Jamaica

Montego Bay Water Supply (Great River) Project

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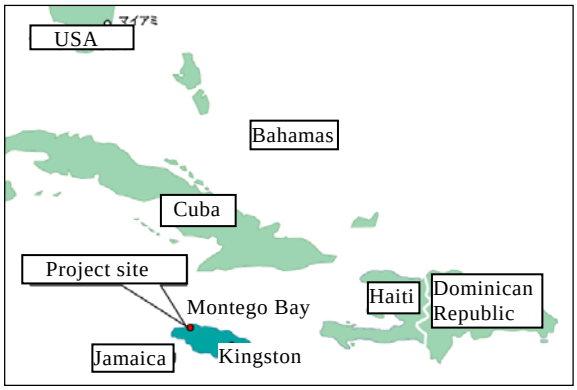
Field Survey: November 2005

1. Project Profile and Japan's ODA Loan



Map of project area

(From left) Water intake system, full view of water purification system, sedimentation tank

1.1 Background

In 1987, Montego Bay—Jamaica's second largest industrial center and a major tourist destination—as well as its surrounding areas[1] were plagued by constant water shortages[2]. Its growing population and rising number of tourists were also placing even greater demands for water. In this context, the area was expected to confront a serious water supply shortage in the future. Meanwhile, with the water supply capacity of the entire area only capable of meeting demand up until the early months of 1989 inclusive of the water supply systems that were under construction, it was pointed out that a supply-demand gap would arise once again[3]. Furthermore, because groundwater, one of the main water supply sources at the time, was facing issues such as declining water levels and salt water intrusion, the area was pressed to develop new water supply systems and, thereby, ensure a new stable supply source.

[1] Montego Bay is in St. James Parish, which has a land area of 595 km^2 and a population of 175,100 people (of which 96,500 people are in Montego Bay, 2001). It has a land area similar to Tokyo's 23 wards combined (622 km^2) and a population similar to Minato Ward, Tokyo (183,000 people, 2005).

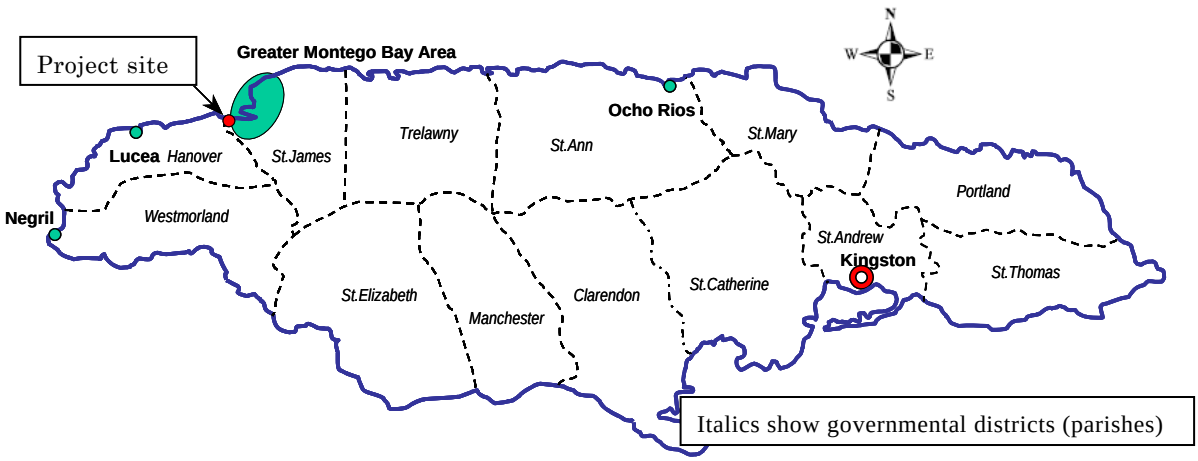
[2] In the end of 1987, while demand in the region was 17.1 imgd (= imperial million gallon per day, equivalent to approximately 78,000 tons/day), its water supply capacity was no higher than 13.5 imgd (approximately 62,000 tons/day), resulting in an unbalance between supply and demand (Source: appraisal materials).

