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**Report No. 16205**

**PROJECT COMPLETION REPORT**

**BANGLADESH**

**THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT**

**(CREDIT 1734-BD)**

**DECEMBER 31, 1996**

Infrastructure Operations Division  
Country Department 1  
South Asia Regional Office

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### CURRENCY EQUIVALENTS

Currency Unit	=	Taka (Tk)
Taka 1	=	Paisa 100
Taka 1	=	US\$ 0.0323 <sup>1/</sup>
US\$1	=	Tk. 31.00 <sup>1/</sup>
US\$1	=	Tk. 40.21 <sup>1/</sup>

### MEASURES AND EQUIVALENTS

cum	=	cubic meter (220 imperial gallons or 264.2 US gallons)
gcd	=	gallons (imperial) per capita per day
ha	=	hectare (10,000 m2 or 2.47 acres)
km	=	kilometer (.62 miles)
l	=	liter (.22 imperial gallons or 0.264 US gallons)
lcd	=	liters per capita per day
m	=	meter (39.37 inches)
mgd	=	million imperial gallons per day
mld	=	million liters per day (0.220 million imperial gallons per day or 0.264 million US gallons per day)
ml	=	million liters or 1,000 cubic meters
mm	=	millimeter (0.04 inches)
km2	=	square kilometers (0.386 sq. miles)

### ABBREVIATIONS AND ACRONYMS

ADB	=	Asian Development Bank
ARV	=	Annual Rental Value
DANIDA	=	Danish International Development Agency
DCC	=	Dhaka City Corporation
DPHE	=	Department of Public Health & Engineering
DWASA	=	Dhaka Water Supply and Sewerage Authority
ERR	=	Economic Rate of Return
FAO	=	Food and Agricultural Organization
FY	=	Fiscal Year
GDP	=	Gross Domestic Product
GOB	=	Government of Bangladesh
IDA	=	International Development Association
LGED	=	Local Government Engineering Department
MLGRDC	=	Ministry of Local Government, Rural Development & Cooperatives
MPO	=	Bangladesh Water Master Plan Organization
NGO	=	Non Governmental Organization
PMED	=	Planning, Monitoring and Evaluation Division (of DWASA)
ROR	=	Rate of Return
TAG	=	Technology Advisory Group
UNDP	=	United Nations Development Program
UNCHS	=	United Nations Center for Human Settlements
UNICEF	=	United Nations International Children Emergency Fund
USAID	=	United States Agency for International Development
WHO	=	World Health Organization

### FISCAL YEAR

July 1 - June 30

Director-General, Operations Evaluation	:	Mr. Robert Picciotto
Director, Operations Evaluation Department	:	Mr. Francisco Agiurre-Sacasa
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<sup>1/</sup> Conversion rate at appraisal.  
<sup>2/</sup> Current conversion.

December 31, 1996

## MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

**SUBJECT: Project Completion Report on Bangladesh  
Third Dhaka Water Supply and Sanitation Project (Credit 1734-BD)**

The attached Project Completion Report (PCR) on the Bangladesh Third Dhaka Water Supply and Sanitation project (Credit 1734-BD, approved in FY87), was prepared by the South Asia Regional Office with Part II prepared by the Borrower, and reviewed by the Operations Evaluation Department (OED). The credit, for US\$30.0 million equivalent, was closed on March 9, 1994, about one year behind schedule. US\$6.25 million of the credit was canceled.

The project's stated objectives were: (i) to improve the Dhaka Water Supply and Sewerage Authority's (DWASA) operational and financial performance, (ii) to strengthen its sectoral planning and training capacity, and (iii) to address immediate needs for additional water supply and sanitation services. The project design, however, mainly comprised physical investment such as new tubewells, water mains, water connections and standposts, new sewer mains and rehabilitation of existing sewers, and an on-site sanitation program. The institutional development components were a pilot leak detection program, expansion of training facilities, and a pilot program for computerized billing and collection.

The project mostly achieved, and in some cases exceeded, its physical targets. The groundwater supply capacity was increased by nearly 60 percent, and the extension of the distribution network was more than double the appraisal target of 144 km. The target of new house connections was exceeded by about 30 percent. As a result, an additional population of about 800,000 was provided with water service, some 30 percent over the appraisal target. No standpipes, however, were installed to serve the poor and the overall service coverage did not improve as the population growth more than offset the expansion achieved. The sewerage system was expanded, but on-site sanitation improvements did not materialize.

Achievements were mixed on the financial and institutional fronts. The rate of return on assets was 4.0 percent in FY93, short of the target of five percent, accounts receivable represented 6.6 months of sales in FY94, still above the generous target of six months; and consequently, DWASA was unable to cover operating costs and debt service. Technical staff gained experience through participation in project implementation, and DWASA also benefited from the training and institutional support provided by the project in other areas.

OED rates the outcome of the project as marginally satisfactory and its institutional development impact as moderate. Due to pending institutional improvements and DWASA's still relatively weak financial situation, project sustainability is rated as uncertain. These ratings are consistent with those implied in the PCR.

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This operation points to the importance of up-front actions on fundamental reforms of institutions and policies. A recently approved follow-on project in Dhaka is reported to have met critical up-front conditions and is thus expected to improve the prospects for long-term sustainability.

The quality of the PCR is satisfactory.

The project was audited with two other sector projects and the Performance Audit Report, issued on June 28, 1996, confirms the above ratings.

Attachment

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke, positioned to the right of the word "Attachment".

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(CREDIT NO. 1734-BD)Table of Contents

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PROJECT COMPLETION REPORT

BANGLADESH  
THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT  
(CREDIT NO. 1734-BD)

PREFACE

This is the Project Completion Report (PCR) for the Third Dhaka Water Supply and Sewerage Project in Bangladesh for which Cr. 1734-BD in the amount of SDR 26.4 million (US\$ 30.0 million equivalent) was approved on January 27, 1987. The credit closed on March 31, 1994, fifteen months behind schedule. Final disbursement was made on May 09, 1994 after cancellation of the undisbursed balance of SDR 4.37 million (US\$ 6.25 million equivalent).

The PCR has been jointly prepared by the Bangladesh Resident Mission of South Asia Regional Office (Preface, Evaluation Summary, Parts I and III) and the Borrower (Part II).

Preparation of this PCR started in May 1994, but it was delayed due to staff changes in the Resident Mission. The report is based, inter alia on the Staff Appraisal Report, the Development Credit and Project Agreements, supervision reports, correspondence between IDA and the Borrower, progress reports of the Borrower and internal IDA memoranda.



PROJECT COMPLETION REPORT

BANGLADESH  
THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT  
(CREDIT NO. 1734-BD)

EVALUATION SUMMARY

Introduction

1. Since 1963, IDA has been involved with the Dhaka Water Supply and Sewerage Authority (DWASA) to help improve the water supply and sanitation services in Dhaka. The city's population is growing rapidly and the metropolitan Dhaka's current population estimate is about 7.9 million. By the year 2000 Dhaka's population is projected to reach about 9.6 million. Water supply to the greater Dhaka area has increased ten-folds since the 1960's due to capacity increase as a result of the three IDA financed projects undertaken by DWASA. However, the level of water produced per capita has not increased much because of the rapid population growth of the city. Water production at the end of FY94 was estimated to be 740 million liters per day (mld) against estimated gross requirements of about 1,100 mld. Ground water has been the major source of water supply in Dhaka. Dhaka's sewerage system extends over 450 km and has about 40,790 sewer service connections. The Third Dhaka Water Supply and Sanitation Project focused on the continued use of ground water supplies and was prepared based on a 1981 long term plan and feasibility study completed during the implementation of the Second DWASA Project.

Objectives

2. The project's principal stated objective was to improve DWASA's operational and financial performance, strengthen sectoral training and planning, and address immediate needs for additional water supply and sanitation services. Specific project objectives are outlined in para 3.1 of Part-I of the PCR. Except for the Demra Resettlement and the Rehabilitation Program, the Low Cost Sanitation Program, and the installation of street hydrants, implementation of all other components of the project were completed. Although the financial objectives were not achieved, DWASA's operational performance improved during the project, in comparison to its performance prior to the project.

Project Organization

3. The project implementation agencies were the Dhaka Water Supply and Sewerage Agency (DWASA) and the Dhaka City Corporation (DCC).

3.1 DWASA: DWASA was established under the East Pakistan Water Supply and Sewerage Authority Ordinance of 1963, as an autonomous body to provide adequate and safe drinking and sewerage facilities. Its functions are to construct, improve and operate water supply and sewerage works and to improve environmental sanitation in the city. Since 1989, the Authority has the additional function of operating Dhaka's stormwater drainage system. DWASA was responsible for implementation of the water, sewerage and technical assistance components of the project including procurement of equipment, materials, installation of tubewells

and construction of new and rehabilitation of the existing water and sewer distribution system. To facilitate the construction of water and sewer components of the project, a Project Director was deputed from DWASA to oversee the implementation of these components. Other project activities, including planning, institutional and financial development components were handled by the relevant divisions of DWASA.

3.2 DCC: DCC is responsible for providing municipal services such as public health and sanitation, education, maintenance of public infrastructure, including town planning activities and development works. The project included a component to be implemented by DCC to develop a low-cost sanitation program based on an assessment of sanitation needs in Dhaka. To facilitate implementation of this program, a low-cost sanitation cell was established under the direct supervision of DCC's Chief Engineer. The cell was responsible for promoting the sanitation concept and ensuring that minimal technical standards are maintained for manufacturing and installation.

#### Implementation Experience

4. Overall project implementation was satisfactory, and most components were completed ahead of the original schedule. Project completion was, however extended by fifteen months due to: (a) the inclusion of additional work in the project; and (b) delays in the Government approval of a revised project proforma prepared to accommodate the revised project. At the end of the project, two components in the original project were not implemented: the sanitation component, for which Dhaka City Corporation was the executing agency, and the Demra resettlement component. At project completion, SDR 4.37 million was canceled.

#### Results

5. The original physical investment program was implemented substantially as planned, and in most cases, original targets were exceeded. A total of 55 tubewells were installed, (against an original target of 25); 391 km of water lines and 83 km of sewer lines were laid (against original targets of 144 km for water and 37 km for sewerage); 32,938 water meters were installed and 16,406 meters replaced (against an original total target of 10,000 meters); and about 33,302 water supply and 7,505 sewerage customers were connected (against original targets of 25,000 water and 8,000 sewer connections). In the end, the project increased water production by 59% and provided water to an additional 200,000 people beyond the appraisal estimates. However, the financial and institutional objectives were not met, and financial covenant targets could not be achieved. DWASA was unable to comply with the following covenants: (i) the rate of return covenant requiring it to achieve a 3% ROR in fiscal years 1987 through 1990 and 5% ROR in fiscal year 1991 and thereafter (DWASA's ROR was 1.4% in FY91; 2.3% in FY92 and 4.7% in FY93); (ii) a cash generation covenant requiring it to generate enough cash from its operations to cover fully operating costs and its debt service requirement; and (iii) an additional financial covenant requiring it to maintain its accounts receivable arrears to no more than six months of billings (while DWASA managed to reduce its arrears significantly during the project period, it never managed to meet this covenant, except in FY93).

### Institutional Performance

6. The institutional development objectives of the project were not achieved, and DWASA's institutional performance continues to be unsatisfactory. Its staffing level is relatively high. During appraisal DWASA had 2,390 staff and in 1993 the approved number of staff was 3,137 with an existing strength of 3,078 reflecting about 4% annual increase. A staff productivity study conducted during the project indicated that only about 71% of the staff working time has been productively used. DWASA's operations continue to be inefficient, and the Commercial Management Division needs to be strengthened further to increase efficiency and regular training to the revenue and meter inspectors needs to be organized. The Training Institute lacks appropriate physical facilities, manpower and effective course curriculum/ design. The only institutional improvement benefit that appears to have been gained from the project was from the technical staff involved in the project implementation who have benefitted from some transfer of expertise and technology from their interaction with expatriate consultants under the project.

