Sri Lanka

Ex-Post Evaluation of Japanese ODA Loan
"Kalu Ganga Water Supply Project for Greater Colombo"

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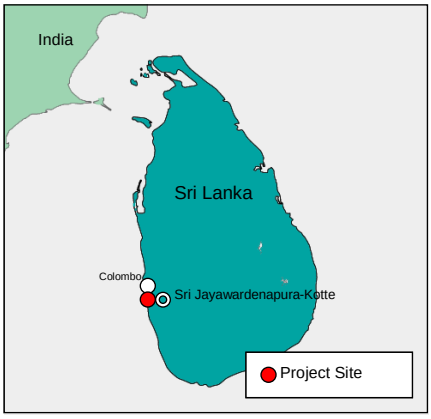
0. Summary

This project is highly consistent with government policies, and no problems with operation and maintenance (O&M) systems can be found. Although slight concern remains about the financial sustainability of the implementing agency (the National Waster Supply & Drainage Board, NWSDB) itself, the O&M-related earning positions are robust, with the operating balance surplus of the facilities relating to this project steadily expanding. Major indicators such as population served, percentage of population served, amount of water supplied, and facility utilization rate have exceeded 80% of the target value, and there is no particular problem with the quality of the treated water produced. Furthermore, numerous positive impacts are appearing, including the improvement of both public health and the business environment in the target areas. In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Location Map

Water Treatment Plant

1.1 Background

As of 1997, Kelani Ganga was the only source of water supply in Colombo, the commercial capital of Sri Lanka, and there were concerns over the expected shortage of water supply capacity in the future and the problem of salinity intrusion during the drought.

The water treatment facilities in Greater Colombo Area available at that time consisted of two systems: 1) the old and new Ambatale Water Treatment Plants located about 10 km east of Colombo (water treatment capacity: 468,000 m^3/day; a repair project completed in 1995 with grant assistance from Japan); and 2) the Kalatuwawa and Labugama Water Treatment Plants (water treatment capacity: 150,000 m^3/day). On the other hand, according to the preliminary study (Special Assistance for Project Formulation, SAPROF) conducted by the Japan International Cooperation Agency (JICA) (then the JBIC), water shortage was predicted for 2003 and after, and the gap between supply and demand was estimated at 45,000 m^3/day for 2005 and 314,000 m^3/day for 2008.

In addition, as of 1997, water supply and drainage facilities had not been established in many poor residential areas in Greater Colombo (there are said to be about 5,000 poor

residential areas), where extreme poor living conditions were causing sanitary and health problems such as waterborne diseases. No water charge was collected for the use of water from communal taps dotting the poor residential areas, a situation that was contributing to the high rate of non-revenue water (50% for Greater Colombo). In addition, the lack of cost-consciousness among residents was resulting in the wasteful use of water. In view of these circumstances, the government of Sri Lanka set forth a policy to reduce the number of communal taps and promote the introduction of household water supply systems in poor residential areas.

Under these circumstances, the most pressing tasks for the Sri Lankan government were to develop new sources of water supply and eliminate the gap between water supply and demand in Greater Colombo Area, while addressing the issue of salinity intrusion in Kelani Ganga. In this regard, there was a need for the early implementation of a water supply project using Kalu Ganga, which had not been utilized, as a new water source. In addition, the establishment of a water supply and drainage system in poor residential areas was urgently needed, as the improvement of living conditions in those areas was necessary.

1.2 Project Outline

The objective of this project is to meet the increased demand of water and to secure the stable water source, even during the dry season in the Greater Colombo area by constructing new water supply system which utilize the Kalu Ganga River as a new water source, thereby contributing to the improvement in public health and business environment in the target area.

In addition, a supplementary component to the project, household water connections and drainage facilities in the selected poor residential areas were constructed with the participation of beneficiary residents.

Loan Amount / Disbursed Amount	11,278million yen / 11,107million yen
Exchange of Notes / Loan Agreement Signing Date	June 1997 / August 1997
Terms and Conditions	Interest Rate: 2.1% Repayment Period: 30 years (Grace Period:10 years) Conditions for Procurement: General Untied
Borrower / Executing Agencies	Democratic Socialist Republic of Sri Lanka / National Water Supply and Drainage Board (NWSDB) and Ministry of Housing and Urban Development
Final Disbursement Date	August 2008
Main Contractors (over 1 billion yen)	China GEO Engineering Corporation (China)
Main Consultant (over 100 million yen)	Nihon Jogesuido Sekkei (Japan) / NJS Consultants Co., Ltd. (Japan) (JV)
Feasibility Studies, etc.	1994 Feasibility Study (by JICA) 1997 Special Assistance for Project Formulation (SAPROF, by former JBIC)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hajime Onishi (Mitsubishi UFJ Research & Consulting)

2.2 Duration of Evaluation Study

Duration of the Study: December, 2010 – November, 2011

Duration of the Field Study: March 9, 2011 – March 24, 2011 / July 10, 2011 – July 16, 2011

2.3 Constraints during the Evaluation Study

None.

3. Result of the Evaluation (Overall Rating: A[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan of Sri Lanka

Relevance with the national policies

At the time that project appraisal was carried out in 1997, the Sri Lankan government had set a state objective of "Safe Water for All by 2010" and was working on expanding the water supply network. In addition, under the "Six Year Development Programme" (1999-2004), concrete targets had been set for the development of water supply facilities and the provision of safe drinking water, such as: (1) The supply of safe drinking water under a socially reasonable tariff system, (2) The development of water facilities capable of 24-hour supply, (3) The facilitation of private investment, (4) The decentralization of water services to the municipality, (5) The efficient utilization of water resources, and (6) The establishment of sustainable operation and management system.

Meanwhile, the administration of Mahinda Rajapaksa that came into power in 2005 sought to correct regional income disparities and wealth inequalities through infrastructure development, as well as promote priority investment in growth centers in each region, through the "Mahinda Chinthana (Mahinda Vision)" announced at the time of inauguration, as well as the policy framework for turning this vision into reality, "Creating Our Future. Building Our Nation: The Economic Framework of the Government of Sri Lanka." Specifically, (1) Development of road networks, (2) Expansion of electric power supply capacity, (3) Development of ports, and (4) Water and sewerage sector investment, are set as priority areas for investment. In addition, at the Sri Lanka Development Forum held in January 2007, the Ten Year Horizon Development Framework 2006-2016, which sets promotion of basic infrastructure development in regions, including water supply infrastructure, as a priority strategic area, was enacted and announced under President Rajapaksa's strong initiative.

Therefore, for both program planning and ex-post evaluation, investment in infrastructure development, especially the promotion of investment in the water supply and sewerage sector, has been assigned high priority in higher-level national policies, and consistency of national policy even through changes of administration has been secured. Thus, consistency between this project's objective of "improving public health through stable supply of water" and national policy is very high.

Relevance with the sector policies

At the time of appraisal in 1997, the Public Investment Program 1997-2001 that set the Sri Lankan government's plan for public investment had an allocation of LKR 23.525 billion planned for the water and sewerage sector, equivalent to 6.9% of the total investment amount, and continuous capital investment into that sector was declared as a fundamental policy.

As of 2011 as well, the National Policy on Drinking Water announced in June 2009

[1] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[2] ③: High, ② Fair, ① Low

continues to hold up the "sustainable supply of safe water" to urban and rural areas as a mission of the utmost importance. In addition, the National Policy on Drinking Water Supply and Sanitation (2004) formulated by the project implementing agency National Water Supply & Drainage Board (hereafter NWSDB), sets the following two targets for water supply development: (1) Percentage (penetration rate) of safe water of 85% by 2015, and 100% by 2025, and (2) Percentage of drinking water supplied by water piping of 100% in urban areas and 75% in non-urban areas by 2015.

Therefore, for both program planning and ex-post evaluation, a certain level of ongoing investment in the water and sewerage sector has been clearly stated in the basic objectives for sector policy, and water supply development in greater metropolitan areas continues to be emphasized.

3.1.2 Relevance with the Development Needs of Sri Lanka

Development needs of this Project

In 1997, water shortage was predicted for 2003 and after, although two water supply systems, i) the old and new Ambatale Water Treatment Plants (water treatment capacity: 468,000 m^3/day) and ii) the Kalatuwawa and Labugama Water Treatment Plants (water treatment capacity: 150,000 m^3/day), were located in Greater Colombo Area. Specifically, the construction of water supply facilities in the southern part of Greater Colombo such as Moratuwa, Panadura, Bandaragama and Horana was not proceeded, and the prompt implementation of a water supply project for the purpose of drastically closing the supply-demand gap was desired at that time.