[3] Even after the construction of the Martha Brae water supply system (water supply capacity: 6.0 imgd) in eastern Montego Bay was completed, supply capacity of the entire area was enhanced only to 19.5 imgd and it was expected that demand would not be met in the years to come (Source: appraisal materials).

1.2 Objective

To remedy the water supply capacity by developing a water supply system in Montego Bay—a major tourist destination in Jamaica—and, thereby, contribute to the improvement of the residents' living environment and to economic development in the region.

Fig. 1 Map of Jamaica's Parishes and Project Site



1.3 Borrower/Executing agency

Government of Jamaica/Carib Engineering Corporation Limited (CECL) (at time of appraisal)

National Water Commission (NWC) (after project completion)

1.4 Outline of Loan Agreement

Loan Amount/ Disbursed Amount	4.72 billion yen/4.3 billion yen
Exchange of Notes Loan Agreement	June 1988 November 1988
Terms and Conditions - Interest Rate - Repayment Period (Grace Period) - Procurement	 3.75% 30 years (10 years) Partially untied
Final Disbursement Date	January 1997
Contractor Agreement	Tomen Corporation, Tank Weld Limited (local enterprise), etc.
Consulting Agreement	Earle & Associates Limited (EAL) (local

	enterprise), Nippon Koei Co., Ltd. (subcontractor)
Feasibility Study (F/S) etc.	1987: EAL (local enterprise) 2004: Water supply capacity rise to 1.5x (private bank-financed project)

2. Evaluation Result

2.1 Relevance

2.1.1 Relevance at the time of appraisal

The Public Sector Investment Program (1987-1992), whose central aims include the vitalization of production activities and exports along with the development of social infrastructure, gave sustainment of economic growth and promotion of tourism achieved through investments in economic infrastructure (e.g. transportation, water and sewerage, electricity, communications) as the program's primary purposes. In the development goals of the water sector expressed in the above program, the expansion of water and sewerage systems in tourist areas (including Montego Bay) and improvements in the water supply service that accompany such expansion were identified as one of the goals. This project was included in the program as a project to develop the foundation of tourism development. Eliminating the unbalance between water supply and demand in Montego Bay as well as addressing the future rise in water demand will largely help to improve the living standard of the residents in the area and to promote the tourism industry. For this reason, this project was a high-priority project.

2.1.2 Relevance at the time of evaluation

In the Medium Term Socioeconomic Policy Framework that outlines short- and medium-term policy goals for FY2004-2007, the health and sanitation field was specified as one of the priority spending sectors of the medium term fiscal expenditure program. Prioritized investment in the water and sewerage sector was set out in the Public Sector Investment Program within the framework. Moreover, the diffusion of water and sewerage systems and reinforcement of service quality were identified as items of priority in the Jamaica Water Sector Policy (formulated in 1999 and revised in 2004), in which the stable supply of tap water and improvements in service quality continue to be sought for Montego Bay, an area which has been designated as one of the utmost importance for tourism development[4]. For the reasons listed above, this project maintains a high level of

[4] In the Master Plan for Sustainable Tourism Development formulated by the Ministry of Tourism and Sport in

importance as a project for ensuring a stable supply of tap water in Montego Bay, where the population continues to grow and the number of tourists continues to rise.

2.2 Efficiency

2.2.1 Outputs

Table 1 illustrates the plan and actual performance of the project's outputs. As an outcome of the hydraulic analysis of the water supply network and other efforts undertaken during the project's implementation by Carib Engineering Corporation Limited (CECL), the executing agency of the project, it was decided that the number of pressure pumps that should be added to the existing water supply

Table 1 Comparison of Outputs

Item	Plan	Actual performance
1) New establishment of water intake and water-conducting systems	Water intake capacity: 10.0 imgd[5]	Max. water intake capacity: 20.0 imgd[6]
2) New establishment of water purification system	Extension of aqueduct: 1.7 km	1.3 km
3) New establishment of water conveyance system	System capacity: 10.0 imgd	10.0 imgd
4) Expansion of water supply network	Extension of water pipe: 13.4 km	12.1 km
5) Installation of pressure pumps	Extension of water distribution pipe: 23.0 km (total)	8.4 km (total)
	10 pumps	23 pumps

Source: National Water Commission (NWC)

network would be further increased. In addition, in view of the water supply network development project[7] carried out by other agencies in Jamaica, the length

September 2002, Montego Bay is designated as a resort development area of utmost importance. The plan sets out measures for environmental conservation along the coast of Montego Bay and the development and expansion of relevant infrastructure facilities (e.g. sewerage, roads, port, airport).

