

PPA: BAN 15006

ASIAN DEVELOPMENT BANK

PROJECT PERFORMANCE AUDIT REPORT

ON THE

DISTRICT TOWNS WATER SUPPLY PROJECT
(Loan No. 571-BAN [SF])

IN

BANGLADESH

November 1995

CURRENCY EQUIVALENTS

Currency Unit - Bangladesh taka (Tk)

		At Appraisal	At Project Completion	At Postevaluation
Tk1.00	=	\$0.0471	\$0.0261	\$0.0251
\$1.00	=	Tk21.22	Tk38.36	Tk39.85

ABBREVIATIONS

DMC	-	Developing Member Country
DPHE	-	Department of Public Health Engineering
FIRR	-	Financial Internal Rate of Return
GWT	-	General Water Tax
LCB	-	Local Competitive Bidding
LGD	-	Local Government Division
m ³ /d	-	cubic meter per day
O&M	-	Operation and Maintenance
PCR	-	Project Completion Report
PEM	-	Postevaluation Mission
PPAR	-	Project Performance Audit Report
TA	-	Technical Assistance
WHO	-	World Health Organization
WTP	-	Willingness-To-Pay

NOTES

- (i) In this Report, "\$" refers to US dollars.
- (ii) The fiscal year (FY) of the Government ends on 30 June.

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BASIC PROJECT DATA
District Towns Water Supply Project (Loan No. 571-BAN[SF])

PROJECT PREPARATION/INSTITUTION BUILDING:

TA No.	TA Project Name	Type	Person-months	Amount	Approval Date
271-BAN	District Towns Water Supply	PPTA	53	\$580,000 ^a	18 December 1978
462-BAN	District Towns Sanitary Drainage	PPTA	12	\$100,000	17 June 1982

KEY PROJECT DATA (\$ million):	As per Bank Loan Documents	Actual
Total Project Cost	21.40	20.77
Foreign Currency Cost	10.60	9.33
Bank Loan Amount/Utilization	14.40	13.13
Bank Loan Amount/Cancellation		1.27

KEY DATES:	Expected	Actual
Appraisal		27 November-15 December 1981
Loan Negotiations		6-7 May 1982
Board Approval		17 June 1982
Loan Agreement		28 July 1982
Loan Effectivity	26 October 1982	26 November 1982
Project Completion	31 December 1986	31 May 1991
Loan Closing	30 June 1987	9 July 1991
Months (Effectivity to Completion)	50	102

KEY PERFORMANCE INDICATORS (%):	Appraisal	PCR	PPAR
Financial Internal Rate of Return			
Barisal	6.15	-7.53	-1.34
Bogra	4.52	-13.55	-4.31
Comilla	4.63	-9.12	-2.90
Jessore	5.29	-9.02	-6.26
Mymensingh	5.51	-12.15	0.74

BORROWER: People's Republic of Bangladesh

EXECUTING AGENCY: Department of Public Health Engineering

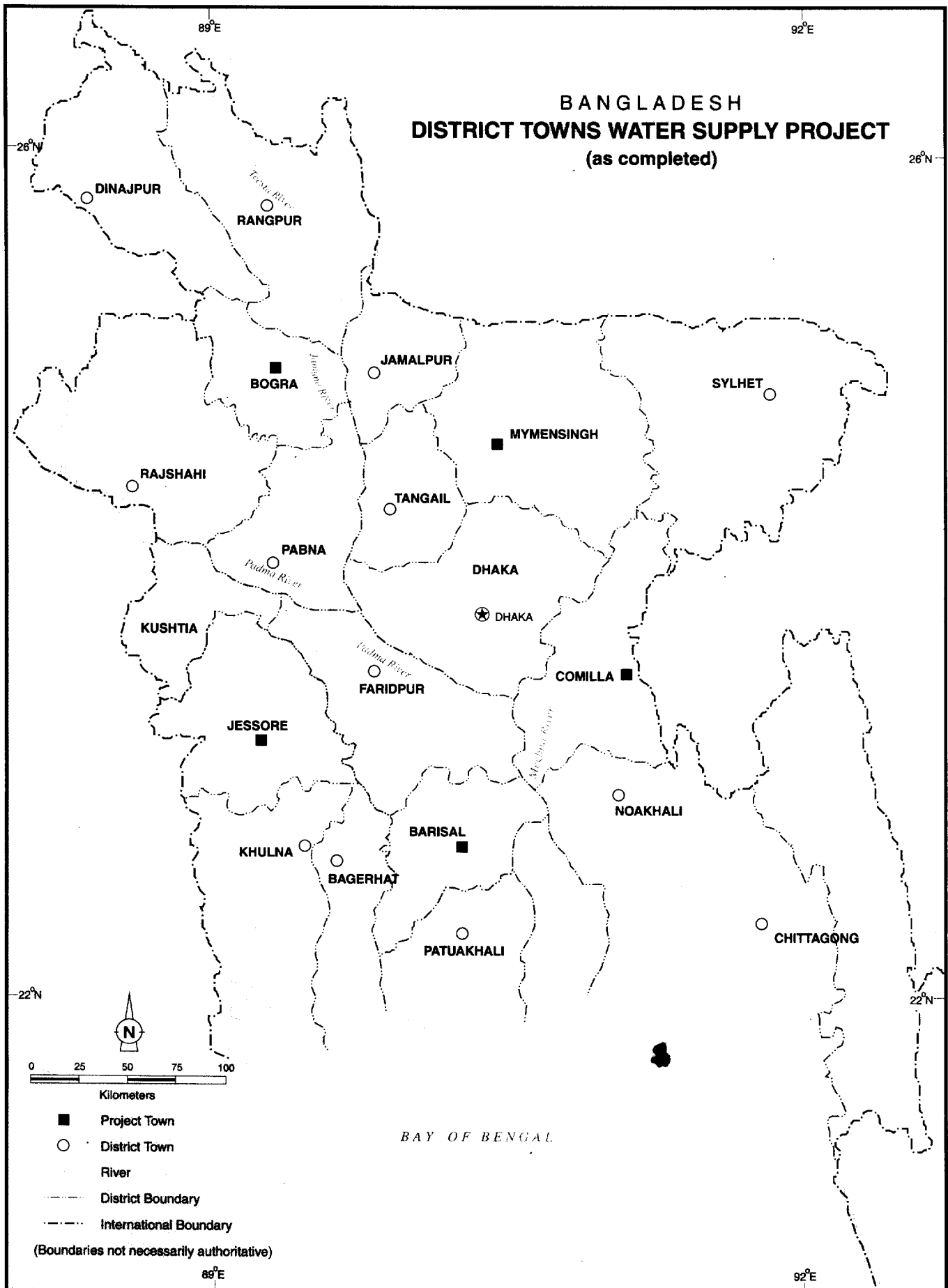
MISSION DATA:

Type of Mission	No. of Missions	Person-days
Appraisal	1	95
Inception	1	4
Project Administration		
- Review	8	152
- Special Project Administration	2	27
- Project Completion	1	22 ^b
- Project Completion Follow-up	1	14
Postevaluation	1	34 ^c

^a Comprised of \$357,388 from the Bank and \$222,612 from the United Nations Development Programme.

