Ex-Post Monitoring of Completed ODA Loan Project

Colombia

Aguablanca Water Supply and Sewage Project

External Evaluator: Koichi Ishii

Pegasus Engineering Corporation

1. Project Description

Location of the Project Site

Overview of the sewage treatment plant

1.1 Project Objective

The objective of this project is to promote the supply of drinking water and the treatment of household and industrial wastewater by developing water and sewage facilities in the city of Cali, thereby contributing to the improvement of the living and sanitary environments of the residents and prevent the contamination of the Cauca River.

1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	18,285 million yen / 182,85 million yen
Loan Agreement Signing Date / Final Disbursement Date	May 1986 / May 2002
Ex-post Evaluation	Fiscal year 2004
Executing Agency	Empresas Municipales de Cali (EMCALI)
Main Contractor	Construcciones Civiles S.A. conciviles (Colombia), Construtra Norberto (Colombia), Degremont Colombia S.A. (Columbia), Degremont Argentina S.A, Mitsubishi Corporation (Japan), etc.
Main Consultant	Nihon Suido Consultants Co., Ltd. (Japan), Tokyo Engineering Consultants Co., Ltd. (Japan), Gandini And Orozco Engineers (Colombia), Ingesam LTDA (Colombia) / Inesco LTDA (Colombia)

1.3 Background of Ex-post Monitoring

At the time of the project appraisal conducted in 1984, the population of the city of Cali had increased dramatically, entailing a rapid surge in the number of incoming low-income laborers, particularly to the Aguablanca region, located in the southeastern Cali. However, the development of infrastructure for basic public service had not kept pace with the rapid population growth. About 70% of the residents in the Aguablanca region had no access to water supply and sewage services. Moreover, because the region consists mainly of depressed land along the Cauca River, sewage flooded the streets during the rainy season, creating extremely unsanitary conditions. Thus, the municipal water supply and sewage systems were upgraded under the project.

During the ex-post evaluation, however, it was observed that many residents illegally discharged domestic wastewater into storm water drains. Consequently, the sewage pipes were clogged by garbage, causing black water to overflow from the pipes. It was noted that the daily average volume of wastewater treated was lower than planned. In the meantime, there remains room to improve the Cauca River water quality, when compared to the standards in Japan. Likewise, with respect to the technical capacity of Empresas Municipales de Cali (hereinafter referred to as EMCALI), many areas remained to be improved, including operation manuals for the sewage system. The evaluator thus made various recommendations to the municipal government, concerning reinforcement of control over illegal connections to storm water drains, improvement of the garbage collection system, promotion of educational activities, and strengthening of the operation and maintenance capabilities of the sewage facilities.

Therefore, due to uncertainties concerning effectiveness and sustainability, this project was selected for ex-post monitoring and reviewed under each criterion with the findings from the field survey and other research activities with a final conclusion being drawn.

2. Outline of the Monitoring Study

2.1 Duration

Duration of the Study: March 2011 - January 2012

Duration of the Field Study: June 12-22, 2011

2.2 Constraints during the Monitoring Study

Beneficiary surveys were not conducted in the monitoring study. Instead, the impact of the project was confirmed partly by interviewing randomly selected local residents.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effect (Water Supply)

After the ex-post evaluation, the operation and impact indicator values had almost reached the expected level. In particular, the average facility utilization ratio of the purification plant improved exponentially.

(1) Operation and Effect Indicators

The situation of supplying potable water in the city of Cali, as shown by the indicators, is as follows:

Table 1 Water Supply in Cali

Indicators (unit)	Planned	Actual			
	1990	1997	2000	Ex-post evaluation (2004)	2010
Water-supplied population (person)	1,550,000	2,000,000	-	2,200,000	2,240,000
Water service coverage (%)	92	100	98	96	100
Average water supply volume (m^3/day)	600,000	568,011	545,083	612,350	634,962
Water supply volume per capita (l/day)	-	285	-	279	283
Plant installed capacity (m^3/day)	-	570,000		570,000	780,000
Average facility utilization ratio (%)	-	71	-	57	78
Unaccounted-for water rate (%)	30	30		39	47

Fig. 1 Population supplied with water

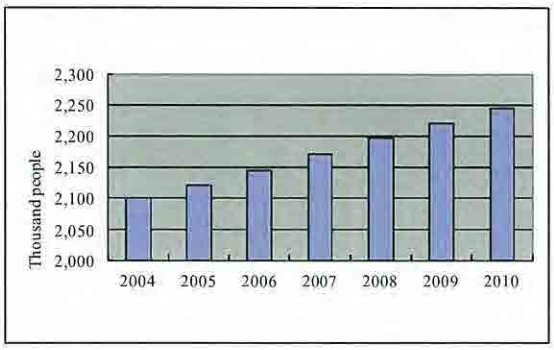
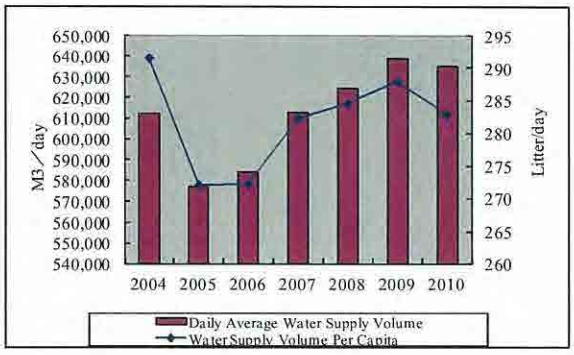


Fig. 2 Water Supply Volume



Source: Created by the evaluator based on the response to the questionnaire from EMCALI.

At the time of the ex-post evaluation in 2004, the service coverage was about 96%, and had risen to 100% at the time of the monitoring study in 2010. According to EMCALI, this is because the number of service connections in the poverty area increased. Similarly, the population of Cali needing domestic water connections reached 2.24 million in 2010 as opposed to the planned 1.55 million.

In the project, the estimated daily average volume of water supply was 600,000 m^3, whereas

the actual water supply volume in 2010 was 634,962 m^3/day. Notwithstanding major interannual fluctuations in the water supply volume, a 21% growth was recorded in the last 24 years from 1986, when construction commenced, to 2010, when the construction was completed. This is because the facility utilization rate improved as mentioned below.

Meanwhile, although the water supply volume per capita was 356 l/day in 1987, it declined to 285 l/day in 1997, 279 l/day in 2004 and 283 l/day in 2010 respectively. According to the ex-post evaluation report, this drop was the result of (1) elevated water rates, (2) the sluggish economy in Cali, and (3) educational activities related to water conservation promoted by the executing agency.

At the Puerto Mallarino Purification Plant, the installed capacity prior to the project implementation was 285,000 m^3/day and the facility utilization percentage was nearly 100%, namely full capacity. Since the capacity doubled to 570,000 m^3/day, the utilization rate accordingly remained at 57%. Recent growth in the population and water demand raised the utilization rate to 78% in 2010.