Table 1: Water Demand and Supply in the Southern Part of Greater Colombo Area

Unit: 10,000 m^3 / day

Year	Maximum Daily Water Supply a	Daily Water Demand		Demand - Supply Gap b-a
		Maximum b	Average	
2006	0.4	9.3	8.3	8.9
2007	6.4	9.8	9.0	3.4
2008	6.4	10.1	9.3	3.7
2009	6.4	10.3	9.5	3.9
2010	6.4	10.9	9.9	4.5
2015 1)	*9.9*	*11.9*	*10.8*	*2.0*
2020 2)	*18.5*	*12.9*	*11.8*	*-5.6*

Source: Answers to the questionnaire to NWSDB
Note 1: Planned (for daily water supply) and forecasted (for daily water demand) figures by NWSDB
Note 2: The operation of the project facilities started in October 2006.

As shown in Table 1, water supply capacity has been significantly strengthened from 4,000 m^3/day to 64,000 m^3/day in the maximum water supply volume (an increase of 15 times), as a result of the October 2006 start of operation of facilities related to this project, including water treatment plants. On the other hand, maximum daily demand for water has increased an average of 4.0% after 2006, resulting in 109,000 m^3/day in 2010. The demand-supply gap that had once been mitigated by this project is again expanding.

Maximum demand is predicted to reach 119,000 m^3/day in 2015, and supply of safe water through expansion of water supply capacity continues to be a pressing task. Had this project——which achieved substantial increase of water supply capacity and greatly contributed to bridging the supply-demand gap——not been implemented, the current supply-demand gap was projected to have widened more than it has.

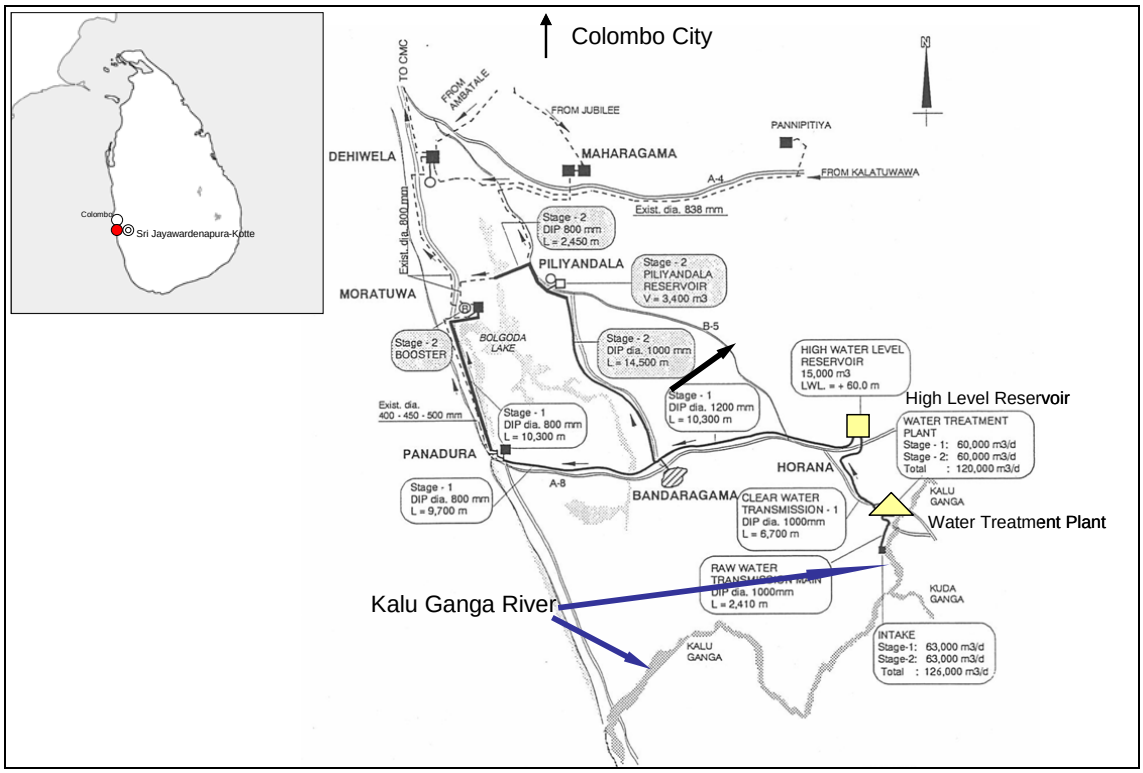


Figure-1: Location of the Project Site ("Stage-1" refers to the facilities of this project)

Water supply needs in poor residential area

In 1997, water supply and drainage facilities were had not been developed in many poor residential areas in Greater Colombo Area, where extreme poor living conditions were causing sanitary and health problems. There is still a high level of needs to establish household water supply system and to develop drainage facilities in the poor residential areas,[3] mainly caused by the situation that the construction of water supply and drainage facilities is still on-going in those areas. The government of Sri Lanka set forth a policy to reduce the number of communal taps[4] and facilitate the provision of household water supply systems in poor residential areas, so the installation of communal taps in the "Shanty Town"[5] are currently limited.

3.1.3 Relevance with Japan's ODA Policy

Under the policy of implementing yen loans to Sri Lanka in 2001 at the time of the appraisal, Japan was taking a course of assisting Sri Lanka that centered on water supply development programs in urban areas with urgent water demand, based on the recognition that water utilities are social infrastructure that contribute to the improvement of public health and the living environment, and that particularly in urban areas they are infrastructure that is indispensable to carrying out economic activities. Therefore, this project was extremely consistent with Japan's aid policies.

[3] Source: Results of interview with USDA (Urban Settlement Development Authority) which is in charge of housing development at poor residential districts in urban areas

[4] There still exists about 8,000 communal taps in the target areas of this project, which includes Moratuwa, Panadura, Bandaragama and Horana districts. (Source: Results of interview with NWSDB Regional Support Center (RSC) - Western South)

[5] **Shanty Town:** The residential colonies where the poor people built a shanty/hut without any authorization. In Colombo, those town is normally located in the public areas in the vicinity of rivers, railway track and swamp/marshland. (Source: JICA(2001) "Greater Colombo Flood Control and Environment Improvement Project: Third Party Evaluation Report – Resettlement and Improvement in Living Environment")

This project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Comparison of outputs planned and actual performance is shown in Table 2 below. There is no major change for the following three outputs: i) Intake capacity of water intake facilities, iii) Treatment capacity of water treatment facilities, and vi) Reserve capacity of high level water reservoir. As for ii) raw water transmission facility, the location of water intake facility was shifted nearer to treatment plant during the Detailed Design (D/D) stage, so the total extension of raw water transmission main was reduced to one tenth of what was originally planned. In the same way, plan revisions during the D/D stage also led to the gravity flow pipes of iv) clear water transmission main being made a little shorter than originally planned.

Other changes include: a significant widening of the scope of v) water distribution facility; and revisions to the specification of clear water pump in the component of iv) water transmission facility. Outlined below are the reasons why the scope was changed substantially.

- ✓ **Water distribution facilities:** The Sri Lankan rupee depreciated against the yen, so there was forecast to be a surplus amount of loan approved. In the wake of this, it was decided to expand the water distribution area to take into account the supply needs of regions close to the target area of this project. Parts of the Panadura East and Raigama areas were chosen as targets for further water distribution network development due to their status as areas not yet supplied by the distribution network. The total length of water distribution pipes were extended by considerably more than originally planned in accordance with the steps outlined above.

- ✓ **The pump stations of water transmission facilities:** Necessary revisions to specifications/quantitative changes (increasing the number of pumps or increasing the size of pump station buildings) were carried out as part of this project, in view of the subsequent "Water Sector Development Project II" (stage 2 of this project, see Table 3 for details).