[5] Water purification system capacity of 10.0 imgd (approximately 45,500 tons/day) is equivalent to approximately one-thirty fifth of Kanamachi Purification Plant's in Tokyo (1.6 million tons/day, supplies water to approximately 2.5 million residents in the neighboring nine wards).

[6] According to CECL, the project's executing agency, "The system was designed taking into account that the water intake tank holds up to 20.0 imgd maximum."

[7] E.g. project carried out by the National Housing Development Corporation.

of extension of the aqueduct was also modified[8]. The specifications for the other systems are otherwise left as planned for the most part.

2.2.2 Project period

At the time of appraisal, the project according to plan was to run from November 1988 to June 1990 for a total of 21 months. In actuality, however, the project required 99 months, i.e. until January 1997, or an extension of 78 months (approximately 6.5 years).

The leading causes of the extension were the delayed start of the tender that accompanied the change in design of the water supply network component[9] (approximately 48 months), as well as the delayed start of the procurement of electric machinery that accompanied the cancellation of the consultant agreement (due to low performance). Other reasons can also be cited, including delays in construction work which fell under the main component on account of natural disasters (e.g. flooding due to hurricanes) (approximately 10 months) and delays in machinery procurement which also fell under the main component (approximately 15 months).

Table 2 Comparison of Implementation Period

Milestone	Plan	Actual performance
(1) Signing of loan agreement	November 1988	November 1988
(2) Consultant agreement	Completed by signing of loan agreement	June 1990
(3) Tender and agreement for main component	Completed by signing of loan agreement	January 1989-November 1989
(4) Construction work, machinery procurement, etc. for main component	November 1988-June 1990	January 1990-January 1992
(5) Formation of detailed design for water supply network component	Completed by signing of loan agreement	November 1991-February 1992
(6) Tender and agreement for water supply network component	Completed by June 1989	July 1992-February 1996

[8] In order to avoid overlap with other projects, a portion of the water supply network that was to be expanded at the planning stage was removed from the scope of the project upon forming a detailed design of the project.

[9] This project consists of two components, both of which were to be implemented concurrently. The components were: 1) the construction of such systems as water intake, water purification, and water conveyance systems (main component); and 2) expansion of the existing water supply network (water supply network component).

(7) Construction work, machinery procurement, etc. for water supply network component	April 1989-March 1990	February 1996-January 1997
(8) Project completion	June 1990	January 1997

Source: NWC, etc.

2.2.3 Project cost

As a result of the depreciation of domestic currency exceeding inflation and the fact that orders were efficiently made through competition between various enterprises, the overall project cost was reduced to approximately 90% of the initially estimated amount of 5.03 billion yen, or 4.443 billion yen.

2.3 Effectiveness

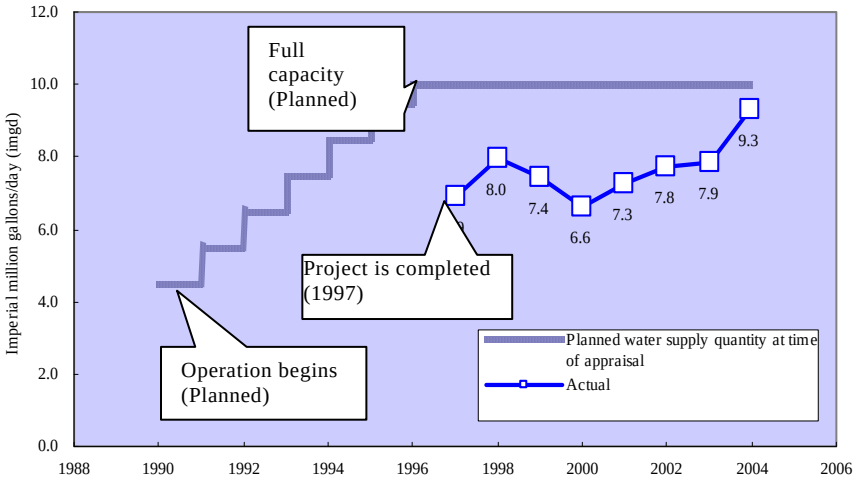
2.3.1 Increase in supply (production amount) of purified water