Fig. 3 Facility Utilization Rate of the Puerto Mallarino Purification Plant

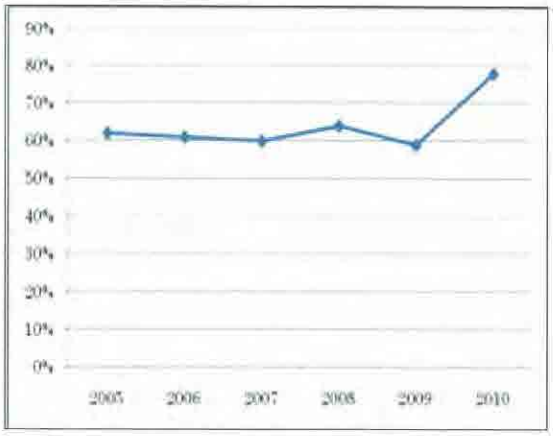
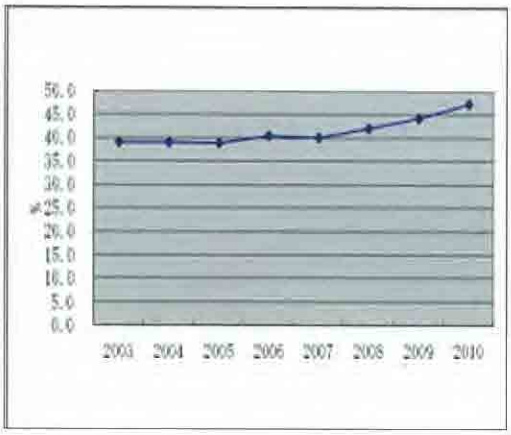


Fig. 4 Unaccounted-for Water Rate



Source: Created by the evaluator based on the response to the questionnaire from EMCALI.

The percentage of unaccounted-for water was 30%, meeting exactly the planned level, in 1997 (when the construction was actually completed). In subsequent years, however, it worsened to 39% in 2004 and 47% in 2010. The factors behind this increase include increased water leakage due to a lack of maintenance work on the deteriorated water supply network and meters, because of EMCALI's financial problems, and more and more illegal connections. In response, EMCALI, the executing agency of the project, has implemented wide-ranging countermeasures: upgrading or installing main pipes and water meters, implementing a management program, controlling illegal connections (the project area is home to many immigrants from the Pacific region), taking measures against water leakage by reducing water pressure, outsourcing water pipe repair and replacement work to the private sector, organizing a local water conservation organization, and water pipe disconnection or compulsory

collection for houses not paying due bills for at least two months. The ultimate goal of the agency is to lower the percentage of unaccounted-for water to below 30%, as initially planned.

The compulsory collection combined with the increased installation and replacement of water meters (212,238 in 2010) have helped improve the accuracy of the local water fee collection system, hence increasing the total collected amount.

Table 2 History of Total Water Fees Collected (million pesos)

Year	2004	2005	2006	2007	2008	2009	2010
Collected amount	114,391	113,611	128,010	186,477	207,798	220,763	203,130

Source: Response to the questionnaire from EMCALI

(2) Results of Re-calculations of the Financial Internal Rates of Return (FIRR) for the Water Supply

The financial internal rate of return (FIRR) at the time of project appraisal was 16.4%, by considering the construction, operation and maintenance costs as expenses, the revenue from the water supply service as a result of implementing the project as a benefit, and the project life as 45 years. When the FIRR was recalculated during the ex-post evaluation using the same assumptions, the value turned out to be 19.3%. In this monitoring study, it was recalculated using the same assumptions and determined as 18.3%.

The percentage derived by the monitoring study was lower than that of the ex-post evaluation because the rate of uncounted-for water jumped from 39% in 2004 to 47% in 2010.

3.1.2 Sewage System

After the ex-post evaluation, the project's effectiveness reached close to the planned level and the wastewater treatment volume also reached the project goal. However, in spite that the plant complies with the designed quality, the project does not currently comply with the discharge regulations.

(1) Results from Operation and Effect Indicators

The efficiency of the sewage plant operations has improved since the ex-post evaluation, as exemplified by an increase in the volume of wastewater treated at the plant, which was pointed out during the ex-post evaluation.

Moreover, the number of illegal connections to the storm drains has been decreasing, mainly thanks to tougher sanctions for offenders with the prevention of contamination of the Cauca River in mind, proving that the measures taken by the city have been effective.

Table 3 Number of Illegal Connections

Year	2004	2005	2006	2007	2008	2009	2010
Number of illegal connections	232	195	158	133	118	97	77

Table 4 Operational Status of the Sewage Treatment Facility

Indicator (unit)	Actual			
	1997	2000	2005	2010
Average daily wastewater treatment volume (m^3/day)	228,960	228,960	198,720(04)	475,200
Facility utilization ratio (%)	35	35(03)	31(04)	67
BOD[1] inflow (mg/l)	-	211(03)	198(04/1)	178
BOD discharge (mg/l)	-	150	133(04/1)	104
BOD removal rate (%)	-	-	30	41
TSS[2] inflow (mg/l)	-	-	171	171
TSS discharge (mg/l)	-	-	72	58
TSS removal rate (%)	-	-	58	66

Source: Response to the questionnaire from EMCALI

Note: Numbers in parentheses show years.

Improvement of the garbage collection system, with the aim of reducing the amount of garbage thrown into sewage pipes, has boosted increases in the daily average volume of wastewater treated (475,200 m^3/day) and the facility utilization rate (67 %.)

In 1985, the sewage pipe network in Cali covered approximately 70% of the population. Since then, the installation of additional sewage pipes to meet rising demand has been steadily implemented, reaching 97% coverage in 2004 and finally 100% in 2010.

While the daily average volume of wastewater treated was originally planned as 475,200 m^3, the actual figures were 228,960 m^3 in 2003, 198,720 m^3 in 2004 and 475,200 m^3 in 2010 respectively, representing achievement ratios of 48, 42 and 100% of the planned goal, respectively. The facility

[1] Biochemical Oxygen Demand (BOD) is an index that indicates the level of turbidity in river water, etc. due to organic matter. It represents the amount of oxygen consumed when organic matter in the water is oxidized by microorganisms during a fixed period at a fixed temperature. The higher the numerical figure, the greater the amount of organic matter and the greater the contamination.

[2] Total Suspended Solids (TSS) refers to the amount of substances floating in the water. The TSS concentration is tested by passing a certain amount of the water through filter paper, drying the paper, and weighing the dried paper. The higher the figure, the more polluted the water.

utilization percentage was recorded as 35% in 2003, 31% in 2004 and 67% in 2010 respectively.

According to EMCALI, the reasons for the increase in the average daily volume of wastewater treated and the facility utilization rate were the reduction in the number of illegal connections to storm water drains, in place of sewer pipes, and the subsequent reduction in the outflow of sewerage from the sewage pipes to storm drains as a result of clogging caused by garbage dumped by residents.

The BOD concentration of wastewater entering the treatment plant is higher than initially estimated, meaning the facility has not met the planned level for the BOD of treated water to be discharged. However, the drop in the BOD level reached 74 mg/l (2010), exceeding the expected level, which demonstrates that the plant is operating properly.

Similarly, since the TSS concentration in wastewater that flows into the treatment plant is high, although the plant complies with designed quality removals for which it was build, the concentration at the time of discharge has not met the planned level. However, the actual drop in the TSS concentration was 113 mg/l in 2010, higher than the planned level.

The Cauca Valley Corporation (CVC), the entity in charge of the environmental administration of the Cauca River; specifies the removal ratios of BOD and TSS as 50%. The BOD values have not attained the required level.

Table 5 BOD and TSS Concentrations at the Sewage Treatment Plant

Item	Planned (at appraisal)		2003		2004		2010	
	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS
Intake (mg/ℓ)	121	130	211	176	198	171	178	171
Discharge (mg/ℓ)	79	52	150	84	133	72	104	58
Removal rate (%)	35	60	29	52	30	58	41	66

Source: EMCALI

Note 1: Intake and discharge amounts for BOD and TSS are annual averages.

(2) Results of Re-Calculations of the Financial Internal Rates of Return (IRR) for the Sewage System

The financial internal rate of return (FIRR), calculated at the time of appraisal, was negative, considering the construction, operation and maintenance costs as expenses, revenue from the sewage service provided by the project as a benefit, and the project life as 45 years.