^b Mission covered other projects.

^c Combined postevaluation mission for the Project and the Flood Damage Restoration Project (Loan No. 892-BAN[SF]).



I. HIGHLIGHTS

1. **Objectives and Scope.** The primary objective of the Project was to provide clean piped water to households and residents in the district towns of Barisal, Bogra, Comilla, Jessore, and Mymensingh. Other objectives were to provide a pilot sanitation program for households and to build institutional capability in each of the towns in order to manage the individual water supply systems as financially viable public utilities. The detailed scope of the Project included the (i) design and installation of production deepwells equipped with pumpsets; construction of elevated reservoirs and treatment plants; installation of water distribution systems and provision of buildings, workshops, and engineering facilities for Department of Public Health Engineering (DPHE) staff; (ii) installation of 23,000 household sanitation units; and (iii) provision of engineering consultancy services for the design and supervision of the water supply facilities and of institutional advisory services.
2. **Cost and Financing.** The final cost of the Project was \$20.77 million, which was 3 percent less than the appraisal estimate of \$21.40 million. The actual total cost of all water supply components exceeded the appraisal cost by \$1.82 million. However, this overrun was more than offset by savings of \$2.52 million in the reduced program of sanitary unit installation. Actual Bank financing was \$13.13 million, as compared with \$14.40 million at appraisal.
3. **Implementation Arrangements and Schedule.** DPHE, as the Executing Agency, implemented the water supply systems on behalf of the individual *pourashavas* (municipalities), with little direct involvement on the part of local communities. The Project was completed and fully commissioned with a delay of 52 months. Delays at the commencement of the Project were the result of the late appointment of engineering consultants. The actual completion of civil works was delayed by the long time taken to amend the contract of the engineering consultants to provide construction supervision.
4. **Institutional Aspects.** The Project was able to provide much needed project design experience and on-site construction supervision for water supply systems at the district town level. The extent to which the individual *pourashava* staff have the necessary technical and in-house institutional skills will determine the extent of the success of transferring the Project assets from DPHE to the *pourashavas* in 1994 and 1995. At the *pourashava* level, further institutional strengthening is required in financial management and commercial operations.
5. **Environmental Impact.** The facilities that have been provided have had no discernable negative impact on the environment. In each of the five towns, pumping from groundwater aquifers has not exceeded the ability of the aquifer to recharge. Regular groundwater testing is undertaken by DPHE in each of the five towns. In Jessore, where iron concentrates are particularly heavy, DPHE operates a modern testing laboratory to ensure that iron levels do not exceed permissible World Health Organization (WHO) levels. No specific environmental issues were involved with the small-scale household sewerage systems that were installed. The systems involved the use of septic tanks with no discharge problems being reported.
6. **Cost/Benefit Assessment.** As a result of the low levels of financial cash flows generated by the individual *pourashavas*, none of the five Project systems is able to generate sufficient revenues to fully service the costs of borrowing and recurrent maintenance. This is reflected in the reestimated financial internal rates of return (FIRRs), which remain well below

appraisal expectations. Water tariffs at each of the five *pourashavas* remain lower than necessary to achieve full cost recovery, despite being higher than in non-Project towns. The reestimated FIRR ranges from -6.26 percent to 0.74 percent, which are lower than at appraisal; however, they are higher than at project completion, because of measures introduced in December 1992 to improve financial and institutional performance at the *pourashava* level.

7. **Overall Performance and Sustainability.** The Project has achieved its primary objective of providing additional water supply facilities to urban residents. By comparison, only a few of the targeted household sanitation units were installed, because of high costs of initial installation and a lack of community awareness as to the importance of improved hygiene standards. The financial performance of each of the water supply systems has been less than satisfactory. Revenues collected from the sale of the piped water remain lower than required to ensure sustainability of the various Project components. The Project is thus rated as partly successful.

8. **Feedback.** Project experience indicates that communities must be committed to the Project, have participated in its initial design, and that appropriate water tariffs must be acceptable to potential users prior to Project implementation. Appropriate water tariffs are the key to successful water supply projects. Potable water deliveries must be priced at tariffs that at least cover the long-run average cost of production. Unless full cost recovery levels are achieved in the initial years of the Project's life, long-term capital and maintenance costs will not be covered. The Project experience also demonstrates the importance of community awareness and education programs where new sanitation schemes are proposed for urban and semi-urban communities. Project implementation should commence only after appropriate technically trained personnel are available.

II. BACKGROUND

A. Rationale

9. Historically, despite the overabundance of annual rainfall, Bangladesh's population has been denied access to safe drinking water. By 1978, the Government recognized that the rapid growth of population in district towns had created major problems for residents in relation to potable water and sanitation facilities. The response was to augment and improve the water supply and sanitation systems in critical towns and to attempt to strengthen the institutional capabilities to support the water supply and sanitation operations. The Government further recognized that piped water systems would be economically viable or be able to compete effectively with private market options (involving the sale of bottles or drums of water) only if the reliability and quality of the systems were acceptable.

B. Formulation

10. In recognizing the need to improve the quality of life, the Government of Bangladesh (the Government) requested the Bank in 1976 to help improve the water supply systems of a number of district towns. From a list of 20 towns, Barisal, Bogra, Comilla, Jessore, and Mymensingh were selected by the Government based on national priorities. The towns had the highest population growth rates, largely from immigration, and had the most acute problems

of access to safe drinking water. The Project was formulated on the basis of a Bank project preparatory technical assistance (TA) study that was cofinanced by the United Nations Development Programme.¹ The study provided a master plan for the development of water supply systems for all five towns to meet their needs up to the year 2000. It also prepared feasibility studies for the first stage of development to meet the needs to 1990.

C. Objectives and Scope at Appraisal

11. The primary objective of the Project was to provide clean piped water to households and residents of five district towns. Other objectives were to provide a pilot sanitation program for households and to build institutional capability in each of the towns in order to manage the individual water supply systems as financially viable public utilities. The detailed scope of the Project included the (i) design and installation of production deepwells equipped with pump sets; construction of elevated reservoirs and treatment plants; installation of water distribution systems; and provision of buildings, workshops, and engineering facilities for DPHE; (ii) installation of 23,000 household sanitation units; and (iii) provision of engineering consultancy services for the design and supervision of the water supply facilities and of institutional advisory services.

D. Financing Arrangements

12. At appraisal, the total Project cost was estimated at \$21.40 million including a foreign currency cost of \$10.60 million and a local currency cost of \$10.80 million equivalent. A loan of \$14.40 million from the Bank's Special Funds resources was approved in June 1982 and covered the foreign exchange cost and \$3.8 million of the local currency cost. The Borrower was the Government of Bangladesh, which was to relend portions of the loan proceeds to individual *pourashavas* at 2.5 percent interest per annum and with a repayment period of 40 years including 10 years grace.