### Financial Performance

7. DWASA was expected to improve its financial performance sufficiently to meet agreed financial performance targets, laid down in covenants. While some progress was achieved (accounts receivable were reduced from 10.4 months of billings in 1988 to 6.6 months in 1994 vs a 6 month target, and the rate of return increased to 4.7% in FY93), DWASA was unable to meet most of the targets. Unfortunately, these targets were in themselves inadequate as mechanisms for improved performance. Improved financial returns were achieved primarily through tariff increases rather than improvements in efficiency. As a result, DWASA continues to be an inefficient operator, as evidenced by water losses of over 45%, high accounts receivables, ineffective billing and collections, inadequate consumer records, and poor maintenance of fixed assets. To improve financial performance, DWASA would need to undertake a comprehensive program involving all aspects of its operations involving improved billing and collection through contracting out to local private sector operators, reduction of revenue losses through a comprehensive leak detection program, and training of the commercial management staff on revenue management, billing, collection, supported by a public sector efficiency improvement program supported by the Government to enable DWASA adopt commercial management practices. These are the elements of the proposed Fourth Dhaka Water Supply Project.

### Sustainability

8. While the physical objectives were met, the financial objectives could not be achieved. Nevertheless, DWASA showed some marginal improvements in its operational performance, when compared to its performance prior to the project. Installation of deep tubewells, expansion and rehabilitation of water and sewer distribution system, installation of water meters and procurement of equipment and meters under this project have resulted in increased available water and brought about significant benefits to consumers, as well as increased revenues. Based from experience with earlier projects, the benefits arising from the physical investment program would be sustainable, although the per capita availability of water may not be sustained due to the high population growth of

Dhaka. Routine maintenance of the physical assets would help to increase life of the assets, and their productivity, thus enhancing sustainability. For the marginal institutional and financial performance gains to be sustained, they would need to be followed by a comprehensive program that combines public sector efficiency improvements to enhance accountability and increase operational autonomy, as well as increased private sector involvement in DWASA's operations, e.g., billing, collection, meter repair and rehabilitation.

#### Findings and Lessons Learned

9. DWASA, and in particular, its Commercial Management Division continues to be weak and should be the focus of future institutional development technical assistance to increase its efficiency. The following are lessons from the project experience:

- (a) Institutional support needs to be clearly linked to institutional objectives and specific components to have any significant impact. There was incongruity between the project objectives and components in the project. While the stated objectives seemed to focus on institutional performance improvements as the main objective, the project components largely supported the physical objectives, with hardly any components to support the institutional objectives (para. 3.1 and 3.2).
- (b) Poor initial progress caused in part by the delay in the appointment of consultants, could have been avoided if such appointments and designs for the first year works had been ready by Board Presentation.
- (c) DWASA's inability to comply with financial covenants was partly due to the lack of clear linkage between financial and institutional development components in the project and the covenants; thus there was no specific program whose implementation would have helped meet the covenants. IDA should have made these covenants part of clear and adequate specific institutional development technical assistance.
- (d) Lack of autonomy, accountability and responsibility within DWASA adversely affected the efficiency of the organization. The need for a regulatory framework that provides clear lines of responsibility for the Government as the policy maker and DWASA as the operator would help improve accountability and enhance DWASA's autonomy.

## PROJECT COMPLETION REPORT

### BANGLADESH THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT (CREDIT NO. 1734-BD)

#### PART I: PROJECT REVIEW FROM IDA'S PERSPECTIVE

##### 1. Project Identity

Name : Third Dhaka Water Supply and Sewerage Project  
Credit Number : 1734-BD  
RVP Unit : South Asia Region  
Country : Bangladesh  
Sector : Water Supply and Sanitation

##### 2. Background

2.1 Bangladesh, with an area of 144,000 sq km and a population of 111 million is one of the most densely populated countries in the world. The total population is growing at about 2% per annum while the urban population has been growing at about 4%. Currently the urban population accounts for about 17% of the total population.

2.2 The trend in urban population distribution is towards an increasing proportion of slum dwellers and squatters. Most of the migrants to urban areas are poor and without marketable skills. They contribute little to municipal revenue but nevertheless increase pressure on existing services. Consequently, although 77% of the Government's total investment in water supply and sanitation over the period 1981-90 was in the urban areas, slum dwellers and squatters have a very low level of service, with only about 30% having access to piped water supply and about 20% to sanitary latrines.

2.3 The Government manages the development and operation of the water supply sector through the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC). The two largest cities, Dhaka and Chittagong, have their own independent water supply and sewerage authorities (WASAs), which provide water and sanitation services on a commercial basis. In other towns, the Department of Public Health and Engineering (DPHE) plans, constructs, and operates water supply and sanitation facilities in municipalities and district towns and the Local Government Engineering Department (LGED) assists local governments in constructing water and sewerage facilities as part of a national program to decentralize responsibility for local government services. Both agencies are under MLGRDC.

2.4 IDA involvement with the Dhaka Water Supply and Sewerage Authority (DWASA) started in 1963 when Credit 368-PAK for US\$ 26.0 million was approved. Due to the activities leading to Bangladesh's independence in 1971 the project was suspended. The project was, however, revived in April 1973 (as Credit 368-BD) with an allocation of US\$ 13.0 million and by March 1979 the Credit was fully disbursed.

2.5 The Second DWASA Project (Credit 941-BD) for US\$ 22 million was approved on June 29, 1979. The objective was to meet Dhaka's immediate needs for water supply and sewage disposal facilities focusing on the urban poor and strengthen DWASA's institutional capabilities. Project implementation was delayed by two and half years and the project was completed in June 1985. The project facilitated installation of deep tubewells, expansion of water and sewer systems and training of DWASA staff.

2.6 In 1981, during the implementation of the Second DWASA Project, a study was undertaken to assess the options of meeting Dhaka's long term water supply requirements. The study concluded that continuous groundwater development would lower the water table significantly and produce water of declining quality. The study recommended that a large surface water source be developed to augment Dhaka's long-term water supply requirements. A site at Demra on the Lakhya River was identified as the best site for a water treatment plant. Although preparation of the Third Dhaka Water Supply Project initially focussed on surface water it was later decided that the project should be scaled down, and focus on rehabilitation of the system, and selective expansion of the system, using groundwater. The project, with a credit amounting to US\$ 30.0 million (SDR 26.4 million) was signed on January 27, 1987, became effective on July 31, 1987 and closed on March 31, 1994, fifteen months after the original closing date.

### 3. Project Objectives and Description

3.1 Project Objectives: The project's stated objectives were "to improve DWASA's operational and financial performance, strengthen sectoral planning and training capacity, and address immediate needs for additional supplies of water and sanitation services". Specific project objectives as described in the appraisal report were to:

- (a) continue the institutional development of DWASA emphasizing operational efficiency, cost recovery and manpower development;
- (b) further develop Dhaka's groundwater resources to increase the supply of potable water, expand water distribution to poor and unconnected areas and maximize use of the system through additional connections;
- (c) rehabilitate parts of water distribution system and strengthen DWASA's control of leakage and unaccounted-for water;
- (d) extend secondary sewers to areas where conventional sewerage is affordable in order to maximize the use of the existing waterborne sewerage system;
- (e) develop an on-site sanitation program as a low-cost alternative to waterborne sewerage and implement a pilot scheme to promote maintenance of public standposts by users;
- (f) finance the resettlement of squatters from the Demra Water Treatment Plant site.

- (g) expand DWASA's Training Institute and extend training to other sector agencies.

3.2 While the stated objectives seemed to indicate a focus on improvements in financial and operational performance (including sectoral planning), the specific objectives and its components indicated otherwise, i.e., the project was in fact, mainly a physical investment program. In fact, the only institutional development components in the project were a Pilot Leak Detection program covering one of DWASA's seven zones; expansion of DWASA's training facilities, and a staff productivity study; and a pilot program to computerize billing and collections, (altogether representing only 2% of the total project cost). Furthermore, it is unclear what sectoral planning strengthening was to be achieved in the project since there was no specific component in the project related to sectoral planning.

### 3.3 Project Description

3.3.1 The project was to upgrade and expand water supply and sanitation facilities in Dhaka and the surrounding areas of Narayanganj, Tongi, Jinjira, Joydebpur and Savar which are a part of the master plan for the development of water supply and sanitation in Dhaka. The project had the following components: (a) construction of 25 deep tubewells; (b) installation of 144 km and rehabilitation of 123 km of existing watermains; (c) installation of 37 km and rehabilitation of 23 km of existing sewers; (d) installation of 25,000 water connections and 8,000 sewer connections; (e) construction of 55 standposts and associated water lines; (f) installation of 10,000 water meters at production wells, distribution branches and service connections; (g) implementation of a pilot leak detection and repair program; (h) development of a low-cost sanitation program to be executed by the Dhaka City Corporation (DCC); (i) procurement of 11 vehicles and five standby generators; (j) expansion of DWASA's training facilities; (k) a staff productivity study; (l) installation of a pilot computerized billing system; and (m) preparation of 33 hectares of land at Gandhrabpur for resettling about 20,000 squatters from the site of the proposed Demra water treatment plant.

3.3.2 Except for the Demra Resettlement Program which was canceled (para. 3.3.3), and the Low Cost Sanitation Program (para. 4.2.2), implementation of all other original components of the project were completed prior to the original project closing date. During FY91, DWASA identified credit savings of about US\$ 10.0 million and requested IDA's agreement to utilization of the savings for additional work. The savings were mainly due to: (a) the cancellation of the resettlement program; (b) exchange rate variations between the Taka and the US Dollar; and (c) lower procurement costs. The use of these savings for additional work under the project was approved by IDA on November 20, 1992 after DWASA met the following conditions: (i) submission of an updated action program for reduction of arrears and improving collections; (ii) agreement between GOB and DWASA on the amount and schedule for the payment of debt service arrears; and (iii) submission of the FY90 audit report. To allow DWASA to complete the additional work, IDA agreed to extend the credit closing date from December 31, 1992 to December 31, 1993 and subsequently to March 31, 1994.

3.3.3 The Demra Resettlement Component was intended to make available a site that had been purchased earlier by DWASA for a surface treatment plan, by resettling about 40,000 squatters who had occupied the site illegally. During implementation, it became clear that there would be insurmountable problems in resettling the squatters due to the lack of a clear resettlement policy. In particular, the cost of compensation was expected to be prohibitive. An alternative, less costly solution was to refill a water-logged site that DWASA owned that was free of squatters. It was therefore agreed between IDA and GOB that the Demra Resettlement Component should be dropped from the project.

3.3.4. The estimated and actual quantities of work carried out under the project, including the additional work, are given below:

Items	Original Approved	Additional Approved	Total	Actual Done
<u>Water Supply</u>				
Construction of tubewells (Nos.)	25	30	55	51
Installation of Watermains (kms)	144	223	367	381
Rehabilitation of Watermains (kms)	123	-	123	95
Water connections (Nos.)	25,000	10,000	35,000	33,302
Construction of standposts (Nos.)	55	-	55	-
Procurement of Water meters (Nos.)	10,000	65,000	75,000	40,000
<u>Sewerage</u>				
Installation of new sewers (kms)	37	33	70	81
Rehabilitation of sewers (kms)	23	-	23	25
Sewers connections (nos.)	8,000	3,000	11,000	7,505

#### 4. Project Preparation and Structure

4.1 Project Design: The project was prepared on the basis of the 1981 long term development plan and feasibility study. The water supply and sewerage components of the project were identified from this plan and the detailed project feasibility study completed in 1984. The engineering design was well conceived and the proposed schemes represented the least cost solution. The physical project components were aimed at meeting the need for additional supplies of water and sanitation services. The preparation of and design of the institutional components was however inadequate. The procurement arrangements for consultants for implementation support and studies included in the project as part of institutional development components, were not initiated prior to Board and the process for consultant appointment only started after the project was approved and became effective. This caused delays in project start-up, especially with regard to the appointment of Implementation Support Consultants. Furthermore, with regard to the studies, there was no commitment beforehand on

the timing of the studies, or on implementation of the results of the studies. As a result, the low-cost sanitation study never started (consultant appointment was only finalized about nine months before the credit closing date); the Staff Productivity Study, although completed, was never implemented; and there was no real commitment to go ahead with the other institutional development components.