When the FIRR was recalculated during the ex-post evaluation using the same assumptions, it was 7.3%. The result of recalculation during the monitoring study was 11.8%.

The figure derived by the ex-post evaluation was greater than expected, since the sewer fees, i.e. the benefit increased from 754 peso/m^3 (2004) to 1,437 peso/m^3.

As shown above, the efficiency of both the water supply and sewage systems rose after the ex-post evaluation, along with a surge in the main operation and effect indicators...

3.1.2 Qualitative Effects

(1) Water supply

The interview with EMCALI revealed that, by educating consumers on the re-use of water, utilization of rain water, and installation of water conservation plumbing fixtures, residents have become more aware of water conservation.

Also, according to a survey on randomly-selected poor families, heightened awareness of water saving has led to more households making use of rain water in order to reduce their monthly water bills.

(2) Sewage system

The project improved the sanitary conditions for local residents, reducing sewage flooding of the streets during the rainy seasons (March to May and September to November).

In order to improve the garbage collection system to eliminate garbage thrown into the sewage pipes, the garbage collection system was privatized in 2008 (EMAS S.A., etc.) EMAS S.A was also contracted to manage an awareness-raising campaign for residents, working together with the community association. The garbage collection customer satisfaction survey, sponsored and financed by a private entity, obtained a favorable satisfactory score, 4.1 of a maximum 5.0 points.

3.2 Impact

3.2.1 Improvement of the Living and Sanitary Environments for the Residents

According to the survey[3], the living and sanitary environments for the residents had improved, compared with the pre-project conditions, in terms of shorter water-drawing time and fewer water-borne illness.

Also, according to data provided by the Cali Public Health Bureau, the mortality rate related to water-borne diseases (babies under 1 and infants under 5 years old) showed a continual decline.

The mortality rate of infants aged under one year in Cali caused by water-borne illnesses such as diarrhea dropped from 5 (1986) per thousand births to 0.3 (2003) and 0.2 (2010) per thousand births. The child mortality rate (under 5 years of age) also declined from 1.5 (1986) to 0.07 (2003) and 0.05 (2010) per thousand births. According to the Cali Public Health Bureau, these improvements are attributed to the implementation of the project.

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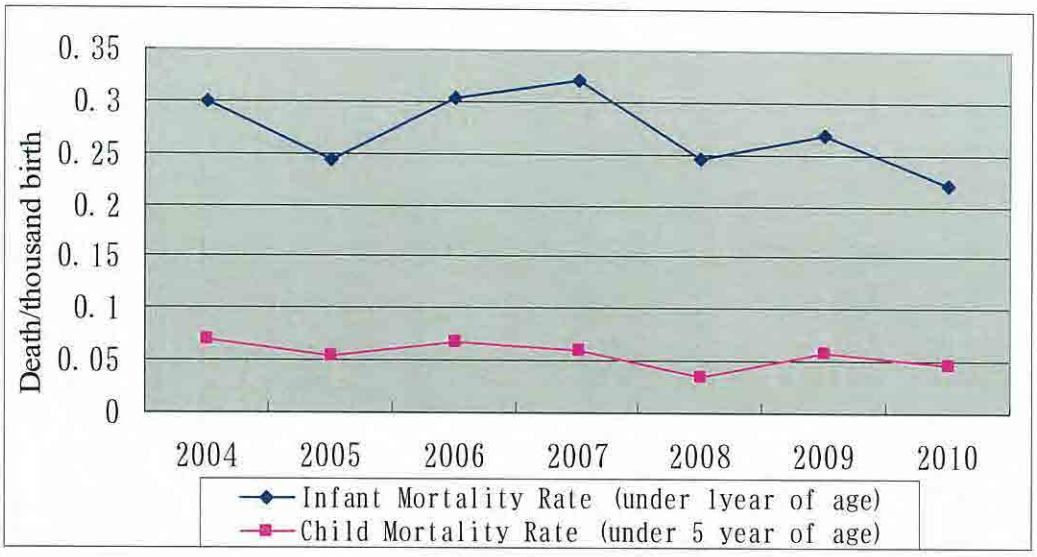
[3] Interviews were conducted with randomly selected residents in the project area. The number of interviewees was limited due to poor security conditions in the region.

Fig. 5 Infant and Child Mortality Rates Due to Water-borne Illnesses



Source: Cali Public Health Bureau

3.2.2 Prevention of Contamination in the Cauca River

Table 6 below shows water quality data for the Cauca River from 2002 to 2010.

Table 6 Water Quality of the Cauca River

Parameter	Water quality of the Cauca River				Water quality standard set forth by Cauca Valley Corporation
	2002	2003	2004	2010	Law number 0686 of 2006
pH	7.10	6.97	6.66	7.01	5.0 - 9.0
BOD (mg/ℓ)	8.80	4.23	3.33	3.32	3.5 mg /ℓ or lower
TSS (mg/ℓ)	172.0	84.0	115.7	59.0	30mg /ℓ or lower
DO[4] (mg/ℓ)	0.60	2.17	2.14	1.45	1.2 mg /ℓ or higher

Source: Cauca Valley Corporation (CVC)

Note 1: The tested area is located 49 km downstream of the Cali sewage treatment plant. Also, the data collected are from spot checks and do not represent annual averages.

As the local standards set forth by the Cauca Valley Corporation (CVC) are not met, the water quality of the Cauca River is still considered polluted. One of the main causes of the pollution is its natural connection with the rivers urban closer to Cali, as Jamundi, Candelaria. Yumbo and others.

4 Dissolved oxygen (DO) is one index of water quality, which indicates the amount of oxygen dissolved in water. The lower the figure for DO is, the worse the water quality.

Other causes include the discharge of contaminated water from industrial and agricultural zones.

In order to attain the CVC standards (the removal ratios of BOD and TSS should both be no less than 50%, as a standard for discharging treated water from wastewater treatment plants), EMCALI plans to construct a secondary treatment facility. In accordance with the agreement with the central government and under CONPES No. 3624, construction of this facility will finish in 2016. A loan from the Colombian central government will be appropriated for the total cost of 110 million U.S. dollars for the construction by securing a moratorium on this repayment. 1.8 million dollars has already been allocated for basic design activities, and the design task to be contracted to a private company, is slated for 2012 and 2013.

3.2.3 Relocation and Land Acquisition

Rehabilitation of the storm water pond provided by the Inter-American Development Bank (IDB) was suspended, based on challenges faced in complying with the local environmental restrictions related to the disposal of dredged soil and sand and also relocating families having illegally occupied the area around the pond.

Although the municipality does not reubicate the illegal people living around the wetlands of Charco Azul and Pondaje, the hydraulic recovering of Charco Azul being done in 2012 (now is about 80-90%) and Pondaje is waiting for the resources to do the job. Its capacity will be 800,000m^3. Damage caused by flooding, averaging 3 times in the year during the rainy season, for roughly 15 hours and constantly affecting the area of Aguablanca, will be controlled and mitigated by these reservoirs.

3.2.4 Other Impacts

The number of illegal connections into storm drains decreased, mainly due to awareness-raising campaigns among residents, as recommended by the ex-post evaluation.