From the day the project was completed in 1997 and beyond, the supply of purified water has been increasing smoothly for the most part, albeit with some fluctuations (Fig. 2). In 2004, seven years after the project was completed, an average of 9.3 imgd (approximately 42,200 tons/day) of purified water were supplied, nearly at full capacity—the initial plan called for achieving full capacity on the sixth year of the project's completion (1996). It can therefore be said that purified water is being supplied at nearly the same pace as the initial plan.

According to NWC's Western Division, which has jurisdiction over the operation and maintenance of the systems in this project, the purified water is supplied to Montego Bay's airport, hotels, hospitals, and the Montego Bay Free Port. They are large consumers of purified water, and in particular, purified water is in high demand from cruise ships making port calls in the Montego Bay Free Port.

In order to cope with the rising water demand in neighboring Hanover Parish, construction work to expand the water supply system constructed by this project began in 2001. In October 2004, its water supply capacity was increased to 15.0 imgd (approximately 68,200 tons/day), where it originally was 10.0 imgd (approximately 45,500 tons/day).

Fig. 2 Planned and Actual Values of Purified Water Supply



1.0 imgd (imperial million gallon/day) = Approx.

Source: NWC and appraisal materials

2.3.2 Water-supplied population and coverage of water supply system

On account of the frequency of census implementation, lack of highly reliable data, among other reasons, water-supplied population and coverage of the water supply system were calculated only for the following three years: 1992, 1998, and 2001. From 1997 and onwards, i.e. the years following the completion of the project, both the water-supplied population and the coverage of the water supply system have shown steady increases. In fact, coverage of the water supply system in St. James Parish in 2001 (approximately 70%) is higher than the national average (approximately 66%).

Table 3. Water-Supplied Population and Coverage of Water Supply System

Annual	Water-supplied population [10] (People)	Coverage of water supply system (%)
1992	88,900	56.7
1998	98.300	59.1
2001	121,500	69.4
2001 (Nationwide)	1,732,000	66.4

Source: 2001 Census and other materials.

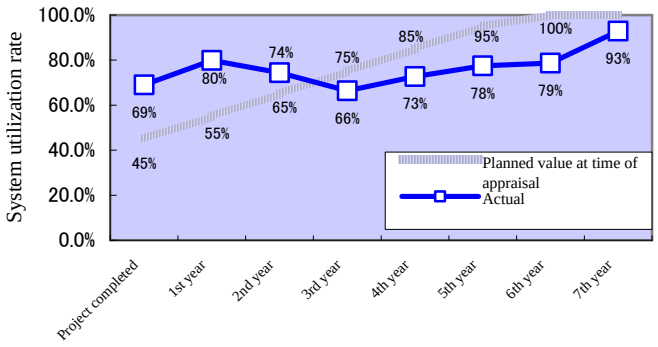
Notes: 1) All data for St. James Parish.

2) Water-supplied population for 1992 and 1998 are estimates (calculated from the coverage of the water supply system).

[10] In 2001, Montego Bay had a population of approximately 96,500 people.

2.3.3 System utilization rate[11]

Fig. 3 Trends in System Utilization Rate



Source: Plan values at time of appraisal from appraisal materials, actual values from NWC.

At the time of appraisal, the plan was to first ensure a utilization rate of 45% in 1990 when the project is completed, and then to increase the utilization rate by 5% each year from 1990 and beyond, and finally to achieve a utilization rate of 100% in 1996 on the sixth year of the project's completion. While the actual rate has been increasing at a slower pace than the rates indicated in the plan, the water supply system has been operating smoothly for the most part since 1997, the year the water supply network component was completed. In 2003, on the sixth year of the project's completion, utilization rate reached approximately 80%. Furthermore, the utilization rate was 93% in 2004 and the water supply system is operating at near full capacity.