E. Completion

13. The Project was forecast to commence by January 1983 and to be completed by 31 December 1986. As it was, all Project components were completed by 31 May 1991 and the Bank loan was closed on 9 July 1991 after five loan extensions. A Project completion report (PCR) was circulated in December 1992, following the Project Completion Review Mission in September-October 1991. Project completion review follow-up missions were subsequently fielded in February 1992 and in November 1992 in order to review a range of corrective measures being implemented by the Government to improve the individual financial performance of the *pourashavas*. The PCR provides a detailed history of the Project's implementation, including a review of the changes to the scope and design of facilities. All Project components were completed and commissioned prior to the first Project Completion Review Mission in September 1991. The PCR was comprehensive and all major technical and cost data were found to be accurate. The technical findings of the PCR were largely limited to the water supply systems because of the significantly reduced scope of work for the sanitation component.

¹ TA No. 271-BAN: *District Towns Water Supply Project*, for \$580,000, approved on 18 December 1978.

F. Ex-Postevaluation

14. This Project Performance Audit Report (PPAR) discusses specific issues relating to the Project's design and implementation and includes the findings of the Postevaluation Mission (PEM) in October 1993. The PPAR is based on a review of the PCR and the Appraisal Report, other Bank reports and files, and World Bank studies on water supply improvements in Bangladesh. The PPAR also reflects discussions with concerned Bank staff members, the Borrower, DPHE, technical staff associated with the five *pourashavas*, and Project beneficiaries in the five district towns. Their comments have been considered and taken into account in finalizing the PPAR.

III. IMPLEMENTATION PERFORMANCE

A. Design

15. Following the early work of engineering consultants, by December 1984 it became apparent that major changes in Project scope and design were necessary to ensure that sufficient water supply would be provided. The number of production deepwells was increased from 23 to 53 units, the number of elevated service reservoirs from 16 to 20 units, and the length of underground pipelines to service households from 243 to 290 km. This was accomplished with only a slight increase in total production capacity. The results of the changes were beneficial to the five towns and all represented least-cost approaches to the Project's objective of providing potable water to town households. The only major design weakness related to the sanitation component. In hindsight, the DPHE design has been found to be over-engineered. A simpler, yet equally efficient septic system has since been field tested and is now being used. The demand for the Project's system of sanitation to be installed should have been more clearly identified.

16. Water quality was recognized to be an issue in Jessore during the detailed design stage. The iron content level was found to be unacceptable by WHO standards, and water treatment facilities were designed and installed. Similar tests confirmed that Bogra and Comilla would not need the water treatment plants that were part of the scope at appraisal.

B. Contracting, Construction, and Commissioning

17. After the award of supply contracts, procurement activities could not proceed due to a delay in the appointment of the consultants by the Government. Subsequently, slow delivery of deepwell equipment held up the start of deepwell construction. Most equipment and materials were procured through international competitive bidding. Only a few contracts were awarded under international shopping procedures.

18. With the exception of 12 deepwells in Barisal that were very deep (in excess of 280 meters), all civil works for the water supply systems were carried out by prequalified local contractors under local competitive bidding (LCB) procedures acceptable to the Bank. A total of 50 civil works contracts were awarded and most contractors were able to recruit employees with relevant overseas experience on similar projects. The PEM regarded as satisfactory the general standard of construction of the water supply systems. The generally high level of

coordination between the engineering consultants, contractors, and DPHE was a contributing factor. Some construction delays were experienced, particularly the overhead reservoirs, and this was due to limited previous experience with such structures. Construction of the household sanitary units was also carried out under LCB procedures.

19. The Project benefited from the services of the engineering consultant both during the preparatory activities and construction supervision. Similarly, the services of associated local consultants during construction supervision were satisfactory. However, DPHE and the Bank found the performance of the management advisory consultant to be less than satisfactory. The delivery of consultancy reports was slow and the management information and accounting systems that were devised were too complicated for the *pourashavas* to install and implement. As a result, the systems had to be reviewed and the manuals rewritten and simplified.

20. Final testing and commissioning of the Project facilities was completed in February 1990 with few technical problems. Delivery of water was satisfactory, as was water quality except in the case of Jessore.

C. Organization and Management

21. Prior to their improvement under the Project, the water supply systems were operated and maintained by the *pourashavas*. For carrying out the improvements and initial operation and maintenance (O&M), the systems were transferred to DPHE. Among other things, DPHE was to be responsible for providing field staff and equipment to carry out surveys and investigations during the design stage and for carrying out construction supervision. As it was, DPHE was not able to provide adequate, qualified staff. To alleviate this constraint, the Government recruited from its own resources a local firm of engineering consultants to assist in detailed design activities, and the same firm became an associate of the engineering consultant to assist in construction supervision. Bank review missions were reported by DPHE to have been adequate and of assistance in resolving issues, particularly regarding consulting services.

D. Actual Cost and Financing

22. The final cost of the Project was \$20.77 million, which was 3 percent less than the appraisal estimate of \$21.40 million. Appendix 1 provides a summary of actual versus appraisal cost estimates. The actual total cost of all water supply components of \$20.45 million exceeded the appraisal cost of \$18.57 million. However, this was more than offset by savings from the sanitary unit component, which was not completed. The actual cost of this component was only \$310,000 as compared to the appraisal projection of \$2.83 million. Actual Bank financing was \$13.13 million, as compared with \$14.40 million at appraisal.

E. Implementation Schedule

23. The Project was completed and fully commissioned 52 months later than envisaged at appraisal. Preliminary activities, such as field surveys, detailed design, and preparation of bid documents, were delayed by some two years by the slow appointment of the engineering consultants. Once started, preliminary activities were disrupted between November 1985 and May 1986 when the Government did not have funds to pay local consultants recruited by it to assist the engineering consultants. Subsequently, the start of civil works was held up by

procedural delays while the Government was amending the contract of the engineering consultants to provide construction supervision. However, the actual time taken to complete the civil works, albeit at a reduced scope, was about the same as estimated at appraisal (see Appendix 2).

F. Technical Assistance

24. A TA study was completed in June 1981. The findings of the study were reviewed by the Government and the Bank. While the technical proposals were considered to be acceptable, the Government did not agree with the institutional arrangements for the O&M of the water supply systems. Recommendations for greater autonomy for the *pourashavas* were not acceptable. In hindsight, the Bank should have provided closer supervision of the institutional aspects developed by the consultants, and should have been aware of the interinstitutional linkages and policy environment concerns of the Government, particularly in relation to DPHE and the devolution of Project component responsibility to the *pourashavas*. This could have avoided the initial institutional problems that arose for Project design and implementation, and assisted in the transfer of Project components to the *pourashavas*. A TA was also piggy-backed to the Project and provided technical data as to the design of sanitary lines to be installed and the capacity of available piped water supplies.¹

G. Compliance with Loan Covenants

25. Overall, the Borrower's compliance with loan covenants has been slow and less than complete. Major difficulties have been experienced in relation to the periodic adjustment of tariffs to achieve full recovery of O&M costs and acceptable rates of return. Arrangements for *pourashavas* to deposit revenues to cover ongoing self-sustainability of the individual systems had not been met in any of the five towns at the time of the PEM. The Bank completed specific and detailed discussions with the Government and DPHE in November 1992 in relation to the noncompliance of the covenants. Corrective measures were subsequently agreed upon and were to be implemented as part of the Bank's processing of a second water supply and sanitation project.² As of October 1995, the various measures introduced were starting to have an effect in rectifying the financial problems of the *pourashavas*. Institutional strengthening is ongoing and further improvements should be anticipated in relation to financial management.