3.3 Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

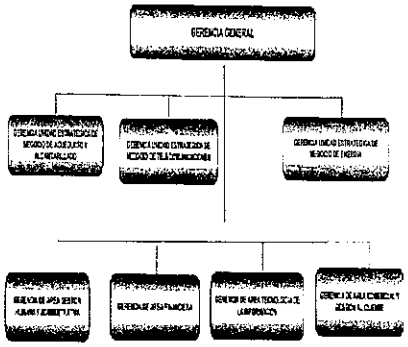
EMCALI, the executing agency, is an independent public company responsible for overseeing the construction, operation, and maintenance of the facilities involved in the water supply and sewage, energy, and telephone services in the city of Cali and surrounding cities. The operation and maintenance of the facilities provided by the project are undertaken by the Water Facilities Division, which has 564 staff members, and the Sewer Facilities Division, which has 253 staff members, both of which are part of the Water and Sewer Bureau of EMCALI. The monitoring study found no problem in the structure and manpower of these operation and maintenance organizations after the ex-post evaluation.

SCADA (Supervisory Control and Data Acquisition) was created to monitor the water level of

the Cauca River, which made it possible to formulate a comprehensive flood control plan.

A portion of the pipes in stock were saved as a result of outsourcing regular replacement and repair activities to the private sector (Litofon S.A.). Some of the staff at the wastewater treatment plant were dispatched by the private personnel dispatch firm EAT (Empresa Asociativa de Trabajo).

Fig. 6 EMCALI Organizational Chart



Source: EMCALI website

3.3.2 Technical Aspects of Operation and Maintenance

According to an EMCALI staff member, the yen-loan-funded facilities are better in terms of performance and durability, and hence operation and maintenance, compared with other facilities funded by the IDB loan.

The technology used for operating and maintaining the plant, particularly the equipment used for monitoring the river water, complies with international standards commensurate with the CVC standards.

The qualification and training systems and the availability and distribution of manuals are sufficient for proper training, performed with the technical assistance of equipment suppliers, Germany and others. It was concluded, based on the fact that the wastewater treatment volume remained at around the target level envisioned in the project, that the functions of the screw pump, the sedimentation basin and the sludge condenser pond, among others, were no longer problematic, although these were identified as technically unsatisfactory in the ex-post evaluation.

Improvements in the O&M technical skills include proper equipment operations necessary for the water supply and sewage services by offering training under an agreement with the labor union, implementing a scheme to grant promotion every couple of years, acquiring ISO 9001(2010), and other qualification systems.

Photograph 1 Water Quality Monitoring Equipment at the Wastewater Treatment Plant

Photograph 2 Water Supply Pump (funded by the yen loan)

3.3.3 Financial Aspects of Operation and Maintenance

Due to the deterioration of EMCALI's financial standing, its administration and supervision rights were transferred from the Cali municipal government to the Colombian central government in April 2000. Currently, EMCALI's management is being restructured under the close supervision of the central government.

The communication area is not profitable but the energy and water supply are producing good returns and profit. Therefore, the company is conducting a program of restructuring these services to improve their financial situation. Financial data dedicated to the water supply and sewage services was not available at the time of monitoring. Incidentally, EMCALI is prioritizing the repayment of loans from commercial banks and Japan International Cooperation Agency (JICA).

EMCALI's capital-adequacy ratio decreased from 47% in 2002 to 39% in 2004. It recovered to 47% in 2010, which improved the profitability of the corporation.

Table 7 Main Financial Data of EMCALI (unit: 1,000 Colombian pesos)

Item	2008	2009	2010
Gross assets	5,039,376,244	5,168,336,286	5,139,993,830
Current assets	786,084,415	801,046,146	782,562,323
Current liabilities	436,359,732	453,676,001	446,071,805
Capital	2,371,268,985	2,461,168,863	2,405,012,509
Net revenue	1,339,718,467	1,409,920,382	1,413,325,194

Net profit	△ 37,425,081*	74,857,197	47,828,673
Return on equity (ROE) (%)	-	0.30	0.19
Net income to net revenue (%)	-	5.31	3.38
Turnover ratio of total liabilities and net worth	0.56	0.57	0.59
Current ratio (%)	180.28	176.82	175.34
Equity ratio (%)	47.05	47.62	46.80

Source: EMCALI

Note*): A large-scale capital investment was made in 2008.

Table 8 below shows the operation and maintenance expenses incurred by the wastewater treatment plant. EMCALI is financing the cost of minimal replacements and repairs needed for proper operation and maintenance.

Table 8 Operation and Maintenance Expenses (unit: Million pesos)

Year	2003	2004	2005	2006	2007	2008	2009	2010
Operation and Maintenance expenses	10,908	10,908	11,374	13,048	13,703	15,946	8,488	11,135

Source: EMCALI

3.3.4 Current Status of Operation and Maintenance

EMCALI is focusing on strengthening the operation and management capacities concerning the sewage facilities, and it plans to do so by developing qualification and training programs.

An observation on the current conditions of the plant and the sewer pipe network found that they were properly repaired, replaced and expanded, except the control system at the Aguablanca pumping station located in a poverty area in poor O&M conditions. This control device is scheduled to be replaced in 2012, as currently only 30% of its pumping capacity (176,000 m^3/day) is used.

The city of Cali continues its efforts to reduce and eventually eliminate the illegal connections to the storm drains by residents, while continuing to improve garbage collection service by four private companies, including EMAS.

On-site observation of the current operation and maintenance conditions at the wastewater treatment plant and the sewer pipe network confirmed that the facilities were managed properly. All facilities are working properly except the above-mentioned pumping station. The reduction in illegal connections to the storm drainage system, combined with the development of awareness-raising campaigns in relation to garbage collection, has yielded positive results: a higher facility utilization rate

and an increased volume of treated wastewater.

In this way, the technical capabilities of EMCALI to provide the water supply and sewer services have improved through the application of manuals and other efforts. Also, with respect to the current organizational structure and financial aspects, the corporate restructuring phase is in progress under the central government's initiative, resulting in better water and sewage service performance to date. The monitoring study confirmed that the reduction of illegal connections to the storm drain system, improvements to the garbage collection system, and the awareness-raising campaigns and strengthening of the operation and management capabilities were appropriately addressed, as noted in the ex-post evaluation.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

As recommended by the ex-post evaluator, the reduction of illegal connections into the storm drains and the resident's awareness-raising campaigns for garbage collection have been implemented and carried forward. Also, the illegal disposal of garbage into the Cauca River decreased; mainly due to the improvement of the garbage collection system now entrusted to the private sector. These activities performed by the executing agency and/or other organizations led to an increase in the volume of sewage captured and treated.

The monitoring study also confirmed that the operation, management, replacement and repair of the facilities were properly performed, except the previously-mentioned pumping station.

4.2 Recommendations

EMCALI, as the executing agency, has taken various measures to counter the worsening rate of uncounted-for water every year, but the result has not yet been recorded. Targeting 30%, as initially planned, the effect of these measures should be verified and revised as necessary.

4.3 Lessons learned

Nil.