[11] System utilization rate (average) = average daily water supply/system capacity × 100.

2.3.4 Non-revenue water rate

The post-project non-revenue water rate estimated at the time of appraisal is comparable to developed countries with advanced non-revenue water measures. In light of the existing situation in Jamaica where the national average for the non-revenue water rate is 66% (2004)[12] , it is believed that the target was set at an unrealistic rate. The non-revenue water rate of St. James Parish has been maintaining a high level since 1998 when the project was completed and, furthermore, the non-revenue water rate of 75% as of 2004 exceeds the national average by approximately nine points (Table 4).

Table 4. Estimated and Actual Non-Revenue Water Rates

Annual	Estimate at time of appraisal (%)	Actual (%)
1998	15.0	64.0
1999		63.7
2000		68.5
2001		80.0
2002		73.7
2003		77.8
2004		74.7
2004 (Nationwide)	N/A	66.2

Source: Estimates at time of appraisal from appraisal materials, actual values from NWC.

Note: Actual values represent the entire St. James Parish.

NWC's Western Division attributes the high non-revenue water rate to various reasons including: 1) water stealing by illegal residents in central Montego Bay; 2) non-installation of meter equipment and errors in meter equipment; and 3) non-payment of fees[13]. In light of the high non-revenue water rates and other factors, NWC is currently installing water meters and implementing measures to

[12] Data source: PIOJ（2005）Economic and Social Survey of Jamaica 2004.

[13] The Office of Utilities Regulation (OUR), which consults on revising the level of utility rates, acknowledges the issue of the high non-revenue water rate in the northwestern area of Jamaica including Montego Bay (*NWC Review of Rates Determination Notice*, Office of Utilities Regulation, December 2003). In addition, interviews conducted during on-site studies suggested that such departments as NWC's Western Division and NWC's Strategic Planning Department view the high non-revenue water rate as an extremely serious issue.

tackle water stealing in northwestern Jamaica through projects such as the North Western Parishes Water Supply Project.

As shown in Table 6, the non-revenue water rates in Latin American and Caribbean countries are high even among developing countries.

Table 5. Jamaica's Water Rate Schedule

Customer type	Monthly use (Unit: gallon)	Monthly rate per 1,000 gallons (Unit: Jamaica $)
General household	Up to 3,000	108.39
	Up to 6,000	191.98
	Up to 9,000	206.31
	Up to 12,000	263.33
	Up to 20,000	327.96
	Over 20,000	422.14
Companies, etc.	Flat fare	406.43
Condominiums	Flat fare	201.61
Schools, etc.	Flat fare	162.58

Source: NWC (rates revised in January 2004).

Note: 1 imperial gallon = Approximately 4.5 liters.

Table 6. Non-Revenue Water Rate of Latin American and Caribbean Countries (Reference)

Average of developing countries[1)] (1996)	Iquitos City, Peru[1)] (2003)	Rural areas in Costa Rica[1)] (Unknown)	Nicaragua Nationwide[2)] (2004)	Latin American/Caribbean countries Average of major cities[3)] (2000)
Approx. 30%	63%	Over 50%	56%	42%

Source 1): JBIC (2004) The Role of Private Sector Participation (PSP) for Sustainable Water Supply and Sanitation Sectors