Table 2: Changes in Output

Project Components	Original	Actual	Differences
i) Water Intake Facility			
· Intake Capacity	126,000 m³/day	The same	As planned
· Raw Water Pumps	63,000 m³/day	The same	As planned
ii) Raw Water Transmission Facility			
· Raw Water Transmission Main	From intake to treatment plant, 2,140 m	217.5 m	10% of original plan
iii) Water Treatment Plant			
· Treatment Capacity	60,000 m³/day	The same	As planned
iv) Water Transmission Facility			
· Clear Water Pump	29.2 m³/min.X2 units	20.8 m³/min.X4 units	Two (2) units
· Clear Water Transmission Main	From treatment plant to high level reservoir, 6.7 km	6.35 km	Mostly as planned
· High Level Water Reservoir	15,000 m³/day	The same	As planned

Project Components	Original	Actual	Differences
· Water Transmission Mains			
➢ High Level Reservoir to Bandaragama	10.3 km	8.832 km	86% of original plan
➢ Bandaragam to Panadura	9.7 km	9.515 km	Mostly as planned
➢ Panadura to Moratuwa	10.3 km	7.903 km	77% of original plan
v) Water Distribution Facility			
· Distribution Pipelines	150 km in total	245.96 km in total	164% of original plan
vi) Water Supply Equipment			
· Domestic Water Meters, Connection Materials and Bulk Meters	20,000 sets in total	The same (16,000 were installed.)	As planned
vii) Others	Office building, Staff accommodations, etc.	Mostly as the same	Mostly as planned
viii) Additional Components	n.a.	The following items were added to the original scope. · Construction of district office buildings · Construction of Water towers (for follow-up project) · Procurement of chlorine neutralization equipment (1), Generator (2), Transformer (1), etc.	
ix) Consulting Services			
· Consulting Service M/M	496M/M in total (Foreign:116M/M, Local: 380M/M)	640.71M/M in total (Foreign:86.75M/M, Local: 553.96M/M)	129% of oriinal plan
· Consulting Service TOR	Detailed Design (D/D), Bidding support, Construction supervision, Decision of distribution areas, etc.	In addition to the left, detailed design of Water Sector Development Project (II)	

Source: JICA internal documents, answers to the questionnaire to NWSDB and results of interviews

- ✓ **Water supply equipment:** 20,000 domestic water meters and connection materials (procured as a set of the two items) were procured as part of this project, as was originally planned. 12,926 of these were installed at the time of project completion. Around 3,000 sets have subsequently been installed up to now and the remaining 4,000 sets are scheduled to be installed in line with the increase in the number of household connections.[6] The number of bulk flow meters was increased in response to requests from departments in charge of operations and maintenance, who regard these meters as essential equipment to help reduce non-revenue water (NRW) rate.

[6] Source: Results of interview with NWSDB RSC - Western South

Table 3: Overall Plan of Water Supply Projects in the Southern Part of Greater Colombo Area (including this project)

Phases	Target Year	Treatment Capacity	Note
Phase-I Stage-I Phase-I Stage-II	2006 2010	60,000 m^3/day 60,000 m^3/day	This project Water Sector Development Project (II) (the follow-up stage of this project)
Phase-II Stage-I Phase-II Stage-II	2015 2020	90,000 m^3/day 90,000 m^3/day	

Source: Prepared from JICA internal documents

Regarding ix) consulting services, consultant input also rose significantly over the original estimate, with the reason that the increase in work hours of local consultants in charge of construction management that came along with the extension of project implementation period[7]. As to the terms of reference (TOR) of the consultant, detailed design (D/D) of the follow-up stage of this project, which is Water Sector Development Project (II), was added to the original scope.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The project cost was longer than planned.

The total cost of the project was originally 13,268 million yen (the Japanese ODA loan share was 11,278 million yen) but the actual project cost was 13,225 million yen (the Japanese ODA loan share was 11,107 million yen), which was equivalent to 99% of the original plan.

Foreign currency portion (about JPY 6.4 billion) was almost at the same level as the original plan at the time of project appraisal, but the local currency portion (about LKR 6.7 billion) greatly exceeded the original plan of about LKR 3.3 billion. Causes of the increase of the local currency portion included: (1) Increase in consultant costs accompanying the delay in construction, and (2) Sudden rise in construction material[8] and construction worker personnel costs due to tsunami reconstruction after December 2004[9]. At the same time, due to the impact of the depreciation of the Sri Lankan rupee, which exceeded inflation rate, overall project cost decreased slightly.

As already stated in the Output section above, the scope of the project was expanded because there was forecast to be a surplus amount of loan approved, due to the depreciation of the Sri Lankan rupee (LKR) against the Japanese yen.

Table 4: Comparative Table of Project Cost

Item	Original	Actual
Total Project Cost	13,268 million yen	13,225 million yen
Foreign Portion	6,418 million yen	6,460 million yen
Local Portion	3,277 million LKR	6,681 million LKR
Yen Loan	11,278 million yen	11,107 million yen

Source: JICA internal documents, answers to the questionnaire to NWSDB and results of interviews

[7] For local consultants, who cost less than foreign consultants, there have been cases of increases in employment volume after project commencement, and a similar situation can be seen as having occurred this time.

[8] For example, compared to the 11.5% rise in wholesale prices overall in 2005, the wholesale prices in the same year for investment commodities, including construction materials, rose by 36%, and 30% in 2006. (Source: Central Bank of Sri Lanka Annual Report, etc.)

[9] The breakdown of expense item in local portion was: LKR 5.61 billion for civil works, LKR 0.59 billion for consulting services, LKR 0.02 billion for land acquisition, and LKR 0.46 billion for others (including administrative costs). Civil works costs and consulting service costs were severely increased compared to those of the original plan (100% and 225% increase, respectively).

3.2.2.2 Project Period

The project period was longer than planned.

The project was scheduled from August 1997 to June 2003, a period of 71 months, but it extended to 111 months, from August 1997 to October 2006[10], which was equivalent to 156% of the original plan.

The main reasons for the delay included: (1) Delay in starting the selection of consultants (two years and a half delay, compared to the estimation at the time of project appraisal), and (2) Prolonged construction works. It took five years and seven months to complete the civil works whereas two years and six months were originally estimated. At the same time, the construction of major facilities was completed in October 2006, as mentioned in Table 5.

Regarding the detailed reasons for the delay in starting the selection of consultants, i) it took long to prepare the shortlist and to fix the terms of reference (TOR) of the consultant (which caused 18 months' delay)[11], and ii) offical approval of these documents and others before starting the selection process required a fair amount of time[12].

Table 5: Comparative Table of Project Periods

Task	Original Schedule (months)		Actual (months)		Differences (months)
Consultant Selection	Aug. 1997 – Sep. 1998	(14.0)	Jan. 2000 – Feb. 2001	(14.0)	0.0
Detailed Design (D/D)	Oct. 1998 – Jul. 1999	(10.0)	Feb. 2001 – Feb. 2002	(13.0)	3.0
Pre-Qualification and Tender	Feb. 1999 – Jul. 2000	(18.0)	Feb. 2002 – Jan. 2003	(8.0)	10.0
Civil Works[1)]	Aug. 2000 – Jan. 2003	(30.0)	Feb. 2003 – Aug. 2008	(67.0)	- 37.0
Inspection and Training	Feb. 2003 – May 2003	(4.0)	Jul. 2006 – Oct. 2006	(4.0)	0.0
Commissioning	Completed in June 2003		Completed in October 2006		- 40.0
Total[2)]	Aug. 1997 – Jun. 2003	(71.0)	Aug. 1997 – Oct. 2006	(111.0)	- 40.0

Source: JICA internal documents, answers to the questionnaire to NWSDB and results of interviews

Note 1: Although the civil works was completed in August 2008, the operation of the constructed facilities started in October 2006, just after the completion of the commissioning process activities of water treatment plant and other related facilities. Auxiliary works such as i) construction of new district office buildings in the target distribution areas, ii) construction of water supply facilities in the target areas of Water Sector Development Project (II), the follow-up stage of this project, and iii) procurement of additional equipment, were carried out in the period from October 2006 to August 2008.

Note 2:Project commencement was defined as the date of L/A conclusion (August 1997). For the definition of the date of project completion, refer to the Footnote-10.

In the process of selecting the contractor for a portion of the construction work, the bidder offering the lowest price withdrew, and, as a result of this and other factors, the start of that portion of the work was delayed by nine months. In addition, due to the delay in the construction of the access road to the site of the above construction work (construction of a 19-km road by the Road Development Authority (RDA) of Sri Lanka, not covered by this project), which was supposed to be completed before the start of said work, the construction period was extended by about 10 months.

Other causes of delay include difficulty in procuring certain construction materials (particularly pipe-related material) and in hiring construction workers, due to the reconstruction activities after the tsunami disasters as mentioned above.

At the time of the evaluation of this project, it was pointed out that, "In the Towns East of the Colombo Water Supply Project (SL-P19), it took more than two years to select the

[10] Although the loan completion date for this project was August 2008, as shown in Table 4, the majority of construction was completed in October 2006, and all of the related facilities began operating in October 2006. Since from that time onward, water was supplied throughout the target area and project effects began to appear, it is considered reasonable to set project completion to the above date of start of operation.

[11] Source: JICA internal documents

[12] More precisely, approval process of Cabinet Appointed Tender Board and Technical Evaluation Committee was delayed. (Source: Results of interview with JICA Sri Lanka Office)

consultants, and as a result, the disbursement date under the L/A was extended. Although the slowness in procurement procedures is a structural problem in Sri Lanka, human factors also often cause delay in procurement procedures. Supervision is needed to ensure the smooth running of procurement procedures." In this connection, JICA had been taking measures to expedite the procurement procedures for ODA loan projects in Sri Lanka.[13] As things turned out, almost the same situation as mentioned above occurred for this project (it took more than two years to start the selection of the consultants, which was the main cause of the substantial delay in the project implementation period). When implementing similar projects in the water sector in Sri Lanka in the future, particular attention needs to be paid to time management when hiring consultants.