End

Comparison of Original and Actual Scope

Item	Planned	Actual Performance
1. Output Water Portion (JBIC portion is (a),(b), and (d)) (a) Expansion of Puerto Mallarino Purification Plant (b) Eastern Water Mains (c) Water Supply Reservoir (d) Water Pipes Sewer Portion (JBIC portion is (i) and (j)) (e) Stormwater Drains (f) Stormwater Management Pond (for stormwater drainage) (g) Stormwater Drainage Pump Station (h) Sewer Pipes (i) Aguablanca Pump Station (for sewage) (j) Sewage Treatment Plant ※(c), (d), (e), (f), and (h) were funded by the Inter-American Development Bank (IDB); (a),(d), and (g) were by Italy's export-import bank	 285,120 m^3/day 11 km 16,000 m^3 36 km 10 km 781,000 m^3 12 m^3/second 12 km 372,000 m^3/day 181,000 m^3/day	 As planned As planned 30,000 m^3 168 km As planned Suspended As planned As planned 176,256 m^3/day 656,640 m^3/day Additions: Chemical Infusion Facility; Deodorization Facility
2. Project Period	May 1986-May 1992 (73 months)	May 1986-December 2002 (200 months)
3. Project Cost (Japan's ODA loan portion only) Foreign Currency Local Currency Total Exchange Rate	12,800 million yen 8,555 million yen (3,719 million Columbian pesos) 18,285 million yen 1 Columbian peso = 2.3 yen (as of January 1985)	13,693 million yen 4,592 million yen (30,613 million Columbian pesos) 18,285 million yen 1 Columbian peso = 0.15 yen (simple average of 1987 to 2002)

Ex-Post Monitoring of Completed ODA Loan Project

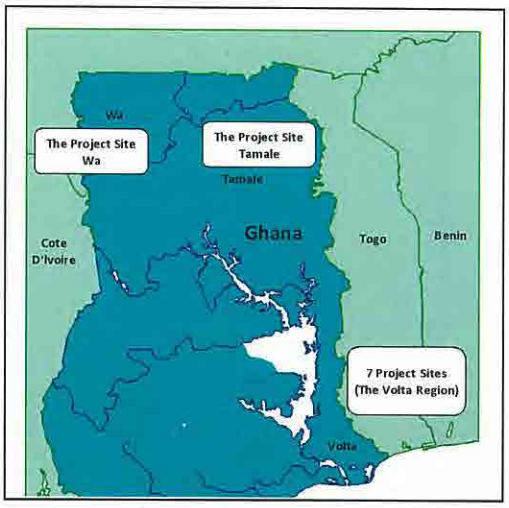
Republic of Ghana

Water Sector Rehabilitation Project

External Evaluator: Tomoko Matsushita

INGEROSEC Corporation

1. Project Description



Location of the Project Site

Facility in Hohoe

1.1 Project Objective

The objective of this project is to improve the water supply services of the country by providing tools and equipment necessary for rehabilitation of the water supply facilities and maintenance of the nationwide water supply system in a total of 9 water supply facilities, located in the Volta Region and the northern area of the country, thereby contributing to improvement of hygiene standards for citizens of the Republic of Ghana and the development of an infrastructure conducive to the country's industrial development.

1.2 Outline of the Loan Agreement

Approved Amount/ Disbursed Amount	5,444 million yen/5,369 million yen
Loan Agreement Signing Date/final Disbursement Date	March, 1994/December, 2000
Ex-post Evaluation	Fiscal Year 2005
Executing Agency	Ghana Water Company, Limited (GWCL)
Main Contractor	Kanematsu Corporation (Japan), Sogea (France)
Main Consultant	COWI Consulting Engineering (Denmark)

1.3 Background of Ex-post Monitoring

During the serious economic crisis in the 1970s and early 1980s, the water supply system in the Republic of Ghana was deteriorated, with over one third of the existing system was dysfunctional. The water service coverage ratio was only 40%, lower than the average of Sub-Saharan Africa. On the other hand, water demand was expanding due to rapid population growth in urban areas. Thereby, the government of Ghana requested the assistance from the government of Japan for rehabilitation of water sector as a matter of priority. Subsequently, the government of Japan decided to implement "the Water Sector Rehabilitation Project" to increase efficiency of water supply of 9 water supply facilities in the Volta Region and the northern area of the country.

However, as a result of the ex-post evaluation in 2006, the following issues were pointed out:

1) In the implementing organization, Ghana Water Company Limited (hereinafter referred to as "GWCL"), the management of data necessary for operation and maintenance of the water supply facilities was insufficient, data was not recorded, or was recorded on paper media but not organized. Analysis and verification of the existing data was not carried out, and the reliability of the data was low.
2) Because sharing of data from each facility to GWCL headquarters was insufficient, GWCL headquarters did not grasp the status of operation of the facilities, and appropriate business management was not implemented.
3) The NRW ratio in the region covered by this project was high at 30.3%, and the water charge was not paid in accordance with the quantity used.

Therefore, based on the above issues concerning project effectiveness and sustainability that were observed during the ex-post evaluation, this project was selected for ex-post monitoring and reviewed under each criterion with the findings from the field survey and other research activities with a final conclusion being drawn.

2. Outline of the Monitoring Study

2.1 Duration of Monitoring Study

Duration of the Study: March 2011 to January 2012
Duration of the Field Study: 16 to 30 July, 2011

2.2 Constraints during the Monitoring Study

There are 9 water supply facilities, covered by the Project. The Volta Regional Office of GWCL provided data on 7 facilities. For the remaining 2 facilities (Tamale and

Wa), however, no data were available from GWCL headquarters. Thus, the evaluation team had to rely on interviews with GWCL officials and existing source material due to time and location constraints. The facilities to be visited were limited to the following 3 facilities that have been arranged to receive the mission: Hohoe, Nkonya-Ahenkro, and Sovie-Digbe.

In addition, in June 2011, GWCL changed their contractor from Aqua Vitten Rand Limited (hereinafter referred to as "AVRL") to a newly established company, Ghana Urban Water Limited (hereinafter referred to as "GUWL")[1]. According to GWCL, at the time of the ex-post monitoring, the operational systems under the contract with GUWL, the roles, responsibilities, and the organizational structure (capital size, personnel deployment, etc.) of the company had not been defined, which had caused an obstacle to the survey of the project sustainability.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

(1) Changes in average daily water supply volume

As Table 1 shows, the water supply volume at facilities in Ho and Hohoe exceeded the values of the ex-post evaluation, and were hence considered as achieving a certain level of result. Likewise, as Table 2 indicates, the facility utilization ratio was 59% in Ho and 71% in Hohoe, respectively. Meanwhile, the water supply volume at facilities in Nkonya-Ahenkro and Denu-Aflao fell below the values recorded in the ex-post evaluation, and the facility utilization ratio was at 38% and 31%, respectively.

Large-scale facility (Ho)

Small-scale facility (Sovie-Digbe)

At the large-scale facilities (i.e. facilities where large-scale water intake equipment and treatment equipment are installed: in the Volta Region, this corresponds to Ho, Hohoe, and Keta-Anloga), GWCL headquarters have prepared annual maintenance plans, and maintenance is carried out in accordance with the plans. Thus the quantity of water supplied and the facility utilization ratio exceeded the planned values.

However, at the small-scale facilities (i.e. facilities with small-scale water intake equipment installed, that treat the water with simple filters: this corresponds to

[1] A company that is 100% owned by the Government of Ghana.

Nkonya-Ahenkro, Sovie-Digbe, etc.), maintenance is not sufficiently implemented, which affected the status of operation of the facilities. Also, according to the explanation of GWCL, the reason that the quantity of water supplied at Denu-Aflao reduced was because an elevated tank had a breakdown, and another tank in a nearby location was used instead. Although the latest data for Tamale in the North and Wa in the Northwest was not provided, judging from the 2008 data, it is considered that the planned values are being achieved.