#### 4.2 Project Organization

4.2.1 DWASA: DWASA was responsible for implementation of the water, sewerage and technical assistance components of the project, including procurement of equipment, materials, installation of tubewells and construction of new and rehabilitation of the existing water and sewer network. A Project Director was deputed from DWASA who was specifically responsible for the construction of water and sewer lines. Other project activities including planning, institutional and financial development and procurement of goods and services were handled by the relevant divisions of DWASA. Despite some initial delays, the project as initially planned was completed prior to the original closing date. However, implementation was affected by issues like insufficient delegation of authority from the Government on matters like tariff reviews and adjustments, staff appointments, budgetary and spending authority, and procurement decisions, which delayed progress. Decision making within GOB was slow due to a multi-tiered procurement approval process involving various levels of GOB officials on issues that could have been decided by DWASA without delay. As a result, some of the additional work which was included under the revised project could not be completed and SDR 4.37 million was canceled.

4.2.2 Dhaka City Corporation (DCC): DCC is responsible for providing municipal services such as public health and sanitation, education, maintenance of public infrastructure, including town planning activities and development works. The Project included funds to DCC to develop a low-cost sanitation program involving an assessment of the sanitation in Dhaka and implementation of a pilot project providing 4,000 latrines covering about 88,000 people. To help implement on-site sanitation systems, DCC created a low-cost sanitation cell under the direct supervision of its Chief Engineer. The cell was to be responsible for promoting the concept of on-site sanitation, ensuring that minimal technical standards are maintained in the production of manufactured elements and in their installation, devising a system to assist households to finance the investments and provide maintenance. DCC was however, unable to implement the component due to lack of commitment by DCC and insufficient interest by potential beneficiaries in the project. DCC took about five years to approve the TOR, prepare a shortlist of consulting firms, finalize the bidding procedures and eventually revised the Project Proforma to reduce foreign inputs and local man month costs. The shortlist of consultants was finally submitted to IDA only nine months prior to the Credit closing date when it was no longer possible for DCC to implement the program.

#### 5. Project Implementation

5.1 Credit Effectiveness & Project Start-up: The Credit was signed on January 27, 1987 and declared effective on July 31, 1987. Delays in approval of the Project Proforma and execution of the Subsidiary Loan Agreement delayed Credit effectiveness by about three months.

5.2 Implementation Schedule: The project implementation schedule (estimated and actual) is shown in Table I. Although project completion was extended by fifteen months, this was only to enable completion of additional work agreed beforehand between IDA and GOB. Implementation of the original DWASA physical components was satisfactory. DWASA was able to complete the physical program within the five year implementation period starting in FY88. By FY91 when the project was about half way through, it became obvious that there would be credit savings of about SDR 7.66 million, and DWASA requested IDA to agree to the use of these savings for additional investments. A program of additional work was prepared and approved by IDA in FY92, after DWASA had met the conditions agreed for use of the savings. To complete the additional work, more time was needed, and consequently, GOB requested, and IDA agreed to extend the project closing date from December 31, 1992 to March 31, 1994. However, DWASA was unable to complete all the agreed additional work and eventually an undisbursed balance SDR 4.37 million was canceled.

5.3 Procurement: Except for the two components canceled and some of the additional work not completed, all the equipment and material under the project was successfully procured. This involved the processing of 34 foreign and local contracts. The process of bid evaluation and award of contracts, particularly with regard to the procurement of services, was slow and to a certain extent, hampered the progress of work. In the early years, lack of counterpart funds by GOB for payment of duties and taxes delayed release of materials from the port and subsequent delivery of the material at site. However, this was not a critical concern, and did not substantially hamper the project's progress.

5.4 Project Cost: The appraisal estimates and the actual project costs shown in Table 3. The project cost at appraisal was Tk. 1,285.00 million equivalent US\$41.4 million, including physical contingencies of US\$2.9 million, price contingencies US\$9.7 million and duties and taxes of US\$7.9 million. The IDA Credit of US\$30.0 million (SDR 26.4 million) represented about 90% of the total project cost, excluding duties and taxes, covering 100% foreign exchange costs and 82% local costs. GOB funded the remaining cost of US\$11.44 million. The funds were provided to the implementing agencies as 60% loan, 26% equity contribution and 14% grants. GOB on-lent the Credit proceeds to DWASA and DCC at an interest rate of 11.5% with a repayment period of 25 years, including a grace period of 5 years. The project completion cost was US\$ 47.22 million, equivalent to Tk.1,888.90 million, which is about 14% higher than appraisal estimates. The increase in project costs occurred due to the appreciation of the SDR in relation to the dollar, and the additional works carried out under the project. Because of this, comparison of the project costs at appraisal and after completion would be meaningless. Since the credit savings were identified and the additional work started prior to the completion of the original works, it is not possible to determine what the original project would have eventually cost.

5.5 Disbursements: The estimated and actual disbursements are shown in Table 4. Disbursements took longer than originally envisaged. This was due to the extension of the Credit Closing Date to allow DWASA to complete additional work. On the disbursements closing date (May 09, 1994), a total of US\$ 29.6 million (SDR 22.03 million) was disbursed against eligible expenditures and the balance amount of US\$ 4.96 million (SDR 4.37 million) was canceled. Due to the fluctuation in the SDR amounts vis-a-vis the US dollar, the total of the final

disbursements figure plus the canceled amount is higher than the original IDA credit amount.

## 6. Project Results

6.1 Objectives: The project's overall objectives were to: (a) improve DWASA's operational and financial performance; (b) strengthen sectoral planning and training capacity; and (c) address immediate needs for additional supplies of water and sanitation services. The project achieved its physical objectives of increasing water supply, but did not meet its financial and institutional objectives. DWASA's financial and operational performance showed some improvement during the project, compared to its performance prior to the project. However, DWASA is still financially weak, has poor cost recovery, and cannot provide efficient services to its customers. The economic rate of return for the project, which was calculated on the water supply investment only was 13% at appraisal. The revised ERR estimate is now 17%. Details are shown in Table 12.

6.2.1 Physical Performance: The project aimed to upgrade and expand water supply and sanitation facilities in Dhaka and the surrounding areas. The physical achievements included: (a) installation of 22 and replacement of 33 deep tubewells which helped to increase water production from 420 mld in 1987 to 700 mld in 1994; (b) installation of 381 km and rehabilitation of 95 km water mains which increased water supply coverage to cover an additional 800,000 people; (c) installation of 80 km and rehabilitation of 25 km sewers which increased the number of sewer connections. Most of the original physical works were completed ahead of schedule, although, due to increase the increase in project works, the overall project closed about a year behind the originally scheduled project completion date. The project has exceeded the original physical targets and has resulted in an increase in water production of about 59%, and enabled DWASA to supply water to an additional 200,000 people, beyond appraisal estimates.

6.2.2 Institutional Performance: DWASA was unable to meet the institutional objectives agreed under the project. The institutional components were: (a) carrying out a staff productivity study, provision of local and foreign training to DWASA staff and the expansion and rehabilitation of the DWASA Training Institute; and (b) a pilot leak detection program to strengthen DWASA's effectiveness in reducing leakages and unaccounted-for-water in one zone; and (c) a pilot program to computerize billings.

6.2.3 Progress in implementation of these programs was slow, and in some cases, non-existent. As an example, the results of the productivity study were never implemented. Although the study confirmed that DWASA is over-staffed. DWASA management disagrees, and in fact, believes that it is understaffed. There are some areas, e.g. in the technical department, where DWASA is indeed understaffed, but the Commercial Department, is significantly over-staffed, and efficiency low. The pilot leak detection program was completed although lack of adequate funding prevented DWASA from continuing in other zones (this program is expected to be continued under the proposed Fourth Dhaka Water Supply Project). In retrospect, the institutional components were inadequate for a project whose major stated objective was improvement in institutional and financial performance. Furthermore, some of the institutional components were inadequately prepared. As an example, to effectively install a computerized billing and

collection system, a complete and accurate consumer data base was necessary, as the manual system in place at the time was incomplete, had ghost consumers who were not billed and in some cases, contained the wrong customer information. It was therefore necessary that a consumer survey be done prior to the implementation of the computerized billing system. However, such a survey was not included as part of the project. Eventually, DWASA was persuaded to undertake the survey prior to the implementation of the computerization sub-project, using savings from the credit. Institutional performance has also been affected by labor problems brought about by union affiliations. In general, the benefits expected from the institutional components of the project have not materialized. However, staff working in project implementation have benefitted from the transfer of experience from expatriate consultants and contractors.

6.3 Operational Performance: Despite some improvements in its billing and collections record ( para 6.3.3) DWASA is still an inefficient operator, as evidenced by its high level of water losses, poor service and weak financial performance. The paragraphs below describe operational performance during the project period.

6.3.1 Accounts Receivables: One of the covenants in the project required DWASA to reduce the level of its accounts receivables arrears to no more than six months of billing. As of June 1994 DWASA's accounts receivables were Tk. 445.0 million out of a total annual billing of Tk. 807.6 million. Of this, Tk. 110.5 million (about 22%) represented arrears from Government departments and public corporations. Under the project, some progress was made in reducing total arrears. Accounts receivable were reduced from 10.93 months of billings in 1988 to 6.63 in June 1994. In FY93, DWASA managed to reduce the ratio of its accounts receivable to 5.9 months of billings, thus meeting the covenant agreed under the project.

6.3.2 Billing: During FY94 DWASA's billings increased by 28% over the same period in FY93 (from Tk. 634.6 million to Tk 807.6 million). This increase is attributed to a tariff increase of 10% in November 1993, increased water production as a result of commissioning of new tubewells under the project, and improved billing following the completion of the consumer survey in April 1992. During the project period, DWASA on average, billed 95% of its customers. During special drives, usually conducted at the end of the fiscal year, DWASA achieves a 100% billing target.

6.3.3 Collection: DWASA's collections in FY94 were about 75% of billings. While the level of billings increased steadily, collections were erratic. Sporadic collection campaigns were usually made at the end of the year, usually driven by the need to show good end-of year performances. The table below outlines the performance of billings and collections activities of DWASA from 1988 to June 1994:

BILLINGS AND COLLECTIONS PERFORMANCE 1988 TO MARCH 1994

FY	BILLINGS (% increase)	COLLECTIONS (% increase)	Coll. as % of bill.	Arrears (months)
1988	1.6	0.2	79.4	10.39
1989	1.9	38.6	108.0	8.96
1990	4.5	7.4	111.0	7.44
1991	7.4	-3.5	99.8	6.88
1992	25.5	16.0	92.2	6.43
1993	31.6	29.8	91.0	5.99
1994	28.2	5.7	75.0	6.63

6.3.4 System Losses: In 1991 a pilot leak detection and waste prevention program was carried out in one service zone to identify causes of system losses, and prepare a program to address the problem. The program indicated that in the pilot zone where the study was carried out, the estimated system loss was around 56% (administrative losses 31% and technical losses 25%) i.e. of the total water produced by DWASA in these zones, only 44% was billed. The major factors contributing to administrative losses were: (i) incomplete customer data base; (ii) unmetered service connections; (iii) illegal and illegally reconnected service connections; (iv) inaccurate and tampered meters; and (v) inaccurate meter reading, faulty invoicing and rent seeking behavior by revenue inspectors. Technical losses were mainly caused by leaking pipes, service connections, inoperational fittings and overflow from tanks and pump stations. In August 1994 a follow-up review showed that the level of unaccounted for water remained consistently high. While the statistics on unaccounted for water are unreliable, due to lack of proper monitoring mechanisms, and since systems losses vary from zone to zone, it is estimated that on average, losses are between 50-47%. This reduces revenues by as much as Tk. 500 million annually.

6.3.5 Water Tariffs: Table 10 provides DWASA's tariff structure from June 1985 to December 1993. Under the project DWASA was required to cover its operating, maintenance and overhead costs including debt service. In order to cover increases in power costs for the production and distribution of water, the Government agreed, through an amendment of the ordinance, to allow DWASA to adjust power tariffs by up to 10% of its direct costs over any twelve month period. However, tariff increases were irregular and the power adjustment clause was rarely used as a guideline. During the project period, however, DWASA implemented water tariffs increases of 25% in July 1986, February 1988 and November 1990, 15% in October 1992 and 10% in November 1993. Because of these increases, DWASA's tariffs are high compared to those of utilities in other major cities in South Asia. Essentially, DWASA used tariff increases to subsidize its inefficient operations, thus passing on the cost of its inefficiency to consumers. It is therefore possible to improve financial performance through efficiency gains, rather than through more tariff increases.