IV. PROJECT RESULTS

A. Operational Performance

26. Physical achievements of the Project are compared with appraisal expectations in Table 1. At appraisal, the volume of available groundwater for pumping was estimated at 65,200 cubic meters per day (m^3/d). By comparison, at completion the estimated volume was 77,000 m^3/d . As of March 1995, the estimate had risen to approximately 85,000 m^3/d . This

¹ TA No. 462-BAN: *District Towns Sanitary Drainage*, for \$100,000, approved on 17 June 1982.

² Loan No. 1264-BAN(SF): *Second Water Supply and Sanitation Project*, for \$31 million, approved on 16 November 1993.

estimate is considered conservative by DPHE, and it excludes water available at public standpipes. Yet, in terms of service delivery, the actual number of service connections has been significantly less than foreseen at appraisal and as such, resulted in significant underutilization of available groundwater. Total daily consumption as of March 1995 was approximately 65,000 m³/d. At appraisal, it was proposed that 26,000 new service connections would be made to the existing systems in the five towns. As of September 1991, approximately 3,600 additional connections had been made and by March 1995 almost 18,000. By comparison, 600 public standpipes, which are used by low income groups, had been installed as of June 1995, compared to 250 at appraisal.

**Table 1: Comparison of Actual Project Components
With Components Proposed at Appraisal**

Item	Unit	Appraisal (Dec. 1981)	Actual (Mar. 1995)
Total Production Capacity	m ³ /d	65,200	85,000
Production Deepwells	no.	23	53
Elevated Service Reservoirs	no.	16	20
Treatment Plants	no.	5	3 ^c
Water pipelines ^a	km	243	290
Service Connections	no.	26,000	18,000
Public Standpipes	no.	250	550
Bulk Meters ^b	no.	128	130
Customer Service Meters	no.	500	500
Utility Vehicles			
- Cars	no.	9	9
- Motorcycles	no.	10	10
Leakage Control Equipment	set	5	5
Sanitation Units	no.	23,000	5,000

^a Of sizes 100 millimeter diameter and wider.

^b For measuring the output from the deepwells and from the service reservoirs into the distribution systems.

^c All at Jessore for iron removal.

Source: Appraisal Report and PEM data.

27. At appraisal, approximately 23,000 sanitation units were proposed to be installed. By comparison, as of June 1992, only 4,400 units had been installed. This number had increased only marginally to 5,000 units as of March 1995. The low number of sanitation units that were actually installed may be explained by (i) the relatively high cost of the installation (a less costly option was developed later for the Bank-funded second project); (ii) a lack of awareness by the

population as to the benefits of improved sanitation; and (iii) the lack of appreciation that some people who had been identified as potential beneficiaries did not need to be connected to piped water.

28. Given that DPHE and the five *pourashavas* have an active program to install household and commercial service meters, and as most of the pumped water is metered from the supply sources and the service reservoirs, most of the water is revenue generating. Nonrevenue water losses are low and are largely the result of defective standpipes. DPHE's policy of permanently sealing standpipes that have been deliberately damaged or tampered with has had a salutary lesson in all urban areas.

B. Institutional Development

29. Engineering consultants engaged under the Project were able to provide much needed project design experience and on-site construction supervision. This has been beneficial to DPHE's ongoing engineering works and has allowed DPHE field staff to train *pourashavas'* technical staff. The extent to which the individual *pourashava* staff have the necessary technical and in-house institutional skills will determine the extent of the success of transferring the Project assets from DPHE to the *pourashavas* in 1994 and 1995. DPHE field staff advised the PEM that most of the *pourashavas* lacked sufficient engineering design experience as was DPHE's position in 1982. Hence, ongoing system expansion is likely to be limited until further institutional strengthening has been carried out.

30. Prior to the completion of the Project, in order to improve the financial performance of the five *pourashavas*, the Bank proposed in conjunction with DPHE an action plan (see Appendix 3). This involved a range of reform measures and management directives covering reductions in nonrevenue water supplies, including procedures for operating a management information system, adjustments to tariff over time, improvements in consumer metering, resolving the issues of nonpayment of electricity accounts, and improving accounts receivable positions. The financial results of the action plan were positive. The final FIRR estimates for each of the individual towns showed a significant improvement, as compared to the PCR estimates and initial PPAR estimates prepared in late 1993, after the PEM.

C. Financial Performance

31. The individual financial performance of the five towns' water systems since 1987/88 has been less successful than forecast at appraisal. Only Bogra and Comilla have reported consistent positive net income figures since 1987/88. Barisal recorded significant losses in 1991/92 and in 1992/93, based on audited statements. The 1993/94 unaudited estimates show that the financial position is largely unchanged. Jessore has been able to generate a modest positive net income balance, but Mymensingh shows losses since 1991/92.

32. Appendix 4 contains audited and unaudited financial statements for the five district water systems since 1987/88. Compliance has been less than satisfactory with loan covenants that stipulated that (i) appropriate water tariffs be introduced from 1983/84, and (ii) tariffs should be adjusted upwards every two years to ensure satisfactory cost-recovery levels. The result has been lower revenues than expected from water sales and reduced net income available for maintenance requirements. High O&M costs, particularly power costs, have more than offset

water tax collections, which have been introduced since December 1982 as a means of improving the financial viability of each system.

33. Of concern to each of the systems has been the recurrent high levels of receivables. In all five towns, receivables frequently exceed four or five months' billings, principally because of slow payments of accounts from Government agencies. In turn, each *pourashava* reports significant electricity accounts payable.

34. Prior to the Project, the general water tax (GWT) was the primary source of revenue to be collected by the *pourashavas* for their water supply operations. The GWT was part of a consolidated tax based on the annual rated value of property, and was levied on all properties within the municipal boundary, whether or not they were connected to the piped water system. A further weakness was that the GWT had no relation to the quantity of water consumed. Hence, higher prices or tariffs did not represent any means for reducing consumption. After the Project commenced, the GWT revenues were to be collected by DPHE and deposited in a joint DPHE-municipality account established in each Project town and to be used as a major source of funds for water supply operations, in addition to the water tariff to be introduced under the Project and to be collected from consumers of piped water.

35. However, in practice, DPHE had neither the trained human resources nor the necessary accounting systems to collect the GWT because the tax amount was dependent on property value assessed by the municipality. After transfer of the authority to collect the GWT from the municipalities concerned to DPHE, two municipalities stopped collecting it while the remaining three continued to collect, but the proceeds of the GWT were used in other municipal operations. As a result, the tax revenues have not been reinvested in the water supply systems. Despite many discussions and ongoing efforts of the Bank and DPHE, the levels of GWT collected have remained modest.

36. Most of the revenue generated is from the sale of piped water. Despite periodic adjustments since 1992, water tariffs are low by comparison to those in other developing member countries (DMCs). As a result, none of the five systems are yet able to generate sufficient revenues to cover the operational costs. As of October 1995, the impact of the institutional and financial action plan has been mixed and debt servicing remains seriously constrained. This is reflected in the reestimated FIRR, which remain well below appraisal expectations. On the other hand, they are above those estimated at PCR, reflecting the impact of some of the measures taken since December 1992.