Table 1: Water Supply Volume in 9 facilities (m^3/day)

	Planned	Ex-post evaluation (2006)	Ex-post monitoring (2010)
Ho	1,260	7,747.6	8,923*
Hohoe	2,400	1,507	1,800
Nkonya-Ahenklo	226	57	36
Sovie-Digbe	196	51.0	57
Anyako	600	271	-
Keta-Anloga	4,600	2,972.9	-
Denu-Aflao	2,330	357.4	94
Tamale	15,900	17,770	19,248**
Wa	1,490	1,117	1,339**

Note: * indicates figures for 2009 and ** for 2008. Source: GWCL

Table 2: Facility Utilization Ratio in 9 facilities (%)

	Ex-post evaluation (2006)	Ex-post monitoring (2010)
Ho	52	59*
Hohoe	66	71
Nkonya-Ahenklo	61	38
Sovie-Digbe	27	31
Anyako	81	-
Keta-Anloga	41	-
Denu-Aflao	37	10
Tamale	91	98**
Wa	97	116**

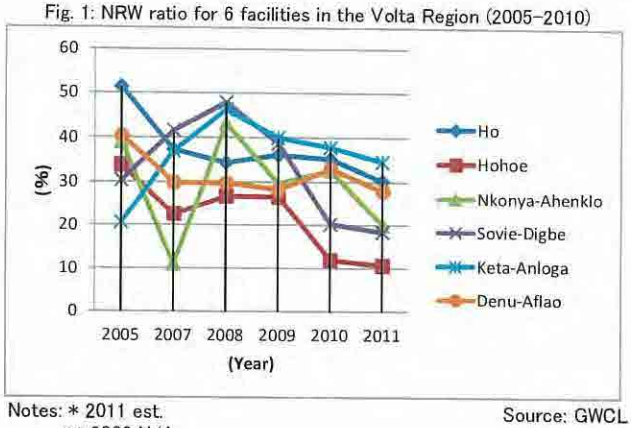
Notes: * indicates figures for 2009 and ** for 2008. Source: GWCL

The facility utilization ratio = water supply volume(m^3/day)/capacity of facility after the project

(2) Transition in the NRW ratio

Figure 1 shows the transition in the NRW ratio for 6 facilities in the Volta Region. The average NRW ratio for the 6 facilities is 23.6% (2011 est.), and although there are fluctuations, it has improved from 30% at the time of the ex-post evaluation.

Fig. 1: NRW ratio for 6 facilities in the Volta Region (2005–2010)



Notes: * 2011 est.
** 2006 N/A.

Source: GWCL

According to hearing surveys with GWCL, the reasons for the improvement in the NRW ratio were (1) implementation of the World Bank's "Urban Water Project[2]", and (2) establishment of the system of water tariffs by GWCL[3].

However, the values of the NRW ratio for all the facilities fluctuate greatly. Time was not allocated to investigate the reasons for this during the period of the field survey, but based on the interviews with GWCL and reports, it was confirmed that there were issues such as (1) the rate for normally-functioning customers' meters is low at about 40%, so the accurate quantity of water used is not known[4], and (2) at some facilities, the water flow meters that measure the quantity of water supplied are faulty[5]. It was inferred that because the measurement by meters is insufficient, it is not possible to calculate the NRW ratio based on the accurate quantities of water supplied, quantities of water distributed, and quantities of water consumed, etc., which is the reason that the numbers fluctuate significantly. It is necessary that GWCL continues its efforts to grasp the status of water supply and water distribution based on accurate data, and to investigate appropriate

[2] In the World Bank "Urban Water Project", initiatives to strengthen the capabilities of GWCL were undertaken by commissioning AVRL to manage the water supply and sewage operations for 5 years from 2006, and to use AVRL's know-how. Specifically, initiatives were undertaken to (1) identify the data necessary for operation and management, (2) data management and sharing by use of IT, (3) training in GIS (geographical information systems) with the objective of determining the water distribution status (leaks, water theft) in the water supply areas, (4) organization management training with the objective of building the capabilities of the staff in management aspects, and (5) improvement in customer response. The results of these initiatives included improvement of meter percentage (from 48% in 2005 to 74% in 2010), introduction of personal computers into GWCL, establishment of a "Customer Response Plan", and establishment of a call center.

[3] In order to improve customers ratio for installation of meters, GWCL have set the water charges for households without meters higher than the charges for households with meters, and are recommending installation of meters (household without meter installed: 520 Ghana pesewa (uniform charge), households with meter installed: 80 Ghana pesewa (20 litters or less), 120 Ghana pesewa (21 litters or higher), as of 2010).

[4] Periodic inspection and replacement of customers' meters is not carried out, so there is a possibility that customers ratio for installation of meters have been calculated including meters that are not functioning properly (GWCL/AVRL report (2011)).

[5] In small-scale facilities, examples were found where aged and non-functioning water flow meters had not been replaced and continued to be used. At these facilities, it seems that quantities of water supplied and delivered are estimated based on the pump flow rates and past records (GWCL/AVRL report (2011) and hearing survey with GWCL).

measures against non-revenue water.

(3) Water quality

From Table 3 below, the quality of water in all the areas monitored in this ex-post monitoring study satisfied Ghana's water quality standards for turbidity, pH and residual chlorine content. Therefore, it is evident that the quality of water in these regions presents no problems for use as daily life water (also as drinking water)[6]. According to GWCL headquarters, no complaints from residents were reported concerning the occurrence water-related disease, and hence considered to have no particular concerns for water quality.

Table 3: Water Quality (as of 2011)

	Turbidity (<5 NTU*)		pH (6.5-8.5*)		Residual chlorine (0.5mg/l*)	
	Raw water	Treated water	Raw water	Treated water	Raw water	Treated water
Ho	0.8	0.0	7.0	8.5	-	0.3
Hohoe	15	1.0	6.9	8.4	-	0.5
Nkonya-Ahenklo	0.0	1.0	6.5	6.5	-	-
Sovie-Digbe	1.0	4.0	6.8	6.6	-	0.8
Anyako	N/A. The facility was taken over from GWCL to the Community Water and Sanitation Agency.					
Keta-Anloga	2.0	1.4	7.3	8.3	-	0.4
Denu-Aflao	0.0	0.5	7.3	7.3	-	0.3
Tamale Wa	N/A. Data were unavailable from GWCL headquarters.					

Notes: *Ghana standard values Source: Response from GWCL

3.1.1.1 Results of Calculations of Internal Rates of Return (IRR)

When the ex-post evaluation was conducted, neither the financial internal rate of return (FIRR) nor the economic internal rate of return (EIRR) were calculated. In addition, during this ex-post monitoring, since data on maintenance budgets were unavailable, it was decided not to calculate FIRR or EIRR.

3.1.2 Qualitative Effects

According to the interviews with GWCL Volta Regional Office and water supply

[6] The water quality standards that have been set as shown in Table 3 compare favourably with the WHO standards.

facilities at Hohoe, Sovie-Digbe and Nkonya-Ahenklo, no complaints from residents were reported concerning the water supply service hours, service disruption frequency or water quality.

Staff at the water supply facilities, however, reported that no water supply service was available during the night at the facilities in Nkonya-Ahenklo. Also in Sovie-Digbe, since no generator had been installed and the power supply was unstable when it rained, the water supply was frequently cut off during rainy times or backwashing operations. Under such circumstances, the evaluation reached in the beneficiary survey conducted during the ex-post evaluation (water supply service hours and service disruption frequency) has possibly deteriorated.

3.2 Impact

3.2.1 Improvement of public hygiene

The official statistics concerning source of drinking water, provided by GWCL as the latest official data are the same as presented in the ex-post evaluation. According to the GWCL Volta Regional Office, there has been no major change in the share of water sources in the Volta Region from the share shown in the data.

Table 4: Source of Drinking Water

	Spring and rain water	River/ Stream	Borehole	Tap water	Others
Volta Region	5.8%	25.7%	32.3%	24.9%	11.3%
Wa	11.4%	9.3%	48.0%	22.3%	9.0%
Tamale	2.8%		2.3%	78.9%	16.0%

Source: 2000 National Census

According to an interviews with GWCL, the access times of the residents to water and the effect on the health status of the residents have not been identified at each GWCL facility. In the site survey, it was confirmed that the water is cut off during rainy times or during backwashing operations. However, GWCL states that there have been no reports of complaints from the residents regarding the water supply times, the frequency of cut-off of water supply, or water quality. As stated previously, no problems in the water quality as water for daily life (drinking water) have been found. Consequently, it can be said that there has been no negative impact such as a worsening of public sanitation etc. since the ex-post evaluation.