Although the project cost was lower than planned, the project period was longer than planned (156% of the original plan), therefore efficiency of the project is fair.

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators [14]

(1) Population served, average water supply per capita and percentage of population served

Population served by this project: As of the end of March 2011, the population served by this project within the target areas reached to 300,000 people (refer to Table 6), and it exceeded the post-scope reduction revised target of 267,800 which covers Panadura East and a part of Raigama.

Table 6: Achievement Rate of Main Indicators

Operation and Effect Indicators	Baseline Data (1997, at the time of appraisal)	Target Value (2003, expected completion year) a	Forecasted Value (2010, seven years after completion) a'	Actual Value (As of 2011) b	Achievement Ratio (%) b/a or b/a'
Population Served	210,300[1)]	Not known	267,800[4)]	307,688[1)]	115%
Percentage of Population Served[1)]	Not known	Not known	50.5%[5)]	52.3%	104%
Average Water Supply per Capita	154 liter/day[2)]	180 liter/day[2)]	189 liter/day[4)]	126 liter/day[2)] [6)]	66%
Water Supply Volume (to be added by the Project)					
Maximum Daily Supply	n.a.	60,000 m^3/day	Not known	58,000 m^3/day	97%
Average Daily Supply	n.a.	Not known	58,500 m^3/day[4)]	56,000 m^3/day	96%
Rate of Facility Utilization [3)]	n.a.	Not known	97.5%	93.3%	96%
Water Supplied Hours[1)]	Not known	24 hrs/day	Not known	24 hrs/day	100%

Source: Prepared from answers to the questionnaire to NWSDB, results of interviews with NWSDB, Project Completion Report, NWSDB Annual Report, etc.

Note 1: Values for the target areas of this project

Note 2: Values for Greater Colombo Area including the target areas of this project (Note: 126 liter/day is the actual value as of 2010)

Note 3: Rate of facility utilization = Average daily water supply / treatment capacity

Note 4: Forecasted value of 2010 by JICA feasibility study (which covers the target areas of Phase-I, Stage-II)

Note 5: Target value of 2011 as one of the Key Performance Indicators (KPIs) set by NWSDB RSC – Western South

Note 6: Actual value for the target areas of this project is 118 liter/day.

[13] For example, Project Director of the specific project (selected through competitive application) has been invested with centralized decision-making authority and efforts have been made to improve awareness and expedite procurement process through, for example, the holding of a Project Director's Forum that brought together Project Directors from several different sectors, including the water sector.

[14] Clear target values were not set out during the appraisal stage of this project, so attention was paid to the resetting of target values when quantitatively analyzing effectiveness. For details, see Appendix 1 "Resetting target values for evaluating effectiveness."

After completion of facilities related to this project, various work aimed at increasing connections led by the NWSDB Regional Support Centre – Western South (RSC Western South) has succeeded, and the number of households connected to the distribution network has been steadily growing since 2007, with 6.6% annual increase on average.

Percentage of population served: The percentage of population served in the target areas has reached 52.3% as of 2011, due to the abovementioned steady growth of the population served by this project. This figure achieved more than 50.5%, which is one of the Key Performance Indicators (KPIs) of NWSDB. In addition, facilities related to Water Sector Development Project (II), which is a follow-up to this project, are scheduled to begin operations in December 2011, and percentage of population served is expected to improve further.

Average water supply per capita: The per capita water volume supplied for Greater Colombo, which includes the area in this project, was 126 liters/day (converted with an average of 4.4 persons per household) as of 2010, falling far short of the target value of 180 liters/day in 2003 when the project was originally expected to complete. Two main factors are thought to be behind the shortfall from the target value: (1) The increase in water tariff in 1999, 2002, 2005 and 2009, and (2) The awareness activities such as the water conservation campaign developed nationwide by the NWSDB.

(2) Water supply volume, rate of facility utilization and water supplied hours

Due to the abovementioned steady increase in the population served by this project, the water supply volume target of 58,500 m^3/day, which takes account of the scope expansion, has been mostly achieved in 2011. The degree of facility utilization rate attainment is likewise high.

As for hours of water supplied per day, all the districts/areas in the target areas of the project have achieved the target value of 24 hours per day. Since many poor people live in the rural areas in Bandaragama and Horana (which are both the target districts of the project), it is imagined that the significant increase in hours of water supplied per day is contributing to the improvement of the living environment for the poor. Especially in Bandaragama, as described below in the Impact section, the accessibility to safe drinking water was significantly improved, compared to the situation before the project implementation.

(3) Water quality

This project's water quality monitoring at water intakes is being carried out at laboratories set up in the water treatment plant site and at the test facility at NWSDB Headquarters. To date, no serious problems with water quality have been confirmed[15].

(4) Target and status of non-revenue water rate

At the time of appraisal in 1997, it was widely recognized that monitoring of the financial status and sustainability of NWSDB was one of the important issues for the supervision of the project, especially the status of i) reduction of non-revenue water (NRW) rate and ii) formulation of appropriate water tariff policy. In line with this recognition, the NRW reduction component was planned to implement for NWSDB under the JICA's "Project for Reduction of Non-Revenue Water", where the loan agreement was concluded in 1999. Given this, no component regarding reduction of NRW

Water Intake Point of the Treatment Plant

[15] Source: Results of interview with a quality inspector of the laboratory inside the water treatment plant

was included in this project[16], and thus no NRW rate targets were set at the time of project appraisal.

The NRW rates in the southern part of Greater Colombo, which is under the jurisdiction of NWSDB RSC Western South, are 33% in 2008 and 34.9% in 2010 (shown in Table 7), respectively. This level did not achieve the target value of 32.0% in 2010, which is one of the Key Performance Indicators (KPIs) of RSC Western South.

Table 7: NRW Rate in the Jurisdiction of NWSDB RSC Western South (in 2010)

Districts	NRW rate
Kalutara	33.8%
Panadura / Horana	30.4%
Towns South Colombo[1)]	36.5%
Average in RSC Western South	34.9%
Target Value of RSC Western South (for 2010)	**32.0%**
National Average in Sri Lanka	**31.6%**

Source: Data provided by RSC Western South and results of interviews

Note: This district consists of Dehiwala, Mt.Lavinia, Ratmalana and Moratuwa in the southern part of Greater Colombo Area. Moratuwa is one of the target districts of this project.

As for measures to reduce NRW, in line with the Corporate Action Plan drawn up by NWSDB Headquarters, unique countermeasures are being adopted under the leadership of each regional support center. Although some measures have been implemented, NRW rate level is still relatively high in areas under the jurisdiction of NWSDB RSC Western South, as shown in Table 7. Various measures aimed at NRW reduction (including the replacement of old distribution pipes with PVC ones) are still being carried out through the Corporate Action Plan 2007-2011, and continuing implementation of these measures, especially those for water leakage, will be desirable.[17]

3.3.1.2 Results of Calculation of Internal Rates of Return (IRR)

(1) Financial Internal Rate of Return (FIRR)

FIRR figures were recalculated with several conditions described in Table 8 below.

The result of recalculating FIRR was minus 4.11%, which was lower than the 7.9% (0.4% for non-inflationary model) at the time of project appraisal. Reasons for this are thought to be: (1) Total project cost in the local currency was increased (approx. 1.5 times higher than that of original plan), and (2) O&M costs were around 2.6 times higher than the amount predicted at the time of appraisal.

[16] However, an NRW countermeasure component for the southern part of Greater Colombo was not included in this yen loan project as a result. After twist and turns, the on-going "Water Sector Development Project (II)" finally included the component of NRW reduction measures for the above area. (Source: Results of interview with JICA officers)

[17] As mentioned in the above, "Water Sector Development Project (II)" (where loan agreement was concluded in July 2007 and the total project cost is JPY 10.85 billion), the follow-up to this project, is currently implementing the component of NRW measures (including replacement of distribution pipes, water supply expansion to the poor residents through household water connections, etc.) in the Colombo Municipality area. This project aims at reducing the NRW rate from 52.7% in 2007 to 37.9% in 2013.

Table 8: Recalculation of FIRR

Timing	Preconditions and Assumptions for Recalculation (Project Life: 50 years after the completion of the Project for each case)		FIRR
At the time of appraisal (in 1997)	Costs:	Construction cost, consulting service cost, and operation and maintenance cost (incl. water production cost)	7.9% (0.4%)[1)]
	Revenue:	Water tariff revenue (assuming increases from 1997 to 2000)	
At the time of ex-post evaluation (in 2011)	Costs:	Construction cost, consulting service cost and operation and maintenance cost (based on the actual expenditure up to 2010)	- 4.11%
	Revenue:	Water tariff revenue (assuming 10% increase in water tariff every 5 years after 2015)	
	NRW:	Assuming 5% reduction every 5 years from 2015 up to 2040, being 30% in 2015 as a base rate and being 5% after 2040 as a convergence rate.	