## 7. Financial Performance

7.1 DWASA's past audited income statements show that between FY91 and FY94, its total operating revenue increased over 110% (i.e. 23% between FY91 and FY92; 35% between FY92 and FY93; and 25% between FY93 and FY94). These increases were partly due to tariff increases, 15% in October 1992, and 10% in November 1993, and increased water production as a result of new tubewells commissioned under the Project. Despite these revenue improvements, DWASA's profitability was still not satisfactory. Net profits fluctuated from a marginal loss in FY92, marginal profits in FY93 and a loss in FY94, although in all the years, DWASA managed to cover all its operating expenditures. Interest charges increased significantly during the period (by about 300%), particularly in FY94 due to new loans incurred, thus contributing significantly to the net loss. Electric power costs (representing 56% of operating expenditures) also increased substantially (by 89%) over the three year period, mainly due to increased pumping costs as a result of the draw-down of the groundwater table in the service area.

7.2. Despite this performance, DWASA's cash flow statements showed positive annual cash balances in all years and huge accumulated balances because:

- (a) lack of proper records in the Ministry of Finance made it possible for DWASA to default on its debt service obligations without incurring any pressure from the Government, thus accumulating the cash it was supposed to use to service the debt; (e.g., in FY92, interest due according to the income statement and subsidiary loan records was Taka 35.7 million; DWASA only paid Taka 15 million, although it had enough cash to pay all the interest due); and
- (b) annual development grants disbursed by GOB and donor agencies to DWASA to finance agreed investment programs, without regard to actual annual work programs to be implemented, resulted in cash balances being carried forward, thus enhancing DWASA's cash flow position.

These cash balances gave the illusion of DWASA as a financially healthy and solvent company, thus, there was no incentive or pressure to improve financial performance and efficiency.

7.3 DWASA's erratic performance is due to:

- (a) inefficient operations: Despite high tariffs and low cost operations, DWASA is still an inefficient operator. These inefficiencies are passed on to consumers in form inadequate service coverage, low quality supply and high tariffs;
- (b) unaccounted for water: The level of unaccounted for water, estimated to be as high as 50% reduces actual revenue substantially and increases unit operating costs.

- (c) collections: DWASA was unable to collect all of its revenue billed; the ratio of collections to billings were about 75% for 1994. Some of the collection problems stem from consumer resistance to pay for poor service, irregular payments by the Government for service provided and lack of a reliable system for arrears follow-up and disconnection.

## 8. Audits

8.1 MLGRDC selects and appoints auditors for DWASA. The project experienced delays in the appointment of auditors in the earlier years due to the need for the Government's approval of the auditors, which subsequently delayed submission of audit reports. In case of delays in the appointment of auditors, IDA's remedies were to withhold approval of procurement contracts for follow-up programs, which helped speed up the appointment process. The situation improved in the last four years of the project, and audit reports were submitted in time. The audit was conducted by private auditors registered in Bangladesh. The audit firms were paid unrealistically low fees and thus there was little incentive to perform good quality audits. The audit reports were, however, acceptable and met international auditing standards, and were satisfactory enough to enable IDA to review the use of credit funds and DWASA's financial performance.

## 9. Project Justification

9.1 The objectives of the project were to strengthen DWASA's operational and financial capability and meet the city's need for supply of safe water and adequate sanitation services. The project upgraded and expanded water supply and sewerage facilities in Dhaka and the surrounding areas. Water production has increased by more than 75%, i.e. from 420 mld in 1987 to 740 mld in 1994 (and by 59% beyond appraisal estimates) and the distribution system extended to 381 km of main lines. About 33,302 new water connections serving about 800,000 people and 7,505 new sewer connections serving about 50,000 people were provided. This has helped control high incidence of sanitation-related diseases and reduced environmental pollution to a certain extent. Some of the slum areas have also benefitted from the expanded water supply and sewerage facilities. However, the cancellation of low cost sanitation program meant that the benefits of such a poverty oriented program could not be achieved. The pilot leak detection study provided the first step in strengthening DWASA's capacity to identify and reduce physical losses in its water distribution system, although this needs to be followed up with additional programs in the remaining zones; and the staff productivity study helped analyze staff weaknesses, although this has not resulted in an improved and efficient deployment of staff resources.

## 10. Project Sustainability

10.1 The project managed to raise the availability of water and sewerage in the Dhaka metropolitan area significantly, and based on past experience, DWASA will be able to sustain the investments from the project, and the additional service provision arising from it. The sustainability of these achievements will depend on the extent to which DWASA is able to maintain and operate its assets, to avoid deterioration of service. However, while the investments may be sustainable, overall service provision will depend on the future demand growth and the extent to which DWASA is able cope with the increased demand. Over the

past 30 years, the overall water and sanitation availability has improved considerably as a result of previous IDA financed projects, although the per capita availability of water has only increased marginally because of DWASA's inability to cope with the tremendous population growth of the city. DWASA would therefore have to step up its system rehabilitation, improve service efficiency, and, to the extent possible, invest in additional service provision. Sustainability of the marginal improvements in financial and operational performance pose some uncertainties. Continued improvement in DWASA's performance will depend on the Government's and DWASA's commitment to address issues of improved cost recovery, reduction of unaccounted for water, increased commercialization of DWASA operations and increased private sector involvement to increase efficiency. While the Government and DWASA have indicated that they are committed to address these issues, lack of any meaningful progress in addressing them would result in deterioration of institutional and operational performance, thus affecting overall sustainability. Under the proposed Fourth Dhaka Water supply Project, IDA is seeking to strengthen DWASA's performance by implementing a public sector reform strategy that includes a leak detection and rehabilitation program, a crash meter installation program and contracting out of billing and collection to address problems of water loss, and a twinning arrangement with an outside utility to help introduce commercial management practices in DWASA operations. If these programs are carried out according to plan, they will help consolidate and expand upon earlier efforts and the marginal gains achieved in financial and operational performance.

## 11. IDA Performance

11.1 IDA's performance in the formulation of the physical aspects of the project was satisfactory. However, the design and appraisal of the institutional aspects of the project were inadequate. In addition, IDA's claims of focussing on institutional and financial improvement as the main objective of this project was somewhat overstated, considering that there were three small components representing only 2% of the total project cost, which were inadequate as a basis for significant improvements in institutional performance. This led to high expectations regarding the efficiency gains DWASA was capable of achieving by implementing these programs. In the case of the pilot Leak Detection and Rehabilitation Program, it was recognized during implementation that such a program would only be effective in reducing water losses if it was comprehensive enough to cover the majority of DWASA's service area. On the basis of this recognition, a more comprehensive program has been prepared for the proposed Fourth Dhaka Water Supply Project. While the engineering designs for the physical program were completed before Board, the preparation of the institutional components (i.e., the process of consultant appointment) did not commence until after project effectiveness, which contributed to delays in their implementation.

## 12. Supervision

12.1 The project was closely supervised by IDA. Fourteen supervision missions visited Bangladesh after the credit became effective in July 1987, up to its closure in June 1994, a period of about 7 years. This works out to an average of two supervision missions a year, which is normal for the average IDA-financed project. Project implementation improved every time a mission visited

Bangladesh, particularly on issues requiring Government decisions on procurement, but in between such visits, progress was slow.

### 13. Covenants

13.1 The Development Credit Agreement and the Project Agreements had several covenants most of which dealt with project implementation. There were three covenants dealing with financial performance: (a) DWASA to meet agreed annual rate of return targets; (b) DWASA to meet agreed billing and collection targets, and to reduce its account receivables arrears to no more than six months of billing each year; and (c) DWASA to generate adequate revenue to cover its operating costs and debt service charges. In the absence of specific programs or components under the project to improve financial performance, the covenants in themselves proved inadequate as mechanisms for improved financial performance, as they only addressed the symptoms, rather than the underlying problem of poor operational efficiency. As an example, to meet the rate of return covenants, DWASA resorted to increasing tariffs, which generated the required revenues without necessarily improving efficiency, thus passing on the cost of its inefficient operations to its consumers. Because of this, DWASA tariffs are high compared to other utilities in the South Asia region. Despite its efforts, DWASA's performance in meeting these financial covenants was unsatisfactory. While billing and collection performance improved significantly during the project (i.e., the ratio of accounts receivables was reduced from 10.4 months of billing in 1988 to 6.6 months in 1994), it was unable to meet the covenant requiring it to reduce these arrears to 6 months (except in 1993, when these were reduced to 5.9 months). In retrospect, even if DWASA had met these covenants, it would still be an inefficient operator, with water losses of more than 45%, and incapable of providing an efficient service to its customers. To summarize, in the absence of specific programs to address operational efficiency, the covenants were not effective tools for improved financial performance.

### 14. Borrower's Performance

14.1 DWASA executed the physical investment program satisfactorily. Even with initial delays in project implementation, it was able to complete the original program as originally planned. However, the borrower's performance in the institutional and financial performance was not satisfactory. There appeared to be no commitment to implement the institutional components, as evidenced by the delays in consultant appointments, and the fact that the results of some of the studies e.g., the Staff Productivity Study, were never implemented. GOB's performance in helping DWASA meet physical project objectives was satisfactory. However, commitment in helping DWASA meet financial objectives was lacking. To assist in implementation, IDA recommended the appointment of a Project Director, with the overall responsibility for all aspects of the project, but with the specific responsibility of coordinating the implementation of the water and sanitation components. While this appointment was expected to help improve implementation, it also proved inadequate in that the Project Director did not have complete autonomy in overall project implementation, particularly procurement decisions, which were always decided by the Government of Bangladesh. This lack of autonomy contributed to procurement delays, since all decisions were deferred to the Government.

15. Project Relationship

15.1 IDA's relationship with the Government and DWASA was satisfactory.

16. Consulting Services

16.1 Several consulting services were used during the project implementation. The lead consulting firms, which coordinated project implementation were the consortium of the Engineering Design Consultants (Engineering & Planning Consultants Ltd., Bangladesh in association with Desh Upodesh Ltd. Bangladesh, Mott. McDonald & Partners Ltd., UK and Camp Dresser & Mackee International Inc., USA) which prepared the system mapping, design, tender documents and monitoring and supervision of the civil works contracts. Other consultancies, for the staff productivity, leak detection, and consumer survey were also carried out satisfactorily, although in some cases, the results were not fully implemented. The project also provided a useful opportunity to engage local consultants in various aspects of DWASA operations, thus facilitating the transfer of technology and expertise from foreign consultants. The consultants contributed productive and useful reports to DWASA. Performance of all the consultants was satisfactory.

17. Project Documentation and Data

17.1 The Staff Appraisal Report and the Engineering Designs provided a useful framework for both IDA and DWASA to guide project implementation. There, however, was insufficient guidance from the project documentation on the institutional aspects of the project. The Development Credit Agreement and the Project Agreement provided the basic framework of what DWASA and the Government had agreed to undertake in the project, including the covenants under the project. The Quarterly Progress Reports and the monthly Management Information System reports prepared by DWASA were useful for monitoring the project progress and DWASA's performance.

18. Conclusions and Recommendations Made

18.1 The physical components of the Third Dhaka Water Supply Project were well conceived, and represented a project that would provide significant development benefits to consumers in the Dhaka City area. The project managed to achieve significant improvements in the level of water and sanitation to Dhaka City. However, these benefits would have been more significant if the institutional and financial performance of DWASA had improved considerably as a result of the project. The lack of improvement threatens the sustainability of the investment from the project, and DWASA's capability to maintain the investments. The major weaknesses of the project ranged from the weak design of the institutional components, to the lack of commitment by DWASA to improve its financial and institutional performance, and the lack of accountability of the management in the day to day operations of DWASA. Some of the lessons which could be derived for similar projects are:

- (a) institutional development objectives need to be well defined, and have clear linkages to project components. Stated project

objectives, in particular institutional objectives, should be consistent with project components to avoid high expectations regarding what could be realistically achieved.