3.2.2 Impact on the environment

As this project did not involve any large-scale construction, there was no impact on

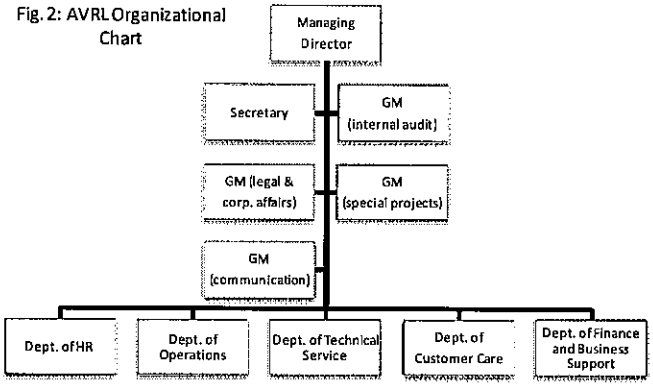
the environment. Also, from the results of a hearing survey with GWCL Volta Region office, there has been no adverse effect such as change to the living environment due to deteriorating water quality and etc. since the ex-post evaluation.

3.3. Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

In order to enhance the management capacities under the PPP scheme as part of the World Bank's "Urban Water Project," AVRL was responsible for overall management under the contract with GWCL. During a five year management contract signed between GWCL and AVRL, a total of 1,500 officials at GWCL, excluding those working at GWCL headquarters (2,500 officials), were transferred to AVRL on loan. In addition to the 1,500 officials transferred from GWCL, AVRL newly employed 1,500 persons and performed operation and maintenance with a total of 3,000 staff members.

Fig. 2: AVRL Organizational Chart



Source: GWCL

In June 2011, when the contract between GWCL and AVRL expired, however, GWCL did not renew the contract and concluded a contract with a newly established private company, GUWL. In the interview with GWCL at the ex-post monitoring, it was explained that the size of capital and the personnel deployment, including the number of employees (including engineers) of GUWL, were unknown and the details of the contract were still under review. It was also explained that there was a chance that officials at GWCL who were transferred to AVRL would be retransferred to GUWL. In addition, it was reported that the Director of the Dept. of Operations at GWCL would assume the position of vice president of GUWL.

Based on the above, it is known that although a new contractor, GUWL, was selected, the contract details were still under review and the future organizational and operational structures had not been determined at the time of the ex-post monitoring. Therefore, it is necessary to pay attention on trends in the future.

3.3.2 Technical Aspects of Operation and Maintenance

As a part of the World Bank's "Urban Water Project", AVRL was making efforts to improve management of GWCL by inviting 7 experts from overseas (2 million U.S.

dollars invested in training programs and 2.5 million US dollars in technological transfer programs including OJT). From June 2005 to May 2011 during the contract term with AVRL, training programs were provided for GWCL officials on the topics of "management," "customer service," "IT," "maintenance of facilities," "water quality," "GIS," "debt management," "supervision work," and "securing of health and safety."

In June 2011, however, a change was made to GWCL's operation system, and it is unknown for the moment whether GWCL officials trained through the programs will remain at GWCL or whether similar training programs will continue to be provided.

Also, since IT was introduced into GWCL operation as part of the World Bank project, and staff have learned the basic methods of using personal computers, data collection and management has improved in part. However, in the ex-post monitoring it was found that the data collected at each facility was not properly managed at GWCL headquarters.

The introduction of GIS with the objective of determining the water distribution status was limited to a trial introduction in some areas. Also, the World Bank pointed out that GWCL is an organization mainly composed of engineers, and thus it is necessary for them to operate their business with more awareness of customers. As a result of the trainings to improve customer care (e.g. response to complaints, etc.,), the satisfactory ratio of customers has improved[7]. On the other hand, it has also been reported that the majority of customer registers are recorded manually, and that the management and record accuracy are not sufficient[8].

Regarding technical aspects, if large-scale facilities only are to be considered, it was confirmed that there are no problems since the maintenance such as replacement of filter sand, inspection and repair of equipment, etc., is carried out in accordance with the annual plans, and the water quality is inspected daily. However, at some small-scale facilities, inspection and repair of equipment was not carried out periodically as at the large-scale facilities.

Based on the above, there is a concern about the technological aspects of sustainability, since, although training programs to improve the techniques and skills of GWCL officials were provided under the contract with AVRL, after June 2011 it is not known how personnel deployment will be conducted and it is uncertain whether training budgets can be secured.

[7] Based on the results of a beneficiary survey (2011) carried out by GWCL, about 90% responded that they were satisfied with processing of complaints.

[8] As the method of recording and managing customer registers is not defined, both management by electronic data and management by paper media are adopted.

3.3.3 Financial Aspects of Operation and Maintenance

As the Ghana cedi denomination was introduced in 2007, the financial data from 2005 onwards was obtained again from GWCL, which is shown in Table 5.

Table 5: GWCL's Main Financial Indicators

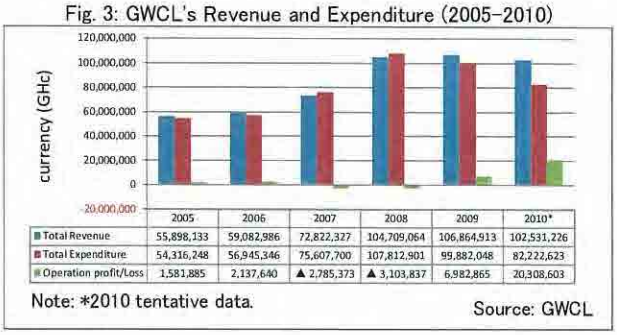
	2005	2006	2007	2008	2009	2010*
Gross Assets	274,522,912	319,176,050	453,437,724	590,775,758	706,824,246	777,280,689
Current Assets	35,546,230	43,671,294	53,366,422	74,490,518	86,317,947	114,940,302
Non-Current Assets	238,976,682	275,504,756	400,071,302	516,285,240	620,506,299	662,340,387
Current Liabilities	17,585,042	36,647,096	52,045,062	76,371,979	88,698,918	70,535,676
Capital	248,789,047	295,181,980	426,839,530	549,653,819	659,804,166	636,274,833
Total Revenue	55,898,133	59,082,986	72,822,327	104,709,064	106,864,913	102,531,226
Total Expenditure	54,316,248	56,945,346	75,607,700	107,812,901	99,882,048	82,222,623
Surplus/Loss	1,581,885	2,137,640	▲ 2,785,373	▲ 3,103,837	6,982,865	20,308,603
Capital-to-asset Ratio(%)	90.6%	92.5%	94.1%	93.0%	93.3%	81.9%

Unit: Ghana Cedi (GHc)** Source: GWCL/AVRL Report

Notes: *2010 est.
**In July 2007, the Cedi was denominated to Ghana Cedi (GHc), such that ten thousand Cedis is quivalent to one Ghana Cedi. The figures presented as above were recalculated based upon GHc.