Note 1: For non-inflationary model

(2) Economic Internal Rate of Return (EIRR)

The economic internal rate of return (EIRR) was not calculated due to limited resources for this study because it would have been necessary to clarify input data from the beneficiary side, such as beneficiaries' WTP (Willingness to Pay) for water usage through individual interviews or through the estimation by using prices of substitution goods and water tariff level.

3.3.2 Qualitative Effects – Development of Alternative Water Source of Kelani Ganga System

As of 1997, Kelani Ganga was the only source of water supply in Greater Colombo, with further water intake problematic due to problems such as salinity intrusion. Upon completion of this project, the Moratuwa district was able to receive water from this project's treatment plant (the area previously had been relying on supplies from the Ambatale Water Treatment Plants located inside Kelani Ganga system).

Table 9: Indirect Effects to the Served Area by Kelani Ganga System

Indirectly Benefited Area By this Project	Newly Served Population By Water Treatment Plant of this Project
Dehiwala	25,000
Wellawatta	60,000
Kesbewa	*12,000*
Total Population Served	**97,000**
Volume of Water Supply Reduced	**31,632 m^3/day**

Source: Prepared from documents provided by RSC Western South

Note: Water supply to Kesbewa district was implemented from January 2009 to October 2010.

As a result, the amount of water handled by the Ambatale Water Treatment Plants fell by about 32,000 m^3/day (around 7% of total capacity). This "saved" water could then be redirected to other areas (the three districts of Dehiwala, Wellawatta and Kesbewa for example. See Table 9 for more details). This water is being used to supply water to new areas, with up to 97,000 people (at most) being newly supplied with water, which can be evaluated as an indirect benefit resulting from this project.

The main indicators, including population served, percentage of population served, amount of water supplied, and facility utilization rate, have all reached 80% of the target or greater. In addition, there are no particular problems with the quality of treated water produced. While the NRW rate is still higher than that of national level, specific countermeasures are being adopted by NWSDB to reduce NRW rate.

This project has largely achieved its objectives; therefore its effectiveness is high

3.4 Impact

3.4.1 Intended Impacts

(1) Impact on public health

Regarding the situation of accessibility to safe drinking water before and after completion of this project, the following results were obtained from a beneficiary survey.

Table 10: Accessibility to Safe Drinking Water before/after the Project
(For General Population, N=83)

Answers from Beneficiaries	Category of Water Users	Moratuwa	Panadura	Bandaragama	Horana	Total
Number of respondents who mentioned some difficulties to access safe drinking water **before** Project completion	New User	7 out of 10	6 out of 9	8 out of 11	1 out of 10	22 out of 40
	Existing User	0 out of 10	2 out of 9	9 out of 11	0 out of 10	11 out of 43
Number of respondents who still mention some difficulties to access safe drinking water **after** Project completion	New User	0 out of 10	0 out of 9	1 out of 11	3 out of 10	4 out of 40
	Existing User	1 out of 10	0 out of 9	0 out of 11	0 out of 10	1 out of 43

Source: Results of beneficiary survey[18]

Note: "New user" refers to a beneficiary who was newly connected to the water supply after completion of the project. "Existing user" refers to a beneficiary who had been receiving water services since before project completion.

The results of the aforementioned survey of beneficiaries show that this project has had a significant impact in improving access to safe drinking water. In particular, new beneficiaries have switched from using wells to using water supply pipes to obtain drinking water. As a result, it is likely these new users are strongly aware of the drastic improvements in water quality.

By district, the area that has seen the biggest improvement is Bandaragama, a farming district with a large number of poor residents.

(2) Impact on business environment

Regarding change in the business environment after project completion, the following responses were obtained from a total of 85 companies in the beneficiary survey, as shown in Table 11.

Table 11: Business Environment before/after the Project (N=85, Multiple Answers)

Answers by Private Companies	Moratuwa	Panadura	Bandaragama	Horana	Total
Production/Sales were increased after receiving new water	0	7	1	20	28 / 85
Quality of products/services were improved after receiving the new water	1	7	0	12	20 / 85
Number of customers were increased after receiving the new water	1	3	0	9	13 / 85
Production cost /Service delivery cost were decreased after receiving the new water	6	12	0	5	23 / 85

Source: Results of beneficiary survey (for 85 private companies)

Note: Type of business of interviewee: Manufacturing (including textiles, garment, lumber production, wood processing, etc.), construction, and service sector (including automobile spare parts sales, food processing, grocery retailing, hairdressing, laundry, pharmacy, restaurant, finance, etc.)

[18] Beneficiary survey implementation overview:
Locations: Areas served by this project (Moratuwa, Panadura, Bandaragama and Horana)
Subjects: General population, private companies (manufacturing, construction, service, etc.), and public institutions (hospitals, schools, temples, etc.)
Total sample: 247 (83 from general population, 85 private companies, 79 public institutions), segmented two-stage random sampling
Data collection method: Face-to-face interview

Similarly, regarding level of improvement of business and commercial activities in the target area, in-depth interviews of one large scale manufacturing company and one hospital in Greater Colombo Area at the time of the field survey obtained the following views on the direct effects associated with project completion, as shown in Table 12.

Table 12: Results of In-Depth Interviews with Private Companies in Greater Colombo Area

Answers by Interviewees	Type of Business
Conditions of water quality, pressure, and hours supplied all improved markedly.	Manufacturing, Hospital
Supply of high quality water contributed to improve the level of medical treatment.	Hospital
The maintenance cost was drastically reduced, by being able to avoid a water supply tank on the rooftop of the hospital	Hospital
Water supply costs have dropped by 30%, which has helped push down overall production costs. (Before this project was completed, the company obtained water from wells within company grounds, with water provided by the company's own water purification plant. Water supply costs stood at one million LKR/month, including electricity and fuel costs. Water charges now stand at LKR 700,000/month. LKR 40,000 was paid as a connection charge to connect the new water supply).	Manufacturing
Drought-related water shortages were significant impediments to operations when water was obtained from wells in the past. However, it is now possible to obtain water 24 hours a day, during both dry and rainy seasons, so it has become easier to map out operational schedules.	Manufacturing, Hospital
Water tariff is still expensive a little.	Hospital
Water connection charge is still expensive a little.	Manufacturing

According to the results of the beneficiary survey above, the construction of a system for providing good quality water (upon competition of this project) had a variety of positive impacts on many companies based in the area, thereby the project helped to improve the business environment. Many of the interviewee companies in this survey were small and medium-sized enterprises run by a small number of staff, such as textiles/clothing companies, lumber companies, manufacturers and retailers of foodstuffs, hairdressers and laundry stores. As the answers in Table 12 show, companies have been able to increase sales, cut production costs and attract more customers. This is likely to have several indirect beneficial impacts on the owners and employees of these small and medium-sized companies (rise in income, etc.).

Furthermore, according to the results of the aforementioned in-depth interviews, the hospital has seen "huge improvements in water quality, which has had a significantly positive impact on medical treatment," while the large-scale manufacturer has been able to substantially reduce production costs. On the other hand, some voices are saying water tariff level (including new connection charge) is "a little high." High water tariff are leading some manufacturers to cut back on water usage.

3.4.2 Other Impacts

3.4.2.1 Impact on Natural Environment

Implementation status of EIA and environmental monitoring during construction

As of 1997, the water supply capacity of this project was below the level at which Sri Lankan environmental law deems an Environmental Impact Assessment (EIA) necessary (500,000 m^3/day). As a result, no EIA was carried out.

As for environmental monitoring during construction, contractors monitored noise and vibration levels as appropriate. Contractors monitored vibrations from blasting operations under the watch of the Geotechnical Survey and Mining Bureau. Blasting operations involving heavy vibrations were carried out under the watch of the relevant supervisory authorities, so no particular problems arose during these operations either[19].

Water sprinkling was also carried out as appropriate during construction operations in order

[19] Source: Answers to the questionnaire to NWSDB and results of interview

to prevent any dust problems from occurring. The project was not seen to have any particular negative impacts on the natural environment.

3.4.2.2 Implementation Status of Resettlement and Land Acquisition

The project involved land acquisition. Table 13 below shows the scale and process of the acquisition. No resettlement of local residents was happened during the implementation of the project.