- (b) delays in project implementation should be avoided by adequate procurement planning, including consultant recruitment prior to Board presentation;
- (c) financial covenants should be consistent with institutional development programs rather than unrelated mandatory targets that the borrower should comply with.
- (d) DWASA has always been a weak utility. As such, technical assistance should consist of a comprehensive and adequate program of related improvements that address all aspects of operations.
- (e) A clear regulatory framework that defines clearly the responsibilities of various parties, e.g., the Government as the policy maker and the water utility as the operator is necessary to instill a sense of accountability. Lack of autonomy and clear responsibility on critical issues, including the lack of political will to address difficult issues, affected DWASA's ability to implement the institutional aspects of the project.

THIRD DHAKA WATER SUPPLY AND SANITATION PROJECT  
(Credit 1734-BD)

PART II: PROJECT REVIEW FROM BORROWERS PERSPECTIVE

A. Analysis of Key Issues

1. The metropolitan city of Dhaka is the administrative, commercial and industrial center of the country. From 1971 to 1985, the capital city of Dhaka grew at an estimated rate of 12.8% a year, reaching a population of about 4.0 million in mid-1985. Dhaka is expected to have a population of about 8.0 million by the year 2000. During mid 1985, about 75% of Dhaka population used to live below the poverty level and about 35% of the population lived in conditions of extreme poverty with seriously deficient diets and few basic urban service available to them during the period.

2. During the aforesaid period the water production in Dhaka was about 413 million liters per day (MLD) which was about 242 MLD less than estimated demand. About 47% of production was unaccounted for, mostly due to system loss and illegal connections. During the project period about 9000 individual water connections and 1190 standposts supplied water to about 50% of the city's population. DWASA estimated that at least another 15% of the population was served indirectly by households with connections. However water revenue financed the cost of operating and maintaining the system but could not fully cover debt services or depreciation. Domestic users (some of whom had unmetered connections) consumed about 88% of water distributed by DWASA; industry and commerce consumed about 6% and GOB and community institutions together consumed the remaining 6%. It was observed that uncontrolled abstraction of ground water could draw down the aquifer and render more shallow, neighboring wells useless. The proposal of legislation to control abstractions was accepted by GOB allowing private extraction under a licensing system an on annual payment of royalties.

3. During the period, sewerage service represented over one quarter of DWASA's operations (in terms of costs and revenues). It was financed by user charges that are billed at a rate equal to that of the water bill for all customers with a sewer connection. It was observed that even after substantial increase in water supply, supplies of water to most houses will not be sufficient to permit water borne sewerage collection. It was also observed that DWASA would need to expand its effort to promote the proper use of all sanitary facilities. Keeping in view the overall sanitation and urgent need of water supply and sanitation of Dhaka Metropolitan city, the IDA came forward to support the Third Dhaka Water Supply and Sanitation project through financial assistance.

4. Dhaka Metropolitan city and its adjoining areas were covered through the project. A credit agreement was signed between GOB and the IDA for implementation of the project on January 27, 1987.

5. But the effectiveness of credit was subject to fulfillment of the following conditions by GOB/DWASA:

- (a) the subsidiary loan has been executed on behalf of the borrower and DWASA pursuant to the provision of section 3.01(b) of the Development Credit Agreement (DCA);
- (b) the Project Proforma for carrying out the project has been approved by the borrower.

The credit became effective from July 31, 1987 on fulfillment of the above conditions by the concerned authorities.

6. The total credit amount was SDR 26.40 million (equivalent to US\$30.36 million in 1985) of which SDR 25.60 million was for DWASA and the rest was for the then DMC (Dhaka Municipal Corporation). As per Development Credit Agreement signed between the Borrower and IDA, the project was expected to be completed by December 31, 1991. The project progress and its expenditure were reviewed by the World Bank visiting mission in March 1991. The mission observed that there would be some cost overrun on some categories and some surplus on other categories, the net effect was a surplus of SDR 7.58 million out of DWASA's share of the credit. As per request of GOB, the IDA agreed on March 11, 1992 to amend schedule to the DCA as follows, subject to (i) increase of tariff by 15% at the minimum; (ii) reach an agreement satisfactory to the IDA for the payment of Debt Service Liability (DSL) under the subsidiary financial agreement signed between DWASA and borrower:

- (a) construction of about 55 tubewells;
  - (b) installation of about 367 km of water mains;
  - (c) installation of about 3500 water connections;
  - (d) installation of about 7,500 water meters are those project total or additional for extended provided at service connection, production wells and distribution branches;
  - (e) provision of 70 km of new sewers and rehabilitation of about 25 km of existing sewers;
  - (f) installation of about 11000 sewer connections; and
  - (g) carrying out a consumer survey to improve and update DWASA consumer base and service levels.
7. The IDA extended the closing date of the credit up to December 31, 1993 for which disbursement for the credit would be made for withdrawal application received by close of business on April 30, 1994 in respect of eligible expenditures incurred before the closing date. Final disbursement was made on May 09, 1994 after cancellation of the undisbursed balance of SDR 4.37 million (US\$6.25 million equivalent).

8. The following works were completed under the project:

(a) Water Supply

Construction of tube wells	-	55 Nos.
New	-	24
Rehabilitation	-	31
Water line	-	391.27 km
Water Connection	-	40249 (Nos)

(b) Sewerage Line

(Construction & Rehabilitation)	-	-83.12
Sewerage Connection	-	8535 (Nos)
Construction of Sewerage Lift Station	-	5 (Nos)

(c) Others

Procurement of Vehicles	-	11 (Nos)
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(d) Technical Assistance

- (i) Engineering (Consultancy)
- (ii) Leak Detection
- (iii) Staff Productivity
- (iv) Aquifer and subsidence study
- (v) Consumer survey
- (vi) Computerization (including hardware and software).

(e) Training

With the implementation of the project, DWASA gathered the following experience:

- (i) DWASA should not go for further abstraction of water in the metropolitan city area;
- (ii) Legislation rules to control abstraction should be followed;
- (iii) DWASA's operational and financial performance with supplies of water and sanitation service were improved significantly; and
- (iv) Unaccounted for water was reduced from 56% to 47%. Efforts could be taken for further reduction in future.

9. The project was completed in April 1994. The total amount of SDR 22.03 million was spent and the remaining SDR 4.37 million was surplus out of DWASA's share of credit (No. 1734-BD). Financial covenants and its compliance by DWASA are given below:

Covenants

Section 4.02 (Project Agreement)

(a) Except as the Association shall otherwise agree, DWASA shall: (i) earn an annual rate of return (ROR) on the average current value of DWASA's fixed assets operation of at least 3% in fiscal year 1987 through 1990, and 5% in fiscal year 1991 and thereafter, and (ii) generate cash from its operations to cover fully its debt service requirements (including principal and interest payment).

Section 6.08 (SAR)

(b) Assurance were received at Negotiations that at least 95% of connections will continue to be billed once every month and that accumulated arrears of DWASA's private billings, net arrears over four years old (which should be written off) and net of arrears on disconnected accounts, will not exceed the equivalent of six months billing from FY87 onwards.

Compliance by DWASA

DWASA could not earn ROR as agreed. However, DWASA is trying to improve its financial position to earn better position of ROR as net with the IDA. The details of ROR achieved from 1978 to 1994 is given at Annex-I. A revised interest and principal arrears payment schedule for paying debt service arrears to the Government on previous IDA credits has already been prepared by Dhaka WASA and is being processed for approval of Government of Bangladesh.

A statement showing the billing of connections on bi-monthly basis from 1987 and onwards is given at Annex-II. The receivables of monthly billing during 1993-94 was equivalent to 6.63 months of billing. DWASA completed a consumer survey. An audit of consumer accounts with a view to write off the bad debts as per existing rules is in progress. On completion of this consumer audit it is expected that the ratio of receivables will come down below the level of 6 months of billing. A statement of receivables from 1987 to 1994 is given at Annex-III.

B. Banks Performance

10. The area coverage of Third WASA project was Dhaka Metropolitan city. Before the implementation of these project IDA provided financial assistance for First and Second Dhaka water supply project.

11. In line with the policy guidelines of IDA pre-appraisal and appraisal were undertaken by the Bank for the project. During the pre-appraisal and appraisal of the project, IDA came to the conclusion that it appears to be urgently needed to improve DWASA's operational and financial performance, to strengthen sectoral training, sectoral planning and to address immediate needs for additional supplies of water and sanitation services. IDA also observed that support to the water supply and sanitation sector in Bangladesh and to DWASA from the contribution of Bank assistance can contribute to the orderly and efficient development of the sector. IDA's involvement into the project was justified in the following manner:

- (a) upgrade and expand water supply and sanitation facilities in greater Dhaka metropolitan city;
- (b) water supply and sanitation are inescapably capital intensive and sound analysis of investments and capital planning is very important;
- (c) the project promises to meet the need for sanitary disposal of excreta at one fifth of less of the cost of conventional, waterborne sewerage; and
- (d) institutional development of DWASA is urgently needed by further strengthening the operational and financial management to improve efficiency by reducing system losses.

12. During negotiation of the project GOB/DWASA had to ensure IDA regarding fulfillment of certain conditionalities which in turn has helped obviously the Executing Agency (DWASA) in shaping and catering the need of the project to a highest extent as well. At the time of the implementation of the project, the borrower complied with the IDA's suggestion to increase the tariff by 10% as per Tariff adjustment clause of the Development Credit Agreement. IDA played a very important role to strengthen the institutional capabilities of DWASA, emphasizing operating efficiency, cost recovery and manpower development. These were performed with the implementation of leak detection program to reduce leakage and unaccounted for water, installation of a computer system in DWASA for commercial management and monitoring of operations, study of DWASA's staff resources, expansion of training activities, extension of water supply and sewerage facilities, rehabilitation of old water and sewer mains. These helped DWASA to reduce system loss of water and bring down the receivables at a minimum level of over to six months current billing value.

13. The procurement of materials was completed in several tranche. By an extension of two year period towards the closing date of the credit by IDA, DWASA utilized the surplus savings thus enabling to cover more areas by construction/rehabilitation of more deep tubewells, water lines and sewer lines.

14. In regard to the compliance with some of the covenants like special account for each fiscal year audited, furnishing certified copy of the report of such audit by independent auditors, furnishing to IDA such other information concerning the accounts and audit thereof, information with respect to withdrawals from the credit account on the basis of statement of expenditure, DWASA faced some problems at the initial stage. Under the constant monitoring of IDA and due to recommendations made in the Aide-Memoire from time to time DWASA could attain compliance with most of the covenants. DWASA did not encounter any problem with regard to reimbursement/disbursement procedure of the IDA.

15. IDA's overall role during the project implementation in general, and its involvement in solving many outstanding issues in particular, was found beneficial for continuous and uninterrupted success of the project as a whole. DWASA would appreciate such a valuable role of the IDA at any critical juncture of future program as well.

C. Bank Officials

16. Quite a good number of Bank officials including Resident Mission members were involved in the implementation of the project. The supervision mission were composed of officials having sound engineering, economic/finance and planning and monitoring background in the relevant field who have contributed by rendering their thoughtful advice and intensive monitoring to achieve the desired goal of the project in a smooth manner. DWASA deeply acknowledges their relentless efforts and professional advice without which implementation of the project would have been difficult.

D. Evaluation of Borrowers Own Performance

17. Under the project the works completed were: construction/rehabilitation of 55 DTW's, installation/rehabilitation of 391.27 km of water mains, installation of about 40249 number of water connection, installation of about 8535 (no) sewer connection, installation of about 40,000 water meter at service connections, production of wells and distribution branches, construction and rehabilitation of 83.12 km of sewerage and implementation of technical assistance programs. DWASA did not face any problem worth mentioning during the implementation of the project.

18. Although the overall system loss of DWASA was much beyond acceptable level, DWASA management has put maximum effort by infusing various means to redress the grave issue. DWASA is very much optimistic that with the timely and expeditious implementation of the recommendation made in technical assistance program, the system loss has come down to a considerable extent and expected to reduce further in future. The receivables of DWASA will also decrease substantially with regular billing and collection.

E. Assessment of Effectiveness of Relationship between the Bank and the Borrower

19. The good and effective bond of relationship which was established between IDA and DWASA during the implementation of the First Water Supply and Sanitation Project and Second Water Supply and Sanitation Project, has further been cemented and strengthened during the implementation of the reporting project. Due to confidence developed on DWASA during the last three decades by working together on a defined objective IDA has once again shown interest to extend financial assistance to DWASA-IV project.