D. Financial Reevaluation

37. At appraisal, Project justification was based on the estimation of FIRR for each of the five water systems. An incremental operations cost analysis was undertaken, as neither at appraisal nor for the preparation of the PCR any willingness-to-pay surveys were undertaken. Such surveys would have identified the likely economic benefits of the systems, based on consumers responses to tariff levels. This data collection and analysis, which is now part of current Bank practice, would have allowed for the estimation of demand curves for the piped water. Consumers could have also responded to issues relating to water quality and service delivery by DPHE, in relation to the alternatives of bottled water or private groundwater supplies.

38. The FIRR was reestimated based on the same methodology as used at appraisal and for the PCR. The costs and revenues were expressed in 1994 prices. The Project's economic life was assumed at 30 years. No replacement investment was included for the Project life at appraisal or PCR, and may not be technically possible. The details of the assumptions and the estimation of the FIRR are shown in Appendix 5. The reestimated FIRRs range from -6.26 percent to 0.74 percent, which are lower than those estimated at appraisal. The reestimated FIRRs are the result of the lower levels of connection and resultant reduced levels of total sales revenue. The FIRRs reflect forecasts of improved revenue collection, particularly from Government agencies, and increased service connections to households. Increased service connections will be achieved through transferring up-front connection fees to being included in the monthly billings and from improved levels of service quality.

E. Socioeconomic and Sociocultural Results

39. As a result of the Project, as of March 1995, DPHE estimates that approximately 480,000 people in the five towns are being served through 18,000 service connections and approximately 550 standpipes. Although the total population projected to be covered by the Project at appraisal was 608,000, the public standpipes are being used by larger numbers from lower income groups.

40. Data has not been available to accurately link the improved quality of water to improved health levels. Improved health is an imputed benefit that cannot be quantified easily in socioeconomic terms.

41. Given the reduced number of household sanitary units that were installed, the range of socioeconomic benefits has been reduced when compared to appraisal estimates. The perceived high cost to households from the installation of septic tanks has limited the installation of the DPHE-designed units. Thus, improvements in health associated with proper personal hygiene, while likely to have occurred, cannot be reliably quantified.

F. Women in Development

42. The Project design did not specifically target women as beneficiaries. However, in the five towns, the provision of piped water has improved the quality of life of all household members. The time taken and manual efforts required for women to fetch water have been reduced.

G. Environmental Impact and Control

43. In each of the five towns, water is pumped from aquifers. Engineering data from DPHE indicates that the supply of water in the various aquifers is well in excess of demand. No adverse environmental effects such as land subsidence from pumping from the aquifers had been reported. No appreciable movement in groundwater tables has been detected. At Jessore, because the groundwater contains levels of ferrous oxide higher than those acceptable by WHO standards, specific filtering of the water is required. Water quality monitoring is undertaken regularly by DPHE. A similar problem was found at Comilla, where a filtering system will be installed by 1995. No specific environmental issues were involved with the small-scale

household sewerage systems that were installed. The systems involved the use of septic tanks, and no discharge problems have been reported.

H. Gestation and Sustainability

44. The designed average daily production capacity from the water supply systems of the five towns remains higher than average daily consumption, as of March 1995. This may be explained by (i) the lack of Project-related public faucets in many locations, as (a) damaged standpipes are closed, and (b) a lack of funds has limited the extension of pipes to new housing areas; and (ii) the lack of participation of user communities, partly the result of high initial connection charges. Under the second water supply and sanitation project, increased demand for household connections has been stimulated by substituting the initial connection fee by a higher monthly charge. By 1999, based on the accelerated rate of connections achieved over the past two years, the *pourashavas*, using their own resources, are likely to reach the appraisal target of 26,000 additional connections.

45. The transfer of the five water supply systems from DPHE to the *pourashavas* was to have been completed by June 1995. However, funding limitations and unresolved debt recovery issues have slowed the transfers and, as of October 1995, the process was not finalized. At issue is how Barisal, Mymensingh, Jessore, and to a lesser extent Bogra, can generate sufficient revenues to fund ongoing maintenance requirements and support ongoing health education and environmental sanitation programs. Thus, unless the financial health of the *pourashavas* is improved, long-term sustainability cannot be assured because the physical facilities would deteriorate with inadequate maintenance, and water quality would eventually be diminished, thereby exacerbating the financial problems of the *pourashavas*. Given the inherent difficulties the municipalities are facing in setting appropriate tariffs to cover the long-run average cost of delivered water, in revising tariff to match cost increases, and in collecting revenues from both private and Government agencies, it is not surprising that cost recovery levels remain low and financial performance is less than satisfactory.

V. KEY ISSUES FOR THE FUTURE

A. Water Pricing

46. Pricing potable water significantly below its economic value is prevalent worldwide and Bangladesh is no exception. The cost of supplying potable water to households affects consumption only to the extent that costs are reflected in the price. If, as in the five district towns covered by the Project, the unit price remains less than the financial or economic costs of the unit of water provided by the individual *pourashava*, more water will be used than if prices were set to reflect the full economic cost of delivered water. For the five towns, average monthly tariffs per service connection range from Tk75 to Tk140. This compares with an estimated minimum monthly cost of production of at least Tk150 (assuming a consumption of about 12 m³ per month). More importantly, the *pourashavas* will continue to lose money on each unit sold (relative to financial costs) and the local and national economies will bear the economic loss (relative to economic costs). Thus, as in the present situation, each *pourashava* will face problems of expanding services to meet increasing urban and semiurban demands. Ongoing maintenance programs will also remain constrained.

47. Appendix 6 provides a summary of the levels of affordability of water tariffs in each of the towns. The majority of households can afford higher meter bills than they currently pay. However, many of the poorest in the five towns live on the urban fringes. They are unable to pay the average monthly tariff of between Tk75 - Tk140, given that the poverty line is set at Tk3,000 per household per month. Because of *pourashavas'* weak financial performances, capital funding constraints have seriously limited the expansion of piped water services to these unserved communities. As the levels of revenue collected do not provide for cash surpluses to be accumulated, debt financing is the only option to fund additional system expansion. The individual *pourashavas* were not fully involved in the initial design of the Project, and were required to take over the ongoing operations of the water supply systems in 1994 and 1995; thus, most have not built up financial reserves to provide for subsidies until more appropriate tariff structures have been developed and accepted by the communities. In hindsight, the appropriate water tariffs to cover long-run average costs (covering both capital and operating cost components) should have been estimated and these should have been accepted by the *pourashava* communities before the Project was commenced. Generally, experience shows that major upward water tariff adjustments are difficult to implement after Project commissioning, with even less than full cost recovery targets often politically unattainable. For the five towns, a similar experience has been found.

B. Improved Financial Management and Accountability

48. Setting water prices or tariffs at the right level is not enough. Water bills need to be paid if they are to contribute to efficient resource allocation. Nonpayment of fees for water, particularly by Government agencies remains a key issue for the *pourashavas*. All *pourashavas* face two basic problems: (i) limited willingness to pay additional tariffs because of incorrect billings, poor services, or poor quality; and (ii) inadequate computerized accounting systems to generate up-to-date billing information and to trace outstanding accounts. However, the failure to recover costs and to reinvest in the systems has already led to a vicious cycle whereby system expansion has slowed and service delivery to public amenities such as standpipes has been reduced. What is urgently required is for the individual *pourashavas* to have expanded managerial and financial powers, with effective authority to charge and collect revenues and with the freedom to manage without political interference.