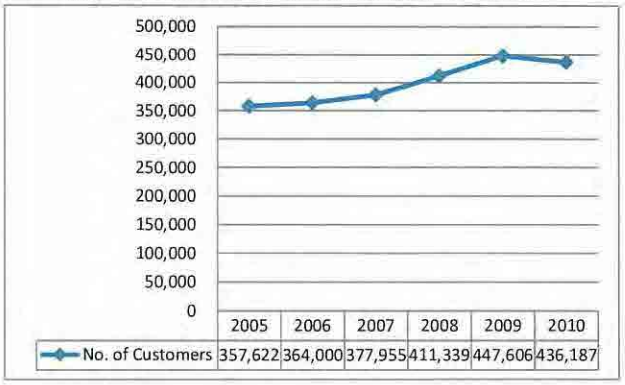
Although GWCL's gross assets are on the increase, there was a reduction in capital between 2009 and 2010. Thus the capital-to-asset ratio was around 90% between 2005 to 2009, but it dropped in 2010. Until 2008, both the revenue and expenditure of GWCL were on the increase, but from 2008 revenue maintained a certain level whereas expenditure tended to reduce, and from 2009 onwards an operating profit was produced. It is considered that the reasons for the increase in operating profit are an increase in the number of customers, the improvement in the tariff collection ratio, and an increase in the water tariffs. Also, as shown in Figure 6, GWCL has made efforts to reduce its expenditures, so the management status of GWCL can be said to be healthy. However, as this refers to the

Fig. 3: GWCL's Revenue and Expenditure (2005-2010)



Note: *2010 tentative data. Source: GWCL

Fig. 4: Totall Number of Customers (2005-2010)

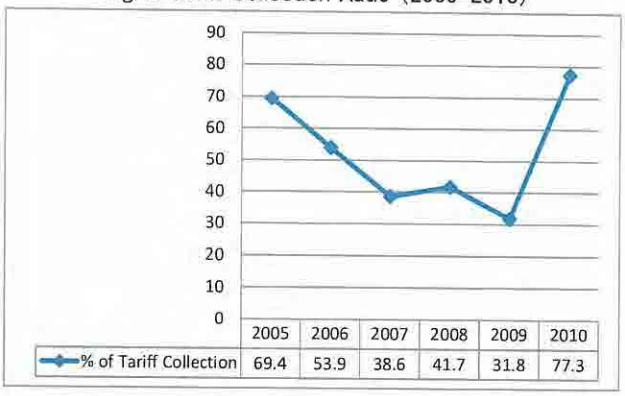


Source: GWCL

past 2 years since 2009, it is necessary to pay attention to the future trends.

According to interviews with GWCL officials during the ex-post monitoring study, maintenance budgets were allocated as needed and spare parts were provided without delay during the contract term with AVRL. After the contract was concluded with GUWL, however, allocation of the budget necessary for management and provision of spare parts have been delayed and there is concern that such a situation will further negatively affect financial sustainability.

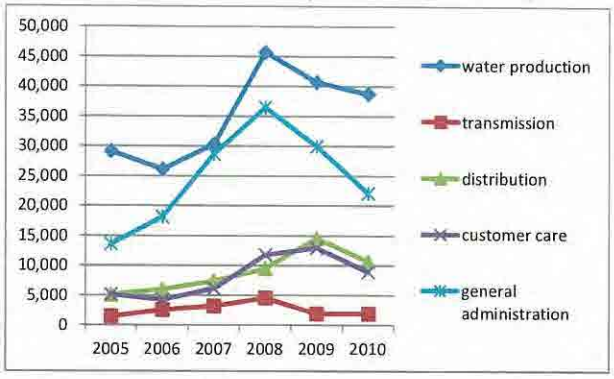
Fig. 5: Tariff Collection Ratio (2005-2010)



	2005	2006	2007	2008	2009	2010
% of Tariff Collection	69.4	53.9	38.6	41.7	31.8	77.3

Source: GWCL

Fig.6: Breakdown of Expenditures (2005-2010)



Unit: Ghana Cedi (GHc)
Note: 2010 est.

Source: GWCL

3.3.4 Current Status of Operation and Maintenance

Based on the interviews at the Volta Regional Office, at large-scale water facilities, periodic maintenance (e.g. changing sand in the filters, inspection and repair of equipment) was conducted in accordance with annual maintenance and clean-up plans, prepared by GWCL headquarters. Also, at the facility in Hohoe, it was confirmed that the intake pump was replaced with GWCL's own budget and the water tank was cleaned once a year. It was also confirmed that a water quality test was conducted every 2 hours daily and no particular problems were found in terms of maintenance.

On the other hand, at small-scale facilities the inside of the tank and the sand filter were not cleaned as regularly as at large-scale facilities. According to the Volta Regional Office, regular clean-up was not carried out at any of the facilities for budgetary

Pump replaced with GWCL budget (Hohoe)

Sand filter (Sovie-Digbe)

reasons. Moreover, it was also difficult to routinely conduct water quality tests by allocating personnel in charge of testing to the site due to the shortage of human resources. In the interviews, it was explained that specialists in water quality testing would be dispatched to small-scale facilities from the Volta Regional Office (approximately twice a week).

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

For large-scale facilities, the quantity of water supplied and the facility utilization ratio exceeded the values at the time of the ex-post evaluation, which means that a certain level of result was achieved. However, for small-scale facilities, maintenance is not sufficient and this is affecting the operational status of the facilities. The NRW ratio has improved for all the facilities since the time of the ex-post evaluation, but all the values exhibit large fluctuations. This is inferred to be because the NRW ratios are not calculated based on accurate data due to insufficient measurement of water supply quantities and quantities used, etc.

In the maintenance of large-scale facilities, replacement of filter sand, inspection and repair of equipment, etc., is carried out based on annual plans. However, at small-scale facilities, it was confirmed that periodic maintenance is not carried out due to budget constraints and other problems.

In June 2011, GWCL changed the private contractor for operation and maintenance work to GUWL. At the time of this survey, the business operation system, the details of the work commissioned, the structure (personnel deployment, size of budget), etc. of GUWL had not been defined. As this could affect the operation and maintenance as a whole, it is necessary to pay attention to the trends in the future.

4.2 Recommendations

Of the facilities, it was confirmed that deterioration at some facilities had advanced and the initially targeted water supply volume was not achieved. GWCL should improve the operation and maintenance structure so that these facilities can operate properly to secure the required water supply volume. In order to maintain and inspect the facilities and machinery regularly and to retire old equipment and replace parts without fail, efforts should be made to (1) consolidate the maintenance system centering around the third party contractor (GUWL) and (2) enhance GWCL headquarters' capability to supervise the private company to which maintenance is contracted.

4.3 Lessons Learned

When operating and maintaining the water supply facilities, the implementing organization should regularly develop and maintain the data to determine the transmission/distribution conditions, operating rate of each facility and the water quality, while the importance of such work should be communicated to the implementing organization when implementing a project.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs	• Rehabilitation and limited expansion of water supply facilities located at the following 9 sites: Ho, Hohoe, Nkonya-Ahenkro, Sovie-Digbe, Anyako, Keta-Anloga, Denu-Aflao, Tamale, Wa. • Construction of maintenance management buildings • Procurement of maintenance management tools and equipment (vehicles, tools, meters and communication equipment)	• Basically, the Project was implemented as planned. Some items, however, were eliminated as a result of the re-examination during the Project period.
2.Project Period	March 1994 – October 1997 (43 months)	March 1994 – December 2000 (81 months) An 18 month-extension was granted.
3.Project Cost		
Amount paid in Foreign currency	4,655 million yen	5,325 million yen
Amount paid in Local currency	1,750 million yen (5,922 million cedi)	995 million yen
Total	6,405 million yen	6,320 million yen
Japanese ODA loan portion	5,444 million yen	5,369 million yen
Exchange rate	1 cedi = 0.296 yen (As of 1993)	1 cedi = 0.056-0.016 yen (Average between 1996-2002)