PROJECT COMPLETION REPORT

BANGLADESH

THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT

(CREDIT NO. 1734-BD)

PART III: STATISTICAL INFORMATION



PROJECT COMPLETION REPORT

Table 2

BANGLADESH  
THIRD DJAJA WATER SUPPLY AND SEWERAGE PROJECT

(Credit 1734-DD)

PROCUREMENT OF MATERIALS AND EQUIPMENTS

MATERIALS	UNITS	TOTAL QUANTITIES		COST(IN 000 TK.)		COST(IN 000 US\$)		NO. OF CONTRACT	METHOD OF PROCUREMENT
		ESTIMATE	ACTUAL	ESTIMATE	ACTUAL	ESTIMATE	ACTUAL		
1. WATER PIPES (Including Fittings)									
a) DUCTILE CAST IRON PIPES	KM	69	40	241,083	94,430	6,898	2,702	4	ICB
b) UPVC WATER PIPES	KM	200	221	112,039	99,976	3,206	2,861	5	ICB
2. DEEP TUBE WELL									
Complete with all appurtenance	Sets	25	65	126,052	66,047	3,607	1,890	3	ICB
Screen, housing pipes & column pipes for DTW	Nos.	-	55	-	35,602	0	1,019	3	ICB
PFI Plants for DTW	Sets	-	25	-	1,261	0	36	1	ICB
3. SEWER PIPES (Including fittings)									
a) VC SEWER PIPE & FITTINGS	KM	10	48	47,918	38,588	1,371	1,104	6	ICB
b) UPVC SEWER PIPES & FITTINGS	KM	65	30	45,788	7,556	1,310	216	2	ICB
Sewerage Pumps & Pumping	Sets	-	15	-	14,265	0	408	1	ICB
4. S.R.CEMENT	MT	2,500	4,000	9,850	15,572	282	446	3	ICB
5. REINFORCEMENT BAR	MT	20	-	2,792	-	80	0	-	
6. UTILITY VEHICLES	Nos.	11	11	6,250	13,797	179	395	1	ICB
7. METERS	Nos.	10,000	109,506	12,049	60,477	345	1,730	7	ICB
8. COMPUTERS	Sets	1	8	3,600	6,000	103	172	1	
9. STANDBY GENERATORS	Nos.	5	-	3,000	-	86	0	-	
10. GAS CLORINATING EQUIPMENT	Sets	-	85	-	37,369	0	1,069	3	ICB
11. OTHER VEHICLES	Nos.	-	6	-	2,196	0	63	2	ICB
12. GATE VALVES/AIR RELEASE VALVES	Nos.	-	2,280	-	21,632	0	619	4	ICB
13. LEAK DETECTION EQUIPMENTS		-	-	-	1,631	0	47	1	ICB
14. EQUIPMENTS FOR TRAINING INSTITUTE		-	-	-	900	0	26	2	
			Total	610,421	517,298	17,466	14,801	47	

Note: Actually about 92,000 meters were purchased, but written documents were found only for this amount

PROJECT COMPLETION REPORT

BANGLADESH  
THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT  
(CredIt 1734-BD)

Table 3

Page 1 of 2

PROJECT COST

ITEM	DESCRIPTION	ESTIMATE						ACTUAL						
		Taka Millions			US\$ Millions			Taka Millions			US\$ Millions			
		LOCAL	FOREIGN	TOTAL	LOCAL	FOREIGN	TOTAL	LOCAL	FOREIGN	TOTAL	LOCAL	FOREIGN	TOTAL	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	Water supply													
	Civil	145.68	24.91	170.59	4.70	0.80	5.50	222.57	-	222.57	6.37	0.00	6.37	
	Mat'l	1.33	185.14	186.47	0.04	5.97	6.01	24.42	397.09	421.51	11.36	0.70	12.06	
	Dutles	188.24	0.00	188.24	6.07	0.00	6.07	0.00	290.00	290.00	0.00	8.30	8.30	
	Total	335.25	210.05	545.30	10.81	6.77	17.58	246.99	687.09	934.08	17.73	9.00	26.73	
	Sewerage													
	Civil	40.29	6.89	47.18	1.30	0.22	1.52	150.28	-	150.28	4.30	0.00	4.30	
	Mat'l	0.56	37.92	38.48	0.02	1.22	1.24	114.30	70.97	185.27	2.03	3.27	5.30	
	Dutles	38.88	0.00	38.88	1.25	0.00	1.25	0.00	124.29	124.29	0.00	3.56	3.56	
	Total	79.73	44.81	124.54	2.57	1.44	4.01	264.58	195.26	459.84	6.33	6.83	13.16	
	Low cost Sanitation													
	Civil	4.44	0.76	5.20	0.14	0.02	0.16	-	-	-	-	-	-	
	Mat'l	2.48	0.28	2.76	0.08	0.01	0.09	-	-	-	-	-	-	
	Dutles	0.31	0.00	0.31	0.01	0.00	0.01	-	-	-	-	-	-	
	Consult	0.00	6.20	6.20	0.00	0.20	0.20	-	-	-	-	-	-	
	Total	7.23	7.24	14.47	0.23	0.23	0.46	-	-	-	-	-	-	
	Resettlement													
	Civil	77.86	18.77	96.63	2.51	0.61	3.12	-	-	-	-	-	-	
	Mat'l	10.23	1.24	11.47	0.33	0.04	0.37	-	-	-	-	-	-	
	Dutles	9.61	0.00	9.61	0.31	0.00	0.31	-	-	-	-	-	-	
	Total	97.70	20.01	117.71	3.15	0.65	3.80	-	-	-	-	-	-	
	Sub-total	519.91	282.11	802.02	16.76	9.09	25.85	511.57	882.35	1393.92	24.06	15.82	39.88	

Table 3  
Page 2 of 2

ITEM	DESCRIPTION	ESTIMATE						ACTUAL						
		Taka Millions			US\$ Millions			Taka Millions			US\$ Millions			
		LOCAL	FOREIGN	TOTAL	LOCAL	FOREIGN	TOTAL	LOCAL	FOREIGN	TOTAL	LOCAL	FOREIGN	TOTAL	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	Operating Equipments													
	Vehicals	0.00	6.68	6.68	0.00	0.22	0.22	14.34	-	14.34	0.41	0.00	0.41	
	Generators	0.00	2.50	2.50	0.00	0.08	0.08	-	-	-	-	-	-	
	Duties(Vehicles)	6.95	0.00	6.95	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	
	Computer	0.00	1.70	1.70	0.00	0.05	0.05	3.93	-	3.93	0.11	-	0.11	
	Duties(computer)	1.36	0.00	1.36	0.04	0.00	0.04	-	-	-	-	-	-	
	Total	8.31	10.88	19.19	0.26	0.35	0.61	18.27	0.00	18.27	0.52	0.00	0.52	
	Miscellaneous													
	Land(tubewells)	20.75	0.00	20.75	0.67	0.00	0.67	9.24	-	9.24	0.26	-	0.26	
	Training	4.15	2.05	6.20	0.13	0.07	0.20	0.66	14.33	14.99	0.02	0.41	0.43	
	Consult-leak-detn	3.92	24.03	27.95	0.13	0.78	0.91	-	70.97	70.97	-	2.03	2.03	
	Consult-engineer	8.11	7.46	15.57	0.26	0.24	0.50	40.41	25.16	65.57	1.16	0.72	1.88	
	Consult-managemen	0.54	3.07	3.61	0.02	0.10	0.12	6.09	2.69	8.78	0.17	0.08	0.25	
	Consult-aquifer	-	-	-	-	-	-	10.34	-	10.34	0.30	0.00	0.30	
	Consumer survey	-	-	-	-	-	-	19.30	-	19.30	0.55	-	0.55	
	Supervision	-	-	-	-	-	-	193.06	-	193.06	5.52	-	5.52	
	Total	37.47	36.61	74.08	1.21	1.19	2.40	279.10	113.15	392.25	7.99	3.24	11.22	
	Base Cost	565.69	329.60	895.29	18.23	10.63	28.86	808.94	995.50	1804.44	32.57	19.06	51.63	
	Physical contingency	62.26	29.46	91.72	2.01	0.95	2.96							
	Price contingency	234.76	62.84	297.60	7.57	2.03	9.60							
	Total	862.71	421.90	1284.61	27.81	13.61	41.42							

KEY: Civil - Civil Works  
 Mat'l - Materials and Equipment  
 Duties - Duties and Taxes (90% of materials & equipments)  
 Consult - Consulting Service  
 Resettlement - Resettlement of Demra Residents

Note: US\$ conversion using Avg. Exc. Rate US\$ = Tk. 34.95

PROJECT COMPLETION REPORT  
BANGLADESH  
THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT  
(Credit 1734-BD)

Table 4

SCHEDULE OF DISBURSEMENTS BY QUARTERS

<u>IDA Fiscal year &amp; Quarter Ending</u>	<u>Disbursements in US\$ million</u>	
	<u>Cumulative Estimated</u>	<u>Actual</u>
<b>FY 1987</b>		
September 30, 1986	1.2	0.0
December 31, 1986	3	0.0
March 31, 1987	4.2	0.0
June 30, 1987	6.9	0.0
<b>FY 1988</b>		
September 30, 1987	9.3	2.6
December 31, 1987	12.0	2.6
March 31, 1988	14.7	2.9
June 30, 1988	17.1	3.5
<b>FY 1989</b>		
September 30, 1988	18.9	3.8
December 31, 1988	20.7	4.3
March 31, 1989	22.2	5.1
June 30, 1989	24.0	7.4
<b>FY 1990</b>		
September 30, 1989	25.2	7.8
December 31, 1989	26.1	9.2
March 31, 1990	26.7	10.3
June 30, 1990	27.6	11.6
<b>FY 1991</b>		
September 30, 1990	28.2	12.8
December 31, 1990	28.8	15.4
March 31, 1991	29.4	16.5
June 30, 1991	29.7	18.9
<b>FY 1992</b>		
September 30, 1991	29.8	20.4
December 31, 1991	30.0	21.4
March 31, 1992	0.0	23.1
June 30, 1992	0.0	23.8
<b>FY 1993</b>		
September 30, 1992	0.0	24.2
December 31, 1992	0.0	24.3
March 31, 1993	0.0	25.0
June 30, 1993	0.0	25.4
<b>FY 1994</b>		
September 30, 1993	0.0	25.6
December 31, 1993	0.0	27.3
March 31, 1994	0.0	28.7
May 30, 1994	0.0	29.6

\* Difference between total disbursements and total project financing by IDA (Table 11) is due to the amount of interest charged on SAFE Account.