Table 13: Status of Resettlement and Land Acquisition of the Project

Item	Actual Status
Project-Affected Families (PAFs)	N.A.
Scale of Resettlement	N.A.
Compensation for Resettlement	N.A.
Land Acquisition Price	For the land acquisition price, the application of the average price of actual transactions using market price as a criterion was permitted. The project-implementing agency applied to the Cabinet and the price was decided. In this relation, official approval was given at a Cabinet meeting in April 2006. Based on this approval, the government issued an official notice, and payment was made.
Locations of Land Acquisition	Water treatment plant site, High level reservoir site
Expenses for Land Acquisition	22.4 million LKR

Source: Answers to the questionnaire to NWSDB

There were concerns about the difficulties involved in resettlement of residents from areas scheduled for water treatment facilities during the F/S phase. As a result, the Special Assistance for Project Formulation (SAPROF) study proposed shifting the target area for water treatment plants over to vacant timber-factory land owned by the Ministry of Industry and Commerce. Given this, with the Ministry's agreement, it was possible to acquire land before project construction was due to start. There were also plans to locate high level reservoir in an area belonging to a state-owned plantation enterprise. With the agreement of the enterprise, it was also possible to acquire this land before construction started.

All land acquisitions were smoothly implemented in accordance with the Land Acquisition Act (1950), without any particular problems occurring[20].

BOX－ Evaluation of Supplementary Component "Community-Participatory Pilot Scheme to Construct Household Water Supply Systems and Drainage Facilities"

As a supplementary component of this project (what is called "Community-Participatory Pilot Scheme"), household water connections and drainage facilities in the selected poor residential areas were constructed with the participation of beneficiary residents.

In this evaluation study on Kalu Ganga Water Supply Project for Greater Colombo, the evaluation of the above component was also conducted with the focus on i) to verify the effect of cooperation with the Japan Overseas Cooperation Volunteers (JOCV) in the abovementioned "Community - Participatory Pilot Scheme" and ii) to examine the spillover effects of the community-participatory water supply system development method on other areas.

As for i) the effect of cooperation with JOCV, thanks to the steady implementation of the government measures to promote conversion from communal taps to household water connections, substantial progress has been made both in the Badowita area (the intervention group where JOCV intervened) and the Obesekarapura area (the control group where JOCV did not intervene). On the other hand, it is confirmed by the survey that the quality of water delivery services (turbidity, water volume, water pressure, and the frequency of water cutoff) is better for the intervention group than the control group. One factor for this difference is the realization of the appropriate management of infrastructure facilities through the meticulous maintenance activities of residents. Between these two areas, there is a

[20] Source: Ibid.

difference in the degree of the involvement of the resident organization CDC regarding the operation and maintenance activities, and the current level of organization / institutionalization and the level of the activities of CDCs differ considerably. The reason behind this situation seems to be the nature of this component in which the "mobilization activities of the JOCV and the NGOs (which includes facilitating the level of participation of residents to the activities, coordinating between CDC and related institutions involved in this component, etc.) aroused a sense of participation in the residents and brought about various changes in resident behavior."

Current Situation of Badowita Area

Regarding the "achievement of cost recovery for water supply," which was one of the major objectives of this component, there is little difference in the burden of water charge between the intervention group and the control group, as far as the samples selected for this scheme are concerned. However, the situation of arrears on the payment of water rates is obviously worse in the Obesekarapura (the control group), and the payment situation in Badowita (the intervention group) is relatively better. In this component, beneficiary residents bore a certain portion of the construction costs for various facilities based on the "beneficiary-pay principle". Therefore, through the process of carrying out the component, there has been a great change in the cost-consciousness of residents, and it seems that changes in their behavior are ongoing even today.

Based on the above analysis, it is concluded that "mobilization activities by disinterested outsiders" and "cost sharing by beneficiary residents in the construction of infrastructure facilities," which were experimented with for the first time under this component, generated some effects in the development of infrastructure in urban poor areas in Sri Lanka.

As for ii) the spillover effects of the community-participatory water supply system development method, the "community-participatory infrastructure development method" has indirectly become a mainstream method in Sri Lankan policy for improving the residential environment for the poor, and a lot of large and small projects have been implemented using this approach. In the implementation of these projects, "mobilization by outsiders" is considered important, in addition to existing participatory development methods. Before this pilot scheme was implemented, skeptical views were prevailing on the ability of the urban poor to pay water rates. The success of this component raised a kind of "awareness" in the NWSDB, which has come to consider the urban poor as "customers."

The spirit and approach of this component surely gained positive responses from the parties concerned in Sri Lanka and, though indirectly, helped bring the existing community participation methods unique to Sri Lanka into a new stage.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspect of Operation and Maintenance

NWSDB[21] Regional Support Center – Western South and NWSDB Western – Production Department are responsible for operation and maintenance (hereafter O&M) of the related facilities that were built in the project. There is a clear demarcation between these two entities for their responsibility of O&M activities, and there seems to be no problem with the operation and maintenance structure.

The NWSDB's organizational structure includes departments involved in policy and strategy making, and water and sewerage project implementation, as well as Regional Support Centers (RSCs) set up in 11 regions throughout the country. RSC Western South (one of the aforementioned RSCs) is in charge of O&M for project facilities, together with the Production Department directly under the Additional General Manager – Western. For details, see Table 14.

[21] NWSDB is a public corporation that was established under the legal authority of the National Water Supply and Drainage Board Law, No.2 of 1974, which came into force in January 1975. It oversees development, supply, operation and management of water and sewerage facilities.

Table 14: Responsibility Matrix of Operation and Maintenance Activities

Type of Facilities	NWSDB RSC Western South	NWSDB Western Production Department
Water Intake / Raw Water Transmission Facilities		In charge
Water Treatment Plant		In charge
Water Transmission Facilities		In charge
Water Distribution Facilities	In charge	

Source: Answers to the questionnaire to NWSDB and results of interview

As shown in Table 15, O&M activities (excluding large-scale repairs) of the related facilities under NWSDB's responsibility are implemented by direct management. O&M manuals have been prepared by the consultant. No particular problems regarding implementation structure of both RSC Western South and Production Department are found for planning, bidding and management of the contractors upon large-scale repairs.

Table 15: Operation and Maintenance System of Project Facilities

Stage/Category of Maintenance Activities	Planning	Preparation of Tender Documents	Implementation	Supervision
Daily Maintenance	W.S / W.P	n.a.	W.S / W.P	W.S / W.P
Periodical Maintenance	W.S / W.P	n.a.	W.S / W.P	W.S / W.P
Large Scale Maintenance	W.S / W.P	W.S / W.P	Contractors	Consultants

Source: Answers to the questionnaire to NWSDB
Note: W.S refers to NWSDB Regional Support Center – Western South. W.P refers to NWSDB Western - Production

Table 16: Number of Staff of NWSDB

Year	NWSDB Staff in Total	Of which, O&M Staff	Of which, O&M Staff of W.S	Of which, O&M Staff of W.P
2007	8,768	6,830	38	31
2008	9,006	7,079	51	32
2009	9,063	7,432	49	31
2010	9,018	7,485	54	31

Source: Prepared from NWSDB Annual Report, NWSDB website, PCR and answers to the questionnaire to NWSDB
Note 1: W.S refers to NWSDB Regional Support Center – Western South. W.P refers to NWSDB Western - Production
Note 2: Part-time workers are included in the total number of NWSDB staff.

NWSDB has 9,018 personnel as of the end of 2010, consisting of 8,627 for permanent staff and 391 for part-time and other staff. Among them, the number of personnel who are in charge of O&M is 85 persons in total (of which 54 persons are for RSC Western South and 31 persons are for Western – Production). The total number of personnel has not fluctuated significantly over the past three years, and the number of workers engaged in O&M activities has been rising and accounted for 83% of total personnel in 2010. From 2007, the proportionate volume of O&M personnel who are in charge of O&M for facilities related to this project is being secured on an ongoing basis.

3.5.2 Technical Aspects of Operation and Maintenance

Technical skills of engineers and workers

The total number of employees assigned to technical jobs for operation, maintenance, and management of the project facilities are 85 persons as of 2010, consisting of 19% of university graduates, 33% of vocational school graduates, and 48% of others. They have five to 15 years of experience in operation and management of the water supply facilities. As described, the

proportionate volume of personnel is being secured for O&M activities of the project facilities since the start of operation in October 2006. The NWSDB has many similar water facilities in Sri Lanka, and is amply accumulating O&M skills through the operation of these facilities. It would appear that there is no problem with the quantity and quality of engineering and technical staff.

Training programs provided by contractors of the Project

Various trainings for technical staff for maintenance have been conducted by the contractors. Three types of training are provided; 1) lecture (of which subjects include control systems), 2) OJT during commissioning period, and 3) overseas training. Regarding the training program of SCADA (Supervisory Control And Data Acquisition, a control system for water treatment facilities), six engineers participated in the entire program and 10 engineers did during OJT conducted in the commissioning period. Overseas training was implemented from 2002 to 2008, with he total number of participants of 41.[22] Training is conducted by the contractor constantly, and the contents of the training are valued by the trainees.[23]

3.5.3 Financial Aspects of Operation and Maintenance

Taking facilities related to this project alone, the operating balance surplus is growing, and the earning position for O&M is sound. However, with the NWSDB overall, although earning capacity is improving, some concerns about short-term financial security remain due to the increase in loan interest payments.