49. To assist the individual *pourashavas* in addition to DPHE, other government agencies, such as the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives, can provide trained staff on secondment and allow *pourashava* staff to work with LGD. This could provide "hands-on" experience for junior staff very quickly, particularly in relation to computer-based financial accounting systems. The Local Government Training Institute, which is responsible for training LGD staff, could be requested to design and conduct courses specifically for *pourashava* staff.

C. Health Benefits

50. An important element in the justification for the Project was the improvement to be expected in the standard of health and productivity of people within the five towns. This was to be achieved both from the availability of additional potable water and from the introduction of sanitation/septic tanks at the household level. At appraisal, by relying on likely forecast improvements in health benefits, it was considered unnecessary to provide any further economic

or socioeconomic justification. No baseline data was provided on health standards against which improvements from greater access to potable water could be drawn. At issue is the appropriateness of investing in urban water supply projects solely as a means of improving health standards, particularly where the current status of health problems is not clearly understood. World Bank research shows that the most powerful forces for reducing risks to health are increases in household incomes and improved education/awareness levels.¹ In particular, higher incomes make it possible for people to afford the necessary household improvements, including ready access to potable water and sanitation services. As education/awareness programs take root, personal hygiene improves, and responsiveness to public health information also increases. Experience elsewhere in DMCs with water and sanitation projects illustrates the limitations of direct provision of household water and sanitation services in order to improve health standards. People demand safe water and good sanitation and are willing to pay for these services, provided they can afford to do so. Health benefits do not provide a rationale for public subsidization of water and sanitation particularly where consumers are not prepared to pay the full cost of water and sanitation.

51. At appraisal, as part of the Project's justification, 80 percent of the morbidity in Bangladesh and about 28 percent of all deaths among children were due to waterborne diseases. Thus, high Government priority was given to the development of water supply and sanitation facilities. However, deaths among children due to waterborne diseases during 1985-1990 averaged between 30 percent to 35 percent.² Improving health standards at the household level is a complex task, requiring changes in housing and drainage standards, diet, health care, work practices, and environmental conditions. Improved water quality is only one input. For the Project, empirical data before and after the Project is not available to use in citing improvements in health standards as a tangible Project benefit.

VI. CONCLUSIONS

A. Overall Assessment

52. The traditional least-cost approach to water supply project planning and implementation has so far failed to deliver a sustainable Project environment despite the recent efforts to improve levels of financial performance. While, from an engineering point of view, most technical targets that were set at appraisal have been met, the inability of the five towns to devise satisfactory water pricing schedules and other revenue generation measures remains of concern. Long-term sustainability cannot be assured until the mismatch between annual water revenues and annual system O&M costs is remedied.

53. The institutional and financial corrective measures that were devised and presented to the individual *pourashavas* have only been partially successful. The result has been that FIRR estimates remain low, although they are higher than estimated in the PCR. As long as communities continue to regard water as a "free" good, the problems concerning financial

¹ "Rural Water Supply and Sanitation - Time for a Change", World Bank Discussion Paper No. 18, A.A. Churchill, et. al., September 1987.

² Based on WHO field estimates.

viability of the individual *pourashavas* will remain. Despite the shortcomings in the financial performance of the *pourashavas*, given the high levels of water sales generated from the systems and the continued expansion of new service connections, the Project is rated as partly successful.

B. Lessons Learned

54. Regardless of the technology, any least-cost approach to water supply project planning and implementation will not achieve sustainable projects unless it is underpinned by sound financial and economic principles. Potable water deliveries must be priced at tariffs that at least cover the long-run average cost of production. Unless full cost recovery levels are achieved in the initial years of the Project life, long-term maintenance costs will not be covered by the Project's cash flows. Public subsidization will then be required from other economic sectors to sustain the Project. Appropriate water tariffs must therefore be in place and be acceptable to potential household users prior to Project implementation.

55. Where pilot schemes such as new sanitation programs are introduced to local communities, the schemes should be sufficiently flexible to accommodate as wide a range of technical options as possible. The pilot sanitation system introduced to the Project involved only one sanitation design, which was found to be unpopular because of its size. Its lack of community acceptance could have been determined with fewer initial pilot units.

56. The Project highlights the need for implementation to commence only after appropriate technically trained and experienced personnel (either government personnel or consultants) are available to supervise contractors. The delays experienced by the Project in commissioning engineering consultants to provide the necessary skills, which had been assumed to be available from DPHE, could thus have been avoided.

57. The Project experience also demonstrates the importance of community awareness and education programs where new sanitation schemes are proposed for semiurban and rural communities. This important lesson was followed in the design of the second project. Public participation forums and seminars were held at the design stage. The design of community sanitation programs should stress the importance of household hygiene, health standards, social maturation, and women's involvement. Particular emphasis should be given to the role of women in participating in the design of sanitation programs to reflect their views and allow for their responses to engineering designs that will be introduced into the home.

C. Follow-up Actions

58. For all five *pourashavas*, further institutional strengthening is required by DPHE to ensure that engineering maintenance of existing facilities and the design/implementation of additional facilities are undertaken satisfactorily. A series of remedial actions were proposed for towns covered by the Bank's second water supply and sanitation project. These have not been specifically required of the five *pourashavas* involved in the Project. Further, specific training is required to allow for the early correction of faults, particularly as related to filtration and pumping. Training should also include Project planning and financial management for *pourashava* staff and senior elected officials. In particular, the computerization of accounts and receivables should be strengthened.

59. The Bank should encourage DPHE to provide additional institutional support to the five *pourashavas* in relation to improved computerization of consumer billing and financial cost accounting.

60. The Bank should encourage LGD to support the *pourashavas* in institutional strengthening of their financial operations. The Local Government Training Institute should be upgraded at the national level to assist individual *pourashavas* more effectively.

61. The Government should be made more aware of the benefits to *pourashavas* from loan financing for institutional strengthening, rather than continuing to rely on TA grants. This would ensure that the lessons learned are well appreciated by the senior staff of the *pourashavas* and by management.

62. *Pourashavas* should be encouraged to provide additional water at higher prices to the various commercial and industrial establishments within their jurisdiction to meet the growing demand and to utilize their installed water production capacity.