PROJECT COMPLETION REPORT

BANGLADESH

Table 5

THIRD DHAKA WATER SUPPLY PROJECT

BASIC OPERATING DATA

	FY1987	FY1988	FY1989	FY1990	FY1991	FY1992	FY1993	FY1994
Population (millions)	3.80	3.97	4.15	4.34	4.81	5.01	5.21	5.42
<b>WATER</b>								
Domestic Connections (No)	98,436	99,510	103,120	112,154	114,179	119,513	130,439	136,658
No. of accounts (Nos)	98,436	99,510	103,120	112,154	113,442	117,709	129,052	140,274
Capacity (mld)	479.3	479.4	491.0	529.8	634.8	696.0	741.2	757.6
Distribution (mld)	420.8	423.8	448.8	517.2	571.0	655.5	679.5	700.7

PROJECT COMPLETION REPORT

BANGLADESH  
THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT

(Credit 1734-B1)

Table 6

DATA ON WATER CONNECTIONS AND WATER METERS

FY 1986-1994

	1986	1987	1988	1989	1990 (*)	1991	1992	1993	1994 (Feb.1994)
<b>Water Connections</b>									
Metered	-	63,760	-	-	68,403	78,099	79,571	90,377	99,335
Unmetered	-	34,676	-	-	39,711	31,211	33,738	38,675	40,939
<b>Total (Units)</b>	-	98,436	-	-	108,114	109,310	113,309	129,052	140,274
<b>Water Meters (Units)</b>									
Purchased	-	13,304	11,200	12,750	0	0	57,746	0	0
Converted	4,887	4,130	827	1,736	6,076	687	3,588	6,647	3,054
Replaced	2,603	1,925	553	847	939	294	1,421	4,087	2,775
Repaired	-	-	-	-	-	147	75	136	82

\* The figures after 1990 shows the no. of accounts

PROJECT COMPLETION REPORT

THIRD DIAKA WATER SUPPLY AND SEWAGE PROJECT

(Code 1734-010)

Table 7

INCOME STATEMENT, PROJECTED AND ACTUAL, 1987-1993

Fig. in million Taka

	FY 1987		FY 1988		FY 1989		FY 1990		FY 1991		FY 1992		FY 1993	
	APPRAISAL ESTIMATE	ACTUAL												
<b>REVENUES</b>														
Water Revenue	238	209.22	287.87	213.81	319.67	215.83	349.42	227.66	401.72	244.2	425.79	310.34	448.86	393.33
Sewerage Revenue	89.3	106.13	104.86	104.31	118.8	110.33	131.71	108.78	132.38	124.24	167.32	131.06	176.73	222.23
Other Operating Revenue	7.01	11.07	8.07	10.68	9.28	13.46	10.67	12.33	12.27	21.13	14.11	13.63	16.23	41.44
<b>TOTAL OPERATING REVENUE</b>	<b>334.31</b>	<b>326.44</b>	<b>400.8</b>	<b>331</b>	<b>447.75</b>	<b>339.64</b>	<b>491.8</b>	<b>348.77</b>	<b>566.57</b>	<b>389.57</b>	<b>607.22</b>	<b>439.03</b>	<b>641.82</b>	<b>659.02</b>
<b>DIRECT EXPENSES</b>														
Power	81.36	83.89	92.26	97.36	101.12	120.19	118.72	128.44	131.39	137.63	144.53	193.11	160.28	238.31
Chemical	7.46	3.49	8.44	3.72	9.61	6.64	10.80	7.92	12.04	7.89	13.23	10.42	14.7	11.94
Repairs & Maintenance	34.29	17.06	61.33	15.33	69.42	24.44	78.08	36	83.86	29.67	94.36	31.76	104.43	23.98
Direct Salaries & Wages	34.73	32.49	39.94	33.46	43.943	31.3	32.82	43.03	60.74	36.03	69.83	44.02	80.33	48.11
Other Expenses	13.42	0.39	14.76	0.33	16.24	0.83	17.86	1.2	19.63	33.3	21.61	49.97	23.77	38.33
<b>TOTAL DIRECT EXPENSES</b>	<b>191.46</b>	<b>141.32</b>	<b>216.73</b>	<b>132.62</b>	<b>246.333</b>	<b>189.62</b>	<b>278.26</b>	<b>216.39</b>	<b>309.78</b>	<b>266.74</b>	<b>343.8</b>	<b>330.78</b>	<b>383.73</b>	<b>403.09</b>
<b>ADMINISTRATIVE EXPENSES</b>														
Salaries	-	21.13	-	29.88	-	31.29	-	43.83	-	23.93	-	36.26	-	47.07
Other Expenses	-	-	-	-	-	-	-	-	-	3.71	-	7.21	-	8.62
Insurance	-	0.09	-	0.09	-	0.09	-	0.09	-	0.09	-	0.09	-	0.1
Provision for Bad debts	24.61	63.07	28.22	64.13	31.45	33.64	34.98	16.82	38.33	18.68	41.31	23.17	43.61	30.88
Depreciation	80.78	67.49	88.96	62.08	94.43	64.39	97.8	71.01	99.14	97.36	99.39	113.7	100.33	117.93
<b>TOTAL ADMINISTRATIVE EXPENSES</b>	<b>105.39</b>	<b>131.78</b>	<b>117.18</b>	<b>136.18</b>	<b>133.9</b>	<b>129.41</b>	<b>132.78</b>	<b>131.77</b>	<b>137.69</b>	<b>147.27</b>	<b>140.9</b>	<b>182.43</b>	<b>143.96</b>	<b>204.6</b>
<b>TOTAL OPERATING EXPENSES</b>	<b>296.83</b>	<b>293.1</b>	<b>333.93</b>	<b>308.8</b>	<b>372.233</b>	<b>319.03</b>	<b>411.14</b>	<b>348.36</b>	<b>447.47</b>	<b>414.31</b>	<b>484.7</b>	<b>513.21</b>	<b>527.69</b>	<b>607.69</b>
<b>OPERATING PROFIT</b>	<b>37.66</b>	<b>33.34</b>	<b>66.87</b>	<b>22.2</b>	<b>75.517</b>	<b>20.81</b>	<b>80.66</b>	<b>0.41</b>	<b>119.1</b>	<b>-24.94</b>	<b>122.52</b>	<b>-34.18</b>	<b>114.13</b>	<b>31.33</b>
<b>Add: Other Income</b>	<b>-</b>	<b>24.89</b>	<b>-</b>	<b>31</b>	<b>-</b>	<b>37.32</b>	<b>-</b>	<b>31.54</b>	<b>-</b>	<b>37.97</b>	<b>-</b>	<b>24.46</b>	<b>-</b>	<b>67.33</b>
<b>INCOME BEFORE INTEREST</b>	<b>37.66</b>	<b>58.23</b>	<b>66.87</b>	<b>53.2</b>	<b>75.517</b>	<b>58.13</b>	<b>80.66</b>	<b>31.93</b>	<b>119.1</b>	<b>33.03</b>	<b>122.52</b>	<b>40.28</b>	<b>114.13</b>	<b>118.88</b>
<b>Interest</b>	<b>48.6</b>	<b>38.34</b>	<b>46.14</b>	<b>38.86</b>	<b>43.67</b>	<b>39.2</b>	<b>41.3</b>	<b>38.08</b>	<b>99.38</b>	<b>36.92</b>	<b>139.9</b>	<b>33.71</b>	<b>131.38</b>	<b>102.79</b>
<b>NET PROFIT/(LOSS)</b>	<b>9.06</b>	<b>19.89</b>	<b>20.73</b>	<b>14.34</b>	<b>31.847</b>	<b>18.93</b>	<b>39.36</b>	<b>13.87</b>	<b>19.72</b>	<b>-3.89</b>	<b>-37.38</b>	<b>4.57</b>	<b>-37.43</b>	<b>11.09</b>
<b>INDICATORS</b>														
OPERATING RATIO	0.84	0.90	0.83	0.93	0.83	0.94	0.84	1.00	0.79	1.06	0.80	1.07	0.82	0.92
AVERAGE FIXED ASSETS	1873.93	1429.97	2143.78	1426.32	2302.69	1303.24	2383.22	1786.84	2334.12	2132.40	2288.63	2333.34	2212.28	2337.21
RATE OF RETURN (%) ON AVERAGE FIXED ASSETS	3.13	3.94	3.18	3.68	3.38	3.93	3.48	2.93	3.13	1.38	3.48	1.78	3.23	4.73

## PROJECT COMPLETION REPORT

Table 8

## THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT

(Credit 1734-BD)

BALANCE SHEETS, PROJECTED AND ACTUAL, FY 1987-1993

Fig. in million Taka

	1987		1988		1989		1990		1991		1992		1993	
	APPRAISAL ESTIMATE	ACTUAL												
<b>ASSETS</b>														
<b>FIXED ASSETS</b>														
Gross Fixed Assets	2937.31	2290.14	3234.87	2335.36	3434.64	2450.38	3558.37	2978.27	3605.08	3328.69	3021.58	3605.43	3648.91	3894.65
(Less) Accumulated Depreciation	895.83	810.17	984.79	862.69	1079.24	918.58	1177.04	978.4	1278.18	1063.77	1372.77	1159.87	1473.12	1266
Net Fixed Assets	2041.48	1479.97	2250.08	1472.67	2355.3	1531.8	2379.33	1999.87	2326.9	2264.92	2248.79	2445.78	2175.79	2628.65
Intangible Assets	-	2.9	-	11.92	-	20.18	-	692.74	-	1248.2	-	2394.92	-	2720.26
Work-in-process	-	-	-	0	-	5.8	-	10.28	-	29.1	-	68.44	-	434.48
Deferred Expenses	-	225.4	-	235.09	-	245.13	-	258.93	-	276.6	-	283.81	-	302.47
Investment	-	0.77	-	0.92	-	1.04	-	1.15	-	-	-	-	-	-
<b>TOTAL LONG TERM ASSETS</b>	<b>2041.48</b>	<b>1709.04</b>	<b>2250.08</b>	<b>1720.6</b>	<b>2355.3</b>	<b>1814.75</b>	<b>2379.33</b>	<b>2982.99</b>	<b>2328.9</b>	<b>3818.72</b>	<b>2248.79</b>	<b>6190.83</b>	<b>2176.79</b>	<b>6085.65</b>
<b>CURRENT ASSETS</b>														
Advances on Materials	11.94	75.12	13.6	80.47	15.33	309.41	17.31	214.09	19.12	352.3	21.03	138.67	23.3	152.6
Net Accounts Receivable	88	319.39	96.98	388.31	108.64	360.63	118.79	216.52	139.55	233.4	150.72	278.41	160.49	379.84
Stores	47.70	191.86	54	200.50	61.32	222.87	69.24	278.8	76.48	274.12	84.12	424.8	93.2	225.02
Other Current Assets	0	3.66	0	4.4	0	8.81	0	9.67	0	20.28	0	32.89	0	59.36
Cash	101.70	190.22	161.81	318.82	238.07	613.08	327.2	408.6	367.89	612.63	326.85	974.96	277.88	932.17
<b>TOTAL CURRENT ASSETS</b>	<b>247.49</b>	<b>780.25</b>	<b>326.27</b>	<b>992.59</b>	<b>423.38</b>	<b>1416.4</b>	<b>532.64</b>	<b>1127.68</b>	<b>603.04</b>	<b>1392.63</b>	<b>582.62</b>	<b>1847.43</b>	<b>654.97</b>	<b>1748.69</b>
<b>TOTAL ASSETS</b>	<b>2288.97</b>	<b>2489.29</b>	<b>2576.35</b>	<b>2713.19</b>	<b>2778.68</b>	<b>3230.15</b>	<b>2911.87</b>	<b>4000.67</b>	<b>2931.94</b>	<b>5211.35</b>	<b>2831.31</b>	<b>7038.38</b>	<b>2730.78</b>	<b>7834.64</b>
<b>EQUITY &amp; LIABILITIES</b>														
<b>CURRENT LIABILITIES</b>														
Accounts Payable	31.91	33.32	36.13	31.67	41.02	17.72	46.41	17.51	51.63	26.85	67.3	69.45	63.98	69.41
Other Current Liabilities	20.59	6.5	14.87	9.07	9.98	13.68	6.09	39.76	2.44	77.53	0.82	88.68	1.37	42.68
<b>TOTAL CURRENT LIABILITIES</b>	<b>52.5</b>	<b>39.82</b>	<b>51</b>	<b>40.74</b>	<b>51</b>	<b>31.28</b>	<b>52.6</b>	<b>67.28</b>	<b>64.07</b>	<b>104.38</b>	<b>68.12</b>	<b>156.11</b>	<b>65.33</b>	<b>102.09</b>
<b>LONG TERM LOANS</b>														
First IDA Credit	202.92	198.48	195.02	-	187.12	182.24	179.22	166.76	171.32	161.14	163.42	155.38	155.62	138.13
Second IDA Credit	518.58	636.36	488.54	-	458.6	874.17	428.48	836.9	398.42	614.42	368.38	689.15	338.34	672.13
Third IDA Credit	360.18	58.22	575.17	-	719.19	261.73	807.71	410	843.8	649.64	822.61	852.26	780.33	1018.34
<b>TOTAL LONG TERM LOANS</b>	<b>1081.68</b>	<b>893.04</b>	<b>1258.73</b>	<b>1009.91</b>	<b>1364.81</b>	<b>1088.14</b>	<b>1415.39</b>	<b>1213.68</b>	<b>1413.34</b>	<b>1425.2</b>	<b>1354.31</b>	<b>1596.78</b>	<b>1274.19</b>	<b>1727.8</b>
<b>CAPITALMENT EQUITY</b>														
Reserves	954.8	897.99	1045.91	828.58	1110.1	1007.38	1151.95	1066.88	1152.88	1240.74	1153.89	1253.93	1154.38	1344.32
Other Grants & Funds	-	178.66	-	243.94	-	278.69	-	194.75	-	216.94	-	251.8	-	295.25
Revaluation Surplus	-	34.09	-	28.89	-	348.58	-	1064.14	-	1734.99	-	3285.27	-	3859.64
Accumulated (Deficit)/Surplus	427	427.02	427	427.02	427	427.02	427	427.02	427	427.02	427	427.02	427	427.02
<b>TOTAL NET WORTH</b>	<b>1164.79</b>	<b>1557.43</b>	<b>1268.62</b>	<b>1662.54</b>	<b>1362.85</b>	<b>2110.73</b>	<b>1443.88</b>	<b>2819.76</b>	<b>1484.69</b>	<b>3681.77</b>	<b>1418.82</b>	<b>6285.49</b>	<b>1391.24</b>	<b>6004.85</b>
<b>TOTAL LIABILITIES &amp; NET WORTH</b>	<b>2288.97</b>	<b>2489.29</b>	<b>2576.35</b>	<b>2713.19</b>	<b>2778.68</b>	<b>3230.15</b>	<b>2911.87</b>	<b>4000.67</b>	<b>2932</b>	<b>5211.35</b>	<b>2831.25</b>	<b>7038.38</b>	<b>2730.78</b>	<b>7834.64</b>
<b>CURRENT ASSETS/CURRENT LIABILITIES</b>	<b>4.71</b>	<b>20.10</b>	<b>8.40</b>	<b>24.38</b>	<b>8.30</b>	<b>45.25</b>	<b>10.14</b>	<b>18.69</b>	<b>11.15</b>	<b>13.34</b>	<b>10.02</b>	<b>11.83</b>	<b>8.49</b>	<b>17.13</b>
<b>DEBT/EQUITY (BASED ON</b>														
<b>AVERAGE ASSETS)</b>	<b>0.47</b>	<b>0.38</b>	<b>0.49</b>	<b>0.37</b>	<b>0.49</b>	<b>0.34</b>	<b>0.49</b>	<b>0.30</b>	<b>0.48</b>	<b>0.27</b>	<b>0.48</b>	<b>0.23</b>	<b>0.47</b>	<b>0.22</b>
<b>ORIGINAL COMMON STOCK</b>	<b>29.3</b>	<b>-</b>												
<b>ADDITIONAL PAID UP CAPITAL</b>	<b>925.6</b>	<b>917.78</b>	<b>1018.81</b>	<b>962.69</b>	<b>1080.8</b>	<b>1060.48</b>	<b>1122.65</b>	<b>1133.84</b>	<b>1123.68</b>	<b>1303.82</b>	<b>1124.69</b>	<b>1321.8</b>	<b>1125.08</b>	<b>1423.04</b>
	<b>954.8</b>	<b>917.78</b>	<b>1045.91</b>	<b>962.69</b>	<b>1110.1</b>	<b>1060.48</b>	<b>1151.95</b>	<b>1133.84</b>	<b>1152.88</b>	<b>1303.82</b>	<b>1153.89</b>	<b>1321.8</b>	<b>1154.38</b>	<b>1423.04</b>