(1) Earnings condition

From 2002 onward, NWSDB has posted a deficit every year. The main causes are: (1) Increase in general administration cost (overhead costs), (2) Start of and increase in interest payable on past loans that have come along with the end of repayment grace periods, and (3) Increase in cost of sales (direct operating expenses). In particular, overhead costs have nearly doubled between 2006 and 2010 as shown in Table 17. As mentioned earlier, taking into account the fact that total number of employees has remained about the same over the past three years (about 9,000), it seems that indirect department costs have become bloated. The main factors behind the rise in cost of sales are the rise in electricity, fuel, and other fees associated with the sharp global rise in the price of oil.

At the same time, along with the start of operations of new water facilities (including those of this project) and the increase in population connected, as well as water tariff increases mentioned later, sales are growing sharply at a speed greater than that of the growth in cost of sales (direct operating expenses).[24] In particular, due to the water tariff revision in 2009, gross profit margin (operating profit on sale of water), which had fallen in 2008, has recovered rapidly from 2009 onward.

As for trends in water tariff increase,[25] tariff were raised a total of four times starting in 1999. Most recently, a revision was implemented with the assistance of the ADB in February 2009. These increases are being carried out with a high level of frequency compared to other developing countries in general, and while they do have an aspect of responding to the rise in the consumer price index,[26] they are still exerting a great upward impact on the earning

[22] The engineers were dispatched to Japan, Germany, U.K., France, Taiwan, China and other countries. Two engineers participated in a roughly three-month training program that was then operated by JICA, and received training in various numerical calculation methods required for O&M planning.

[23] Source: Results of interviews with employees who underwent training.

[24] Cost of sales increased 73% over the past five years, while sales increased 83% over the same period.

[25] Regarding water tariff, the Sri Lankan government is currently planning to introduce a tariff adjustment mechanism that responds to the rise in the price index. The Cabinet looks ready to approve it by the end of this year at the earliest.

[26] Since 2005, the consumer price index (Colombo Consumer Price Index, (CCPI)) has risen between 10% and 25% each year. (Source: Department of Census and Statistics)

capacity of the NWSDB.[27]

Table 17: Profit and Loss (P/L) Statement of NWSDB

Unit: Million LKR

Year / Item	2006	2007	2008	2009	2010
Sales of Water	5,869	6,481	6,743	9,670	10,744
Direct Operating Expenses	4,080	4,903	6,089	6,322	7,047
Operating Profit on Sale of Water	1,789	1,578	654	3,348	3,697
Administration Overheads	*1,349*	*1,762*	*1,895*	*2,062*	*2,564*
Revaluation Deficit	-	-	-	-	*12,697*
Depreciation	*1,100*	*1,381*	*1,398*	*1,410*	*3,423*
Profit from Operation Activities	255	▲575	▲1,715	184	▲13,654
Finance cost	512	852	1,193	1,569	1,419
Profit from Ordinary Activities before Tax	▲150	▲1,224	▲2,848	▲1,336	▲14,975
Net Operating Profit after Tax	▲214	▲1,278	▲2,915	▲1,425	▲15,080

Source: Prepared from documents provided by NWSDB

Note: The huge deficit in FY2010 (LKR 15 billion, or about JPY 12 billion) came along with the recording of loss on revaluation, aimed at the change of accounting standards to IFRS (International Financial Reporting Standards).

(2) Financial status

The capital ratio at the end of FY2010 was about 77%, maintaining a high level. However, total liability is consistently trending upward, and the burden of interest payments on loans is weighing on management.[28] In the past, current ratio and quick assets ratio were maintained at very high levels, but both ratios are close to 100% now as a result of the sudden increase in current liabilities accompanying the jump in interest payments. Some degree of concern remains regarding short-term financial security and short-term solvency.

Table 18: Balance Sheet (B/S) of NWSDB

Unit: Million LKR

Year / Item	2006	2007	2008	2009	2010
Assets					
Current Assets	13,620	13,093	15,190	13,460	15,044
Quick Assets	5,079	6,021	5,250	4,301	4,175
Fixed Assets	89,991	100,813	115,632	135,978	140,284
Total Assets	**103,611**	**113,906**	**130,822**	**149,438**	**155,328**
Liabilities and Equity					
Equity Capital	84,175	92,797	105,226	118,734	119,508
Current Liabilities	2,136	2,852	5,315	7,379	9,345
Fixed Liabilities	17,300	18,257	20,281	23,324	26,475
Total Liabilities and Equity	**103,611**	**113,906**	**130,822**	**149,438**	**155,328**

Source: Prepared from documents provided by NWSDB

Table 19: Financial Indices

Year / Item	2006	2007	2008	2009	2010
Gross Margin Ratio (%)	30.5	24.3	9.7	34.6	34.4
Sales to Receivable Ratio (%)	1.2	1.1	1.3	2.2	2.6
Days Sales Outstanding	316	339	284	162	142
Gross Debt (Mil. LKR)	19,436	21,109	25,596	30,703	35,820
Current Ratio (%)	637.6	459.1	285.8	182.4	161.0
Quick Asset Ratio (%)	444.5	331.3	216.3	131.3	116.9
Fixed Assets to Fixed Liability Ratio (%)	88.7	90.8	92.1	95.7	96.1
Capital Ratio (%)	81.2	81.5	80.4	79.5	76.9

Source: Prepared from P/L and B/S

Receivables generated from unpaid water charge, etc., have been decreasing in the past several years. However, as shown in Table 19, as of 2010 the sales to receivables ratio of 2.6 and the average days sales outstanding of 142 are still at low standards, making for a situation

[27] At the same time, slightly less than 50% of the overall population are benefitting from discount tariff for the impoverished. (For example, fees for new connections are about 1/3 of ordinary fees.) In order to further boost earning capacity, there are expectations for more newly connected population and secure collection of water tariff, along with curtailment of costs and streamlining of indirect departments.

[28] For the payment of principal on loans, a certain amount of subsidies is provided from the government. The ratio of subsidies differs depending on the loan case.

where an average of over four months are needed to collect fees. In order to improve financial soundness, ongoing upgrade of the fee collection system is desirable.

Regarding the measures to strengthen NWSDB's financial status and sustainability (such as reduction of administrative expenses, formulation of appropriate water tariff policy, strengthening of inventory control, reduction of NRW rate, etc. which were mentioned at the time of project appraisal), some components to tackle with these issues are included in the ongoing Water Sector Development Project by JICA.

(3) Operation and maintenance expenditure relating to the Project

As shown in Table 20, operating balance in the areas involved in this project that are under the administration of NWSDB RSC Western South have achieved a surplus in FY2010, along with: (1) The water tariff increase in February 2009, and (2) Higher water tariff revenue due to the increased number of connected households. The surplus further expanded in FY2010.

Table 20: O&M Expenditure Relating to the Project Facilities

Unit: Thousand LKR

Item	2007	2008	2009	2010
Treatment / Transmission Facilities	84,341	93,942	93,859	97,998
Distribution Facilities	51,042	248,570	259,498	305,751
O&M Expenditure	**135,383**	**342,512**	**353,357**	**403,749**

Source: Prepared from documents provided by NWSDB

Table 21: Income and Expenditure of RSC Western South (2010)

Unit: Mil. LKR

Item	2010
Income	1,243.9
Expenditure	1,014.1
Operating Profit	**229.8**

Source: Documents provided by NWSDB

The annual expenditure for O&M of the project's facilities (including the additional component's distribution network) has risen every year after the start of operation. Specifically, the O&M expenses for distribution network have sharply increased, compared to other expenditure items.

As part of its activities to decentralize and strengthen the authority of the regional support centers, NWSDB is currently instructing each RSC in independent accounting. In response, RSC Western South is carrying out various measures of its own, including strategies to increase connected population and to reduce NRW rate.

In addition, as already mentioned in the Effectiveness section, a plant with water treatment capacity of 48,000 m^3/day will begin operating within 2013 through the follow-up stage, Water Sector Development Project (II). This will result in further expansion of RSC Western South's overall source of income and create an environment for improving its earning position.

3.5.1 Current Status of Operation and Maintenance

In general, the utilization status and O&M of the various facilities and equipment under the administration of the NWSDB (intake, water treatment, transmission, and distribution facilities and related equipment) are good, and no major problem has occurred to date. Items such as an O&M manual have been developed through this project.

On the other hand, several problems occurred after the facilities began operations, including (1) malfunctioning of sludge processing facilities [29]

Sludge Drying Beds

[29] **The malfunctioning of sludge processing facilities:** Sludge (polluted mud) is created during the water treatment process. There are times when solar drying of the sludge drying bed does not happen as planned due to

and (2) the frequent occurrence of lightning and power cuts[30]. It would be desirable if the executing agencies could deal with these problems using their own "managerial efforts" from hereon.