APPENDIXES

Number	Title	Page	Cited On (page,para.)
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3	Improved Institutional and Financial Performance of <i>Pourashavas</i>	19	8,30
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COMPARISON OF ACTUAL PROJECT COSTS WITH APPRAISAL ESTIMATES
(\$ million at current prices)

Item	Appraisal Estimate			Actual		
	Local	Foreign	Total	Local	Foreign	Total
A. Water Supply						
Land	0.40	—	0.40	0.23	—	0.23
Civil Works	3.26	1.66	4.92	8.22	4.54	12.76
Materials and Equipment	0.14	2.62	2.76	0.15	2.63	2.73
Engineering Consultancy	0.19	1.27	1.46	0.51	1.69	2.20
Advisory Services	0.05	0.61	0.66	0.06	0.17	0.23
Taxes and Duties	2.01	—	2.01	2.06	—	2.06
Contingencies	3.60	2.56	6.16	—	—	0.00
TA 271—BAN Recovery	—	0.20	0.20	—	0.19	0.19
Subtotal (A)	9.65	8.92	18.57	11.23	9.22	20.45
B. Sanitation						
Civil Works	—	1.25	1.25	0.21	0.10	0.31
Taxes and Duties	0.81	—	0.81	—	—	—
Contingencies	0.34	0.43	0.77	—	—	—
Subtotal (B)	1.15	1.68	2.83	0.21	0.10	0.31
Total	10.80	10.60	21.40	11.44^a	9.32	20.76

— = magnitude zero

^a Includes local cost financing by the Bank of \$3.80 million, comprising \$3.16 million for civil works, \$0.07 million for materials and equipment, \$0.51 for engineering consultancy, and \$0.06 million for advisory services.

Source: Project Completion Report.

SUMMARY OF SCHEDULED VERSUS ACTUAL DATES OF COMPLETION OF CRITICAL ACTIVITIES

Activity/Milestone		Appraisal Schedule	Actual	Delay (months)
Engineering Consultant Services	Started	Jan. 1983	Oct. 1984	21
	Completed	Dec. 1986	May 1991	53
Advisory Services	Started	Jan. 1983	Sep. 1984	20
	Completed	Dec. 1984	Jul. 1986	19
Detailed Design	Started	Apr. 1983	Jan. 1985	21
	Completed	Sep. 1983	Oct. 1985	25
Deliveries of Pipes and Valves	Started	Jul. 1984	Mar. 1987	20
	Completed	Dec. 1985	Jul. 1988	31
Deepwell Construction	Started	Jan. 1984	Jul. 1988	54
	Completed	Nov. 1986	Mar. 1991	52
Construction of Service Reservoir	Started	Apr. 1984	Aug. 1988	52
	Completed	Nov. 1986	Mar. 1991	52
Pipelaying	Started	Oct. 1984	Aug. 1988	46
	Completed	Nov. 1986	Dec. 1990	49
Testing and Commissioning of Water Supply Facilities	Started	Apr. 1986	Apr. 1990	48
	Completed	Dec. 1986	Feb. 1991	50
Construction of Sanitation Units	Started	Jan. 1983	Jun. 1987	48
	Completed	Dec. 1986	May 1991	53

IMPROVED INSTITUTIONAL AND FINANCIAL PERFORMANCE OF THE *POURASHAVAS*

1. In order to improve the institutional and financial performance of the *pourashavas*, and to ensure the sustainability of the water supply systems, a range of specific solutions to identified problems were agreed between the Bank, the Department of Public Health Engineering (DPHE), and the *pourashavas* in December 1992. Each of the specific solutions was accompanied by a timebound commitment to be monitored by the Bank. The action plan is outlined in Table 1 of this Appendix.
2. The Bank and DPHE realized that specific additional institutional support needed to be provided to DPHE and the *pourashavas* to assist them in implementing the action plan. The Bank, therefore, approved a technical assistance (TA)¹ to assist DPHE in developing interdisciplinary capability and additional skills to carry out its essential role of trainer and advisor to the *pourashavas* and in transferring skills and experience to *pourashava* staff. Specific objectives of the TA were the following: (i) providing initial reorientation of DPHE staff for an enabling role in support of municipal water supply service delivery; (ii) strengthening DPHE's project management, financial awareness, and community relations support capabilities and its management information system and training; (iii) recommending improvements in financial management and reporting within DPHE and assisting with making improvements; (iv) developing an outline consumer-oriented community participation program for water supply service promotion and operational management by *pourashavas*; and (v) training DPHE trainers for delivery of water supply financial and community organization systems and programs.

¹ TA No. 1979-PAK, *Institutional Strengthening of the Department of Public Health Engineering*, for \$350,000, approved on 16 November 1993.

Table 1: Action Plan to Improve Institutional Financial Performance

Problems	Suggested Solutions	Target Date
A. Institutional Aspects		
1. Procedures for Water Connections, Private and Illegal Connections.	<ul style="list-style-type: none"> Procedures to be implemented should include specifications for connection materials and installation works, plumbing code, applications for water connections, payment procedures for new connections, and guidelines for inspection of water connection on a regular basis (say, every three months). House-to-house surveys to identify illegal connections should be carried out and rules and regulations, including punitive measures, for disconnection of supply to defaulters need to be established. 	To be completed by 30 June 1993
2. Reintroduction of the management information system	<ul style="list-style-type: none"> Department of Public Health Engineering (DPHE) should organize short refresher courses on accounting and reporting for accounting personnel in the respective Project towns. Management information system to be introduced may include monthly reports to be submitted by the Project district towns to DPHE on water revenues, collection efficiency, number and types of connections, O&M expenses, and comparison between budget and actual costs, including measures proposed to be taken to improve the deviations from budgetary projections. 	To be completed by 30 June 1993. To be completed by 31 March 1993.
3. Management Conflicts between DPHE and Municipalities during Project Implementation and Maintenance Period.	<ul style="list-style-type: none"> Municipalities should continue to be responsible for operation and maintenance of their own systems throughout the construction period of the new facilities. DPHE should provide on-the-job training to municipality staff during the construction period. 	The first monthly report for the month of May 1993 to be submitted to DPHE by 30 June 1993. Policy guidelines to resolve the conflicts to be in place by 30 June 1993.

Table 1: Action Plan to Improve Institutional Financial Performance

Problems	Suggested Solutions	Target Date
	<ul style="list-style-type: none"> - Municipalities should be entrusted with the responsibility for commissioning Project facilities through assistance from DPHE. - DPHE should take the lead role in water supply development and act only as a construction agent for the municipalities. 	
B. Financial Aspects		
1. Water Tariffs and Collection Efficiency	<ul style="list-style-type: none"> - Water tariffs should be adjusted in line with affordability of water consumers (3-4 percent of average household incomes). - Bill collection efficiency should be improved to an annual average of at least 90 percent, as has been achieved in Bogra. 	<p>31 March 1993</p> <p>30 June 1993</p>
2. Low Number of House Connections	<ul style="list-style-type: none"> - Connection charges should be reviewed to attract consumers to apply for new connections. - Internal procedures for the installation of new connections should be hastened to enable completion of installation work within a reasonable time (say, 7-10 days). 	<p>31 March 1993</p> <p>31 March 1993</p>
3. Metering of Large Consumers and Industries	<ul style="list-style-type: none"> - All large consumers and industries should be metered and charged accordingly. 	30 June 1993
4. Operation of Joint Account	<ul style="list-style-type: none"> - Municipalities should regularly deposit water tariff and general water tax in the joint account. If necessary, punitive measures should be introduced by the Local Government Division to ensure that the respective municipalities fulfill their obligation regarding depositing of the general water tax. 	30 June 1993