PROJECT COMPLETION REPORT

Table 9

THIRD DHAKA WATER SUPPLY AND SEWAGE PROJECT

(Credit 1734-BD)

SOURCE AND APPLICATION OF FUNDS, PROJECTED AND ACTUAL, 1987-1993

Fig. in million Taka

	1987		1988		1989		1990		1991		1992		1993	
	APPRAISA ESTIMATE	ACTUAL	PPRAISA ESTIMATE	ACTUAL	PPRAISA ESTIMATE	ACTUAL	PPRAISA ESTIMATE	ACTUAL	PPRAISA ESTIMATE	ACTUAL	PPRAISA ESTIMATE	ACTUAL	PPRAISA ESTIMATE	ACTUAL
<b>SOURCE OF FUNDS</b>														
Total Surplus (deficit)	9.06	19.69	20.72	14.34	32.04	57.5	39.28	51.9	19.7	-3.89	-37.39	4.57	-37.44	11.09
Depreciation	80.7	67.49	88.96	62.08	94.45	64.4	97.8	71	99.14	97.36	99.59	115.69	100.33	117.93
Adjustments	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest Expense	-	-	-	-	-	-	-	-	-	82.07	-	-	-	-
Total funds from operations	89.76	87.18	109.68	76.42	126.49	121.9	137.08	122.9	118.84	175.54	62.2	120.26	62.89	129.02
<b>EQUITY &amp; GRANTS</b>														
Government	129.08	0.66	82.57	-	55.65	-	33.31	-	12.92	174.88	-	199.2	-	227.22
Foreign	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Grants	-	33.01	-	-	-	0.1	-	-0.2	-	674.36	-	1250.28	-	12.75
Total Equity/Grants	129.08	33.67	82.57	-	55.65	0.1	33.31	-0.2	12.92	849.24	-	1449.48	-	239.97
<b>LONG TERM DEBT</b>														
Government	-	35.2	-	30	-	79.5	-	59.5	-	-	-	28.96	-	77.5
IDA Loans (Third credit)	282.8	82.34	214.99	155.73	144.02	140	88.52	193.2	35.1	189.47	-	231.55	-	200.84
Other	-	-	-	-	-	317.7	-	716.4	-	-	-	113.3	-	346.6
Total Long-term debt	282.8	117.54	214.99	185.73	144.02	537.2	88.52	969.1	35.1	189.47	-	373.83	-	619.94
TOTAL SOURCES OF FUNDS	501.64	238.39	407.24	262.15	326.16	659.2	258.91	1091.8	166.86	1214.23	62.2	1943.57	62.89	988.93
<b>APPLICATIONS OF FUNDS</b>														
<b>Investments</b>														
Third IDA Project	411.88	-	297.56	45.22	199.67	152.9	121.83	1214.4	48.71	371.26	-	276.74	-	266.39
DWASA	-	55.18	-	9.02	-	39.2	-	38.1	-	96.29	16.4	1139.35	27.35	356.61
Working Capital changes	-18.34	-9.02	20.26	17.69	20.83	204.4	18.55	-127.7	28.25	95.06	16.66	-82.5	13.91	-67.96
Principal payment of loan	29.4	38.34	29.4	38.86	29.4	61.8	29.4	67.6	49.9	45	70.3	45	70.3	45
Interest repayment	-	-	-	-	-	-	-	-	-	15	-	15	-	25
Other	-	-	-	4.11	-	5.6	-	4.7	-	460.15	-	60.47	-	374.89
TOTAL APPLICATIONS OF FUNDS	422.94	110.1	347.22	133.55	249.9	464	169.78	1197.2	126.86	1110.32	103.36	1481.17	111.56	1030.17
Increase(decrease) in cash	78.7	128.29	60.02	128.6	76.26	195.2	89.13	-105.4	40	103.93	-41.16	462.4	-48.67	-41.24
<b>DEBT SERVICE REQUIREMENT</b>														
<b>DEBT SERVICE</b>														

PROJECT COMPLETION REPORT

BANGLADESHI  
THIRD DHAKA WATER SUPPLY & SEWERAGE PROJECT  
(Credit: 1734-BD)

Table 10

DWASA TARIFF STRUCTURE

Figures in Taka per Unit

	UNIT	Historical	Appraisal		Actual				
		From June/85	From June/86	From June/87	From July/86	From Feb/88	From Nov/90	From Sep/92	From Dec/93
<b>WATER SUPPLY</b>									
<b>A. METERED</b>	'000 gallon								
Residential and Community		8.75	10.94	13.13	10.94	11.33	12.52	14.4	15.84
Commercial and Office		28.5	35.63	42.75	35.63	37	40.7	46.8	51.48
Industrial		28.5	35.63	42.75	35.63	37	40.7	46.8	51.48
<b>B. UNMETERED</b>	Per annum on Annual Valuation of Building								
Residential and Community		12.5%	na	na	15.63%	16.25%	17.88%	20.56%	22.62%
Commercial and Office		12.5%	na	na	15.63%	16.25%	17.88%	20.56%	22.62%
Industrial		12.5%	na	na	15.63%	16.25%	17.88%	20.56%	22.62%
<b>C. NON-CONNECTED HOLL</b>	Per annum on Annual Valuation								
Water		3.00%	na	na	5.63%	5.85%	5.85%	5.85%	8.15%
Sewer		4.50%	na	na	5.63%	5.85%	5.85%	5.85%	8.15%

Table 11

PROJECT COMPLETION REPORT  
BANGLADESH  
THIRD DHAKA WATER SUPPLY AND SEWERAGE PROJECT

(Credit 1734-III)

PROJECT FINANCING

Figures in million US\$

ITEM	DESCRIPTION	TOTAL	IDA	GOB
1	Civil Works	10.29	7.31	2.36
2	Equipment, Vehicles & Materials	26.30	17.82	8.48
3	Consultants' Services	5.74	5.74	0.00
4	Training	0.43	0.36	0.07
5	Others	3.64	0.00	3.64
	TOTAL	46.40	31.23	14.55

Note: Using Exchange rate SDR=1.43077 US\$ = SDR1=US\$  
TOTAL is from WASA's Project Cost Sheet, March 31,1994  
IDA from Monthly Disbursement Summary of March,1994

BANGLADESH

Table 12

## THIRD DHAKA WATER SUPPLY PROJECT

## PROJECT COMPLETION REPORT

## ECONOMIC EVALUATION OF WATER SUPPLY INVESTMENTS

YEAR	BENEFITS		COSTS		TOTAL FLOW
	INCREASED NET CAPACITY (ml/day)	VALUE OF NET CAPACITY (M Taka)	ADJUSTED CAPITAL COSTS (M Taka)	ADJUSTED O & M COSTS	
1986	0.0	0.00	0.00	0.00	0.00
1987	2.8	0.00	0.00	0.00	0.00
1988	5.8	3.22	69.56	12.02	-78.36
1989	30.6	21.44	75.36	19.84	-73.75
1990	99.2	72.42	81.15	42.27	-51.01
1991	153.0	120.63	144.92	92.87	-117.16
1992	237.5	214.99	98.53	168.38	-51.93
1993	261.5	236.71	28.49	183.99	24.24
1994	322.0	329.08	79.77	228.71	20.61
1995	322.0	329.08		228.71	100.38
1996	336.0	343.39		228.71	114.68
1997	336.0	343.39		228.71	114.68
1998	336.0	343.39		228.71	114.68
1999	336.0	343.39		228.71	114.68
2000	336.0	343.39		228.71	114.68
2001	336.0	343.39		228.71	114.68
2002	336.0	343.39		228.71	114.68
2003	336.0	343.39		228.71	114.68
2004	336.0	343.39		228.71	114.68
2005	336.0	343.39		228.71	114.68
2006	336.0	343.39		228.71	114.68
2007	336.0	343.39		228.71	114.68
2008	336.0	343.39		228.71	114.68
2009	336.0	343.39		228.71	114.68
2010	336.0	343.39		228.71	114.68
2011	336.0	343.39		228.71	114.68
2012	336.0	343.39		228.71	114.68
2013	336.0	343.39		228.71	114.68
2014	336.0	343.39		228.71	114.68
2015	336.0	343.39		228.71	114.68
2016	336.0	343.39		228.71	114.68
2017	336.0	343.39		228.71	114.68
2018	336.0	343.39		228.71	114.68
2019	336.0	343.39		228.71	114.68

ECONOMIC RATE OF RETURN

17%

BANGLADESH

THIRD DHAKA WATER SUPPLY PROJECT

PROJECT COMPLETION REPORT

ECONOMIC EVALUATION OF WATER SUPPLY INVESTMENTS

Assumptions:

- (i) Gross taxes and duties on capital costs were deducted from the project's total costs;
- (ii) A standard conversion factor of 0.90 was used to adjust local costs;
- (iii) calculations have assumed that although the average billing is less than 70% of total production, some of the unbilled water reach customers, and therefore have an economic value. A factor of .80 has therefore been used to adjust the value of the net capacity to take into account of water delivered but not billed.
- (iv) an asset life of 30 years has been assumed for the analysis
- (v) the average incremental cost of water has been assumed to reflect willingness to pay.







IMAGING

Report No: 16205  
Type: PCR