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project is highly consistent with government policies, and no problems with O&M systems can be found. Although slight concern remains about the financial sustainability of the NWSDB itself, the O&M-related earning positions are robust, with the operating balance surplus of the facilities relating to this project steadily expanding. Furthermore, numerous positive impacts are appearing, including the improvement of both public health and the business environment in the target areas. In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations for Executing Agency

Recommendation-1 for NWSDB RSC Western South

Measures to reduce non-revenue water should be implemented in earnest. As mentioned earlier, each regional support center takes the initiative in implementing its own measures to reduce non-revenue water in line with the Corporate Action Plan developed by the head office of the NWSDB. In the target area of this project, various measures have been taken by the NWSDB RSC - Western South, including changing water pipes to PVC pipes, though only limited effects have been observed so far. (The non-revenue water rate in the jurisdiction of the center in 2011 is 34.9%, whereas the national average in 2010 was 31.6%.) At present, reduction measures are continued under the Corporate Action Plan 2007–2011. For the future, it is advisable to continue various measures (particularly measures against water leakage, which is believed to be the main cause of non-revenue water). For example, the "24-hour water leakage helpline for customers" that NWSDB RSC - Central is introducing under JICA's Water Sector Development Project is effective in helping reduce the non-revenue water rate and is also attractive as a measure that can directly enhance customer satisfaction. The possibility of introducing this system in the medium to long term should be explored.

Recommendation-2 for NWSDB RSC Western South

In order to address detailed issues concerning operation and maintenance, voluntary "management efforts" are expected from the executing agency. With regard to the issue of power failure, for example, voluntary measures are expected to be taken, such as those similar to the "construction of power lines connected to the main transmission network using one's own

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weather-related problems and so on. This leads to substantial impediments to sludge processing operations. RSC Western South is planning to take the necessary measures to deal with these problems from hereon (the problems are expected to be dealt with from Phase II stage onwards).

[30] **The frequent occurrence of lightning and power cuts:** The target areas for this project were areas in Sri Lanka which are prone to lightning strikes. These strikes sometimes place excessive loads on some electrical equipment, for example, or impede the supply of electricity to pump stations through frequent blackouts. Furthermore, utility costs are rising (electricity and fuel costs, etc.) as generators need to be kept working during blackouts. These problems are external factors outside of the control of the executing agencies (NWSDB), but it would be a good idea for them to implement their own measures to deal with the problem of regional blackouts, such as the "construction of new power lines connected to the main transmission grid using one's own funds" as implemented in JICA's Greater Kandy Water Supply Project.

funds” as implemented by RSC - Central in JICA’s Greater Kandy Water Supply Project.

4.2.2 Recommendations for JICA

N.A.

4.3 Lessons Learned

In this project, it took more than two years to start the selection of consultants, and this became the main cause of the substantial delay in the project implementation period. Similar situations have occurred in past yen loan projects in Sri Lanka. In view of this, when implementing similar projects in the water sector in Sri Lanka in the future, particular attention needs to be paid to time management when hiring consultants. Measures for “expediting the procurement process,” which are taken by JICA Sri Lanka Office, should be continued, along with efforts to seek further enhancement of the project management capacity of the executing agency.

Regarding associated projects, it was pointed out that the mobilization activities (encouraging the participation of beneficiary residents in the project, facilitating coordination between CDCs and various agencies concerned, etc.) of the Japan Overseas Cooperation Volunteers (JOCV) and of NGOs evoked a sense of participation among residents and brought about various changes in resident behavior (i.e., the payment of water rates). Although these effects may depend largely on the personal efforts of the JOCV and NGO staff, they seem to present certain suggestions for the implementation of water supply projects in poor residential areas.

End

Comparison of Original and Actual Scope

Item	Plan	Actual
A) Output		
1.1 Water Intake Facility		
· Intake Capacity	126,000 m³/day	The same
· Raw Water Pumps	63,000 m³/day, Pump house: 60 m^2	63,000 m³/day, Pump house: 114 m^2
1.2 Raw Water Transmission Facility		
· Raw Water Transmission Main	From intake to treatment plant, 2,140m	217.5 m
1.3 Water Treatment Plant		
· Treatment Capacity	60,000 m³/day	The same
1.4 Water Transmission Facility		
· Clear Water Pump	29.2 m³/min.×2 units, Pump house: 60m^2	20.8 m³/min.×4 units, Pump house: 341 m^2
· Clear Water Transmission Main	6.7 km	6.35 km
· High Level Water Reservoir	15,000 m³/day	The same
· Water Transmission Mains		
➢ High Level Reservoir to Bandaragama	10.3 km	8.832 km
➢ Bandaragam to Panadura	9.7 km	9.515 km
➢ Panadura to Moratuwa	10.3 km	7.903 km
1.5 Water Distribution Facility · Distribution Pipelines	150 km in toal (for Horana, Bandaragama, Panadura districts)	245.96 km in total (Panadura East and Raigama were added to the districts shown in left)
1.6 Water Supply Equipment		
· Domestic Water Meters and Connection Material	20,000 sets in total	The same
· Bulk Meters	7 sets in total	14 sets in total
1.7 Others	Office building, Staff accommodations, O&M vehicle, Electricity supply facilities to the intake facilities and treatment plant, Telecommunication equipment, etc.	The same for staff accommodations, O&M vehicle, electricity supply facilities and telecommunication equipment
1.8 Additional Components	n.a.	The following items were added to the original scope by using a budget surplus. (Activities related to this were implemented from 2006 to 2008) · Construction of office buildings of Bandaragama and Panadura districts · Construction of Water towers at Panadura East (for Water Sector Development Project (II)) · Procurement of chlorine neutralization equipment (1), Generator (2) and Transformer (1)
1.9 Consulting Service		
· Consulting Service M/M	496 M/M in total (Foreign:116 M/M, Local: 380 M/M)	640.71 M/M in total (Foreign:86.75M/M, Local: 553.96M/M)
· Consulting Service TOR	Detailed Design (D/D), Bidding support, Construction supervision, Decision of distribution areas, etc.	In addition to the left, detailed design of Water Sector Development Project (II)

Item	Plan	Actual
B) Project Period	August 1997 – June 2003 (71 months)	August 1997 – October 2006 (111 months)
C) Project Cost Foreign currency Local currency Total Japanese ODA loan portion Exchange rate	 6,418 million yen 3,277 million LKR 13,268 million yen 11,278 million yen 1 LKR ＝ 2.09 yen (as of January 1997)	 6,460 million yen 6,681 million LKR 13,225 million yen 11,107 million yen 1 LKR ＝ 0.96 yen (as of April 2009)

Appendix-1: Resetting Target Values for Evaluating Effectiveness

This project was carried out before the introduction of a system for ex-ante evaluation. As a result, clear target figures were not set out during the appraisal phase of this project (by NWSDB). Also, as touched on above when discussing efficiency, the target areas for water distribution increased following an enlargement of the scope of this project. Based on the specific circumstances of this project (as outlined above), attention was paid to the calculation of goal attainment levels when evaluating effectiveness. Outlined below are the specific viewpoints and things to consider with regard to calculating goal achievement levels for each indicator.

Target year: According to the SAPROF report, the target year for this project (which is Phase I Stage 1 of the overall plan) was set at 2006, with the project scope fixed so as to ensure the relevant demand would be met in the third year after the completion of the project (the completion year was 2003). In light of this, the target year was set at 2010 (three years after this project was completed) and the estimated values for 2010 were set as target figures.

Water-supplied population: The estimates for 2010 were set as the target values. During the F/S Phase in 1994, the estimated water-supplied population (including Raigama and Panadura East, added as extra target areas for water distribution) was listed as 267,800 people. This was set as the target value.

Water supply coverage: Neither estimates nor target values exist for 2010, so it is difficult to calculate goal achievement levels. On the other hand, as mentioned in the Sustainability section, NWSDB is currently instructing each RSC in independent accounting, and is helping to improve management levels through the introduction of Key Performance Indicators (KPIs) for management goals. In light of this, a 2011 target rate for water supply coverage of 50.5% (as determined by NWSDB RSC - Western South) was used when calculating achievement levels.

Supply volume: The estimates for 2010 were set as the target values. At the time of the feasibility study conducted in 1994, estimated water supply volume (including Raigama and Panadura East, added as extra target areas for water distribution) was listed at 58,500 m^3/day. This was set as the target value.

Facility utilization rate: Based on the aforementioned estimated water supply volume of 58,500 m^3/day, the facility utilization rate for 2010 was calculated at 97.5% (= 58,500/60,000). This was set as the target value.

Water supply hours: According to the NWSDB, the target rate as at the time of project appraisal was set at 24 hours/day. This value was set as the target.