Source 2): IMF (2005) Nicaragua: Poverty Reduction Strategy Paper

Source 3): WHO (2000) Global Water Supply and Sanitation Assessment 2000 Report

2.3.5 Calculation of Financial Internal Rate of Return (FIRR)

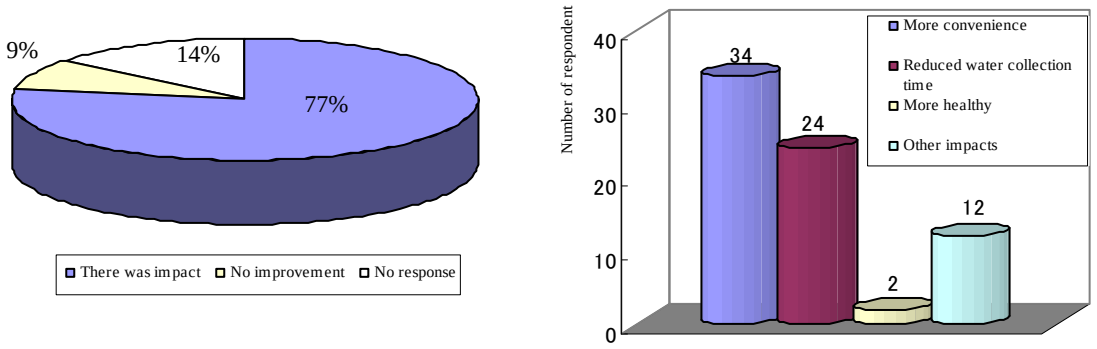
The Financial Internal Rate of Return (FIRR) was recalculated[14] based on project expenses (construction expenses and operation/maintenance expenses) and revenue (revenue from water fees), and the recalculated FIRR was 6.0%, far below the 14.2% calculated at the time of appraisal. The main reasons are as follows: 1) the current non-revenue water rate largely exceeds the estimated rate; and 2) an excessively high rate had been calculated because the project life of the water supply project had been set at 45 years at the time of appraisal where it usually is around 20 years and, furthermore, sufficient rehabilitation expenses, etc. had not been taken into account for maintaining the functions of the system.

2.4 Impact

2.4.1 Improvement of the residents' living standards

According to the results of an interview study conducted on beneficiaries[15], 72 out of 93 households answered that a positive impact was shown after the project's completion, which account for 77% of the respondent households (Fig. 4). Among these households, 34 have said that it was more convenient on account of the stabilization of the water pressure, etc., and 24 have said that the time spent on collecting water was reduced. In addition, households were asked to make a comprehensive evaluation of the project from the viewpoint of the benefits

Fig. 4 Existence/Inexistence of Impact After the Project and Type of Impact (Beneficiary Study Results N=93)



provided to benefiting residents[16], and 72% of the households that gave valid responses, or 67 households, have drawn the conclusion that "The project was

[14] The recalculation is based on assumptions that the project life is 20 years and the non-revenue water rate will decline to 50% in 2007.

[15] Among the beneficiary districts, a study was conducted in the form of interviews of five districts in Montego Bay (Norwood, Flower Hill, Mango Walk, Paradise Acres, and Salt Spring), which were selected based on NWC's advice.

[16] At the end of the interview study, households were asked "Do you believe the project was beneficial to your family?" and to make a comprehensive evaluation.

beneficial" (on account of improvements in water supply services including the stabilization of the water pressure).

2.4.2 Development of local economy (development of tourism industry)

The trends in tourism revenue and number of tourists in Montego Bay in the years following the project's completion are as shown in Table 7.

Between 1998 and 2000, in the years immediately following the project's completion, a sharp rise was seen in both tourism revenue and number of tourists. They have also shown steady increases from 2000 and beyond[17]. It can be said that "The stable supply of water provided by this project is supporting the tourism industry."

After 2003, the number of tourists has been surging with large cruise ships beginning to make port calls, among other factors. One reason for the port call commencement is believed to be Montego Bay's track record of providing a stable supply of purified water to cruise ships to date[18].

Table 7. Tourism Revenue and Number of Tourists in Montego Bay

Annual	Tourism revenue (US$1 million)	Number of tourists (10,000 people)
1997	306	48.8
1998	337	44.6
1999	381	55.4
2000	419	61.2
2001	386	59.8
2002	388	58.1
2003	413	73.7
2004	434	75.9

Source: Materials from the Ministry of Tourism of Jamaica.
Notes: 1) Cruise ship passengers are also included in the number of tourists.
2) The tourism revenue for 1997 is an estimate (calculated based on the number of tourists, etc.)

[17] The drop in 2001 and 2002 are believed to be an outcome of the temporary decline in cruise ship passengers which accompanied the 9-11 terrorist attacks in the United States.
[18] According to NWC's Western Division, "The commencement of port calls by large cruise ships is believed to be an outcome of the successful provision of a continuous stable supply of water over the years."

