

As mentioned above, there are challenges such as unused waste disposal site and improvement of collection rate of sewerage charges. In order to resolve these issues, under the initiative of the PTA, clarifications are hoped for regarding who the stakeholders for this project are and that consultations with them be performed regarding response measures for the challenges to this project. In these consultations, it is hoped that sufficient participation from the LGUs will be acquired because this project is a regional development project, as decentralization is being promoted in the Philippines.

(2) Technical assistance for the BWSS

It is hoped that technical assistance for the operation of water supply and sewage projects be conducted with assistance from similar entities. As there are sufficient opportunities for training in technical areas, the following can be identified as particular areas for support.

- Formulating rules (operating regulations, penal regulations, etc.)
- Business accounting and finance
- Corporate governance

(3) Reliable collection of sewage usage fees

To collect sewerage service charges appropriately, it is necessary for the BWSS to set the tariff for sewerage service charges by first grasping the amount of water supplied as well as the amount of inflow of treated sewage into river and ocean water, and then accurately grasping the amount of inflow of water supplied by the BWSS into its sewer pipelines. The BWSS needs to set appropriate sewage service charges, and to ensure accurate and reliable cost recovery for sewerage service charges (especially from large customers) through such as equipping water meters and training for service charge collectors. To do this, it is essential that the BWSS consult with concerned parties from the LGUs, other water supply companies, and others.

(4) Ensuring guidelines and finances for the sustainable conservation of the environment

In order to formulate guidelines for actions to maintain and conserve the natural environment of Boracay Island, a conservation program must be formulated regarding the environment through reviewing the BIDMP by the LGU in collaboration with DOT. It could be an idea to seek contributions from tourism-related industry and tourists to ensure the fund for the action.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Output		
Water supply system		
1) Intake facilities	・ install infiltration wells at 16 locations along the Nabaoy River	・ intake plants and intake pump condensed into one location
2) Water treatment facilities	・ water treatment plant: water treatment capacity of 4,000m^3/day ・ chlorination facilities	・ water treatment plant: water treatment capacity of 6,000m^3/day ・ equipment procurement: chlorination facilities, set of generators, electricity supply facilities, water meters
3) Transmission facilities	・ transmission pipelines: extension of 6,500lm, inner diameter of 250mm, PVC ・ submarine pipeline crossing: extension of 1,000lm, inner diameter of 250mm	・ transmission pipelines: extension of 1,945lm, inner diameter of 200mm, PVC ・ submarine pipeline crossing: extension of 960lm, inner diameter of 250mm, PVC
4) Distribution facilities	・ distribution pipelines: extension of 16.7km, inner diameter of 75-300mm ・ ground reservoirs: (concrete) capacity of 2,600m^3 (Brgy. Manoc-Manoc), capacity of 100m^3 (Brgy. Yapak)	・ distribution pipelines: extension of 29.07km, inner diameter of 50-400mm ・ ground reservoirs (concrete): capacity of 2,000m^3 (Brgy. Manoc-Manoc), capacity of 550m^3 (Brgy. Yapak)
5) Booster pump stations	・ 1 in the vicinity of the water treatment plant, 1 in Brgy. Balabag	・ as planned
6) Water supply equipment	・ 1,900 service connections (1,500 residential, 400 commercial)	・ service connections: 717 residential, 188 commercial
Sewage system		
1) Sanitation (installation of toilets)	・ 3 communal toilets with septic tanks, 402 simplified pour flush toilets	・ 3 public toilets, simplified pour flush toilets 115
2) Sewer pipelines	・ sewer collection pipelines: extension of 16km, diameter of 150mm, extension of 5,425m, diameter of 300mm ・ 3 pump facilities	・ sewer collection pipelines: extension of 185.05lm, diameter of 350mm (primary sewage collection), extension of 1,492.01lm, diameter of 250mm (primary sewage collection), extension of 5,975lm, diameter of 200mm (secondary), extension of

		2,555lm, diameter of 200mm (secondary), extension of 884lm, diameter of 100mm (project directly managed by the PTA: primary sewage collection) ・ 1 pump facility, 7 lift facilities
3) Sewerage treatment plant	・ installation of a sewerage treatment plant (2.5ha): anaerobic pond, maturation pond, chlorination pond, facultative pond, regulating pond ・ discharge conduit: extension of 1,000m, inner diameter of 300mm	・ 14,198m^3/day oxidation ditch disposal site development and management (generator set, laboratory, distribution panels): grit chamber, pump station, 2 sedimentation tank units, 2 oxidation ditch units, disinfection tank, power distribution lines, sludge thickener, vacuum truck, sludge drying bed – 6 chambers ・ discharge conduit: extension of 840m, inner diameter of 250mm, CLEC steel pipe
Solid waste disposal		
	・ landfill site (2.4ha) ・ attendant facilities	・ landfill site (1.2ha) (drying area for sewage sludge) ・ attendant facilities
Consulting services		
	Foreign: 50M/M Local: 181M/M	Foreign: 50M/M Local: 181M/M
(2) Project Period L/A signing Project completion	 August 1995 September 2000	 August 1995 March 2003
(3) Project Cost Total ODA Loan Portion	 1,803 million yen 1,352 million yen	 1,961 million yen 1,350.5 million yen