2.5 Sustainability

2.5.1 Executing agency

2.5.1.1 Technical capacity

There are absolutely no problems regarding the technical capacity and personnel involved in the operation and maintenance of water intake/water purification systems and the water supply network. NWC's Western Division, which is in charge of the operation and maintenance activities, has abundant experience in the operation and maintenance of many water intake/water purification plants. In this respect, there are no problems associated with technical level. Furthermore, the consultant for this project has created a manual on the operation and maintenance of the water purification system, etc., and is implementing relevant training on the system's operation and maintenance. In regards to personnel, the Technical Services Department of the Western Division (number of staff: 65 people) is in charge of maintaining the system[19], and the Water Production Team of the St.James/Trelawny Area Department (number of staff: 52 people) is in charge of operating the system.

2.5.1.2 Operation and maintenance system

This project intended for CECL to implement the project (design and surveillance) and for NWC to carry out the operation and maintenance after the system was constructed. According to both agencies, the handover of operations that took place after the completion of the construction work was conducted smoothly without running into any problems.

As to NWC's operation and maintenance structure, NWC takes a two-division approach in which all of Jamaica is divided into two divisions. The Eastern Division is in charge of eastern Jamaica including its capital Kingston, and the Western Division is in charge of western Jamaica including Montego Bay. This project's water supply system is under the jurisdiction of the Western Division.

In addition to technical sectors such as the Technical Services Department, the Western Division also has a Customer Relations Department which handles customer/client service-related matters (number of staff: 70 people). This latter department is in charge of fee collection and measures to tackle water stealing.

[19] The maintenance managers (a group of maintenance engineers from the Technical Services Department) of NWC's Western Division, who are responsible for the operation and maintenance of the system, are participating in a training program of the Japan International Cooperation Agency (JICA) and receiving training in Jamaica on the operation and maintenance of water systems.

2.5.1.2 Financial status

As a result of reviewing the fair value of property with the introduction of international accounting standards (International Financial Reporting Standards: IFRS) in 2003, fixed assets rose to approximately 2.5 times the previous year's amount. Accordingly, the depreciation expense marked a sharp increase. In addition, bookkeeping of accrued retirement benefits for employees began in 2003 and of deferred tax liabilities in 2004. Stemming from these factors various indicators have been worsening on the surface (Table 8).

Regarding safety, while the capital adequacy ratio has been declining sharply, this is associated with the change in accounting standards mentioned above and, furthermore, a ratio of approximately 40% (as of 2004) is being secured after the change in standards. The liquidity ratio is also above 130%, and in this respect, there are virtually no problems associated with short-term cash flow. In addition, the current liability has been on a downward trend in the last several years. With respect to profitability, the net profit has posted a large deficit in the last two years due to the surge in depreciation expenses associated with the change in accounting standards. Meanwhile, the net profit to total assets ratio, net profit to sales ratio, and total assets turnover all improved between 2003 and 2004, and profits are being made in the course of utilizing the water supply system.

Table 8. NWC's Financial Performance and Various Indicators

Unit: Million Jamaican Dollars

Accounting fiscal year/item	2001	2002	2003	2004
Total assets	8,818	12,400	28,161	27,635
Current assets	2,580	2,242	2,912	1,876
Fixed assets	6,238	10,158	25,249	25,759
Current liability	2,065	1,577	1,701	1,421
Accrued retirement benefits for employees, etc.	-	-	9,780	10,618
Capital	6,607	8,673	15,475	10,425
Sales	4,731	4,797	5,146	6,124
Depreciation expense	250	485	1,429	1,453
Current net profit	51	-695	-2,112	-1,857
Net profit to total assets ratio (%)	0.6	-5.6	-7.5	-6.7
Total assets turnover	0.54	0.39	0.18	0.22
Net profit to sales ratio	1.1	-14.5	-41.0	-30.3
Liquidity ratio (%)	124.9	142.1	171.2	132.0

Capital adequacy ratio (%)	74.9	69.9	55.0	37.7

Source: NWC Annual Report.

Furthermore, sales in 2004 increased by 19% year-on-year as a result of the revisions made to the water rate in January 2004[20]. NWC intends to strengthen non-revenue water measures such as newly install meters, replace old meters, and implement measures to tackle water stealing[21]. In this context, further revenue increases can be expected in the future if the non-revenue water rate continues to decline.

2.5.2 Operation and maintenance

The water intake/water purification systems and the water supply network constructed by this project are appropriately operated and maintained. Broken/malfunctioning equipment (e.g. pumps) is also replaced on a timely basis. In this respect, it is believed that there are no particular problems concerning the provision of spare parts[22].

Meanwhile, water stealing is a problem much as before in central Montego Bay's 19 informal communities (a type of slum district). Fee collection is proving to be a difficult task in these communities, and with the goal of achieving a non-revenue water rate of 50%[23]. NWC's Western Division is currently implementing various countermeasures (e.g. program to tackle water stealing, awareness raising activities for residents)[24,25].

3. Feedback

3.1 Lessons learned

It is inferred that an extremely high non-revenue water rate was set for Montego Bay at the time of appraisal. Given that lowering the non-revenue water rate is

[20] The Office of Utility Regulation (OUR), which decides the level of utility rates, approved the draft revisions of the water rate on December 22, 2003 and they entered into force in January 2004.
[21] For details see Footnote 13 and Recommendation 3.2.
[22] When beneficiaries were interviewed, 36% of the 91 respondents said "Operation and maintenance are going well under NWC," and 24% of the respondents said "There are no problems in particular." On the other hand, 19% of the respondents said "Operation and maintenance are not going well."
[23] The non-revenue water rate of the entire St. James Parish in Montego Bay is 74.7% (as of 2004, according to NWC).
[24] The Planning Institute of Jamaica (PIOJ) is implementing a resident relocation project called Relocation 2000 in all of Jamaica. According to NWC, some informal communities in Montego Bay are subject to this project and it is possible that some of the residents in these communities will be relocated.
[25] Regarding awareness raising activities for residents (public education activities concerning wellhead protection and water stealing), the Customer Relations Department of NWC's Western Division (number of staff: 70 people) is planning various activities that will be carried out in concert with community based organizations (CBOs). As part of these activities, regular meetings are being held with Montego Bay's major CBOs and non-governmental organizations (NGOs).

vital to ensure the financial sustainability of the water supply project, programs such as one aimed at remedying the non-revenue water rate should have been included in the project component.

3.2 Recommendations

(Recommendation to executing agency 1)

Water stealing in central Montego Bay's informal communities may be one of the major causes behind the high non-revenue water rate, and in this context, it is desirable for various measures to be taken with the Customer Relations Department of NWC's Western Division playing a central role.

(Recommendation to executing agency 2)

NWC is currently implementing the North Western Parishes Water Supply Project covering the northwestern region of Jamaica including Montego Bay. Included in the project is the installation of a total of 23,000 water meters and a review of the customer management database, and it is expected that the project will contribute to lowering the non-revenue water rate of the region. These activities are being carried out as part of efforts to improve the non-revenue water rate identified in NWC's management improvement program called the Three-Year Action Plan (2004-2006). In this context, NWC should make utmost efforts to ensure that these steps are taken and that they are fruitful.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Output 1) New establishment of water intake and water-conducting systems	Water intake capacity:10.0 imgd (Approx. 46,000 tons/day) Extension of aqueduct: 1.7 km (Water intake point – water purification site)	Max. water intake capacity: 20.0 imgd 1.3 km
2) New establishment of water purification system	System capacity: 10.0 imgd (Approx. 46,000 tons/day)	As planned
3) New establishment of water conveyance system	Extension of water pipe: 13.4 km (total) (Water purification site – water reservoir)	2.1 km (total)
4) Expansion of water supply network	Extension of water distribution pipe: 23.0 km (total)	8.4 km (total)
5) Installation of pressure pumps	10 pumps	23 pumps
2) Project Period	November 1988-June 1990 (21 months)	November 1988-January 1997 (99 months)
(3) Project Cost		
Foreign currency	3.404 billion yen	3.401 billion yen
Local currency	1.625 billion yen (62 million Jamaican dollars)	1.042 billion yen (183 million Jamaican dollars)
Total	5.03 billion yen	4.443 billion yen
ODA Loan Portion	4.72 billion yen	4.3 billion yen
Exchange rate	1 Jamaican dollar = 26.3 yen (November 1987)	1 Jamaican dollar = 5.7 yen (November 1989 – January 1997 Avg.)