Table 1: Action Plan to Improve Institutional Financial Performance

Problems	Suggested Solutions	Target Date
5. Electricity Bill Arrears	<ul style="list-style-type: none"> - Electricity bill arrears have negative effects on the cash flow position of the joint account. DPHE and each municipality concerned should prepare an action plan to eliminate the electricity bill arrears, and should submit the plan to the Secretary of Local Government Division for approval. - DPHE and the municipalities concerned should discuss with the Power Development Board, or other competent authorities, the lowering of electricity rates for water supply activities consistent with the practice in other countries, e.g., Pakistan's present irrigation rates for water supply. 	<p>31 March 1993</p> <p>30 June 1993</p>
6. Accounts Receivable	<ul style="list-style-type: none"> - Accounts receivable have increased substantially over the years and need to be reduced considerably to improve the cash flow of the municipalities. The Government should develop a constructive action plan to reduce the accounts receivable. The practice followed in Bogra for accounts receivable collection could be adopted by other municipalities. 	30 June 1993

FINANCIAL STATEMENTS FOR THE FIVE POURASHAVAS

Each of the five *pourashavas* (municipalities) was responsible for the preparation of the various historic financial statements. The format of the statements follows Government requirements. Auditing of statements is frequently two years in arrears. The engineering section of each of the *pourashavas* is responsible for setting water tariffs and for billing and collection. Payments of electricity as an operation and maintenance cost represent the cost of power as provided by the Power Development Board to each *pourashava*. As reflected in the financial statements, electricity accounts represent significant outstanding debts. As a result of the low levels of tariffs and the outstanding electricity accounts, annual net operating incomes are low. For Barisal and Mymensingh, annual deficits are frequently recorded. None of the *pourashavas* have provisions to service the cost of capital as associated with the Project. This represents an annual servicing cost to the Government, through the Department of Public Health Engineering. Allowances for depreciation of assets are similarly not included in the statements. Hence the future maintenance of the assets, when fully transferred to the individual *pourashavas* from the Department of Public Health Engineering will be a major issue for the *pourashavas*.

Table 1: Barisal Pourashava: Summary of Audited and Unaudited Financial Statements (Taka)

Item	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94 ^a
Revenue							
Water Sales	947,048	1,309,689	1,562,696	1,056,270	1,722,060	3,241,078	3,276,120
Others ^b	<u>332,335</u>	<u>256,545</u>	<u>257,429</u>	<u>964,596</u>	<u>1,145,170</u>	<u>1,468,468</u>	<u>1,572,230</u>
Total Revenue	1,279,383	1,566,234	1,820,125	2,020,866	2,867,230	4,709,546	4,848,350
O&M Expenses							
Salaries	1,002,785	1,188,217	1,569,496	1,617,705	1,933,169	2,998,584	3,137,622
Repair	158,852	65,515	23,147	60,732	110,851	20,666	72,530
Electricity ^c	—	—	—	—	—	—	—
Others	<u>324,220</u>	<u>178,072</u>	<u>144,772</u>	<u>81,660</u>	<u>878,925</u>	<u>1,965,167</u>	<u>1,866,028</u>
Total Expenses	1,485,857	1,431,804	1,737,415	1,760,097	2,922,945	4,984,417	5,076,180
Net Income	(206,474)	134,430	82,710	260,769	(55,715)	(274,871)	(227,830)
Cash Balance							
Beginning	232,848	26,374	160,804	243,514	504,283	448,568	173,697
Ending	26,374	160,804	243,514	504,283	448,568	173,697	274,615
Electricity Bill Payable ^c	4,196,415	5,125,861	4,791,861	6,689,061	4,380,000	4,439,000	4,581,000
Water Bill Receivable	2,017,504	2,234,126	2,589,864	4,905,444	2,398,574	1,107,242	1,234,276

^a Unaudited as of March 1995.

^b Includes connection fees and property sales. Excludes Government.

^c Electricity costs are not accounted for under O&M costs; they are funded from DPHE allocations.

Source: Barisal Pourashava.

Table 2: Bogra Pourashava: Summary of Audited and Unaudited Financial Statements (Taka)

Item	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93 ^a
Revenue						
Water Sales	507,130	546,713	551,172	851,424	1,351,308	1,476,261
Others ^b	<u>33,265</u>	<u>50,015</u>	<u>109,033</u>	<u>72,901</u>	<u>320,528</u>	<u>337,590</u>
Total Revenue	540,395	596,728	660,205	924,325	1,671,836	1,813,851
O&M Expenses						
Salaries	420,783	443,785	521,316	514,365	888,645	914,520
Repair	17,904	4,253	17,218	19,434	2,867	12,635
Electricity	69,623	113,575	126,940	81,000	574,156	592,362
Others	<u>19,611</u>	<u>14,012</u>	<u>9,135</u>	<u>12,647</u>	<u>18,074</u>	<u>19,390</u>
Total Expenses	527,921	575,625	674,609	627,446	1,483,742	1,538,907
Net Income	12,474	21,103	(14,404)	296,879	188,094	274,944
Cash Balance						
Beginning	42,236	54,710	75,813	61,409	205,145	217,422
Ending	54,710	75,813	61,409	358,288	237,997	241,881
Electricity Bill Payable	1,490,622	1,919,231	1,888,415	256,345	1,207,859	1,376,592
Water Bill Receivable	193,469	159,896	149,246	270,320	348,986	367,742

^a Unaudited estimates, as of March 1995.

^b Includes connection fees and property sales. Excludes Government.

Source: Bogra Pourashava.

Table 3: Comilla Pourashava: Summary of Audited and Unaudited Financial Statements (Taka)

Item	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93 ^a
Revenue						
Water Sales	548,283	783,498	1,355,054	1,974,198	2,327,843	2,416,791
Others ^b	<u>78,290</u>	<u>88,650</u>	<u>110,750</u>	<u>506,050</u>	<u>373,700</u>	<u>412,918</u>
Total Revenue	626,573	872,148	1,465,804	2,480,248	2,701,543	2,829,709
O&M Expenses						
Salaries	571,923	622,520	687,179	931,373	1,080,000	1,146,722
Repair	3,555	80,000	—	—	206,621	275,414
Electricity	—	—	178,287	616,110	168,642	171,320
Others	<u>13,300</u>	<u>122,174</u>	<u>12,692</u>	<u>232,207</u>	—	<u>9,475</u>
Total Expenses	588,778	824,694	878,158	1,779,690	1,455,263	1,602,931
Net Income	37,795	47,454	587,646	700,558	1,246,280	1,226,778
Cash Balance						
Beginning	69,311	107,106	154,560	742,206	2,372,971	2,416,418
Ending	107,106	154,560	742,206	1,442,764	1,784,129	1,934,522
Electricity Bill Payable	4,253,271	5,134,245	5,039,245	2,267,416	2,000,000	2,100,000
Water Bill Receivable	1,491,929	2,076,662	2,117,330	3,027,464	3,514,757	3,722,717

^a Unaudited estimates, as of March 1995.

^b Includes connection fees and property sales. Excludes Government.

Source: Comilla Pourashava.

**Table 4: Jessore Pourashava: Summary of Audited and Unaudited Financial Statements
(Taka)**

Item	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94 ^a
Revenue							
Water Sales	718,034	828,131	905,842	1,145,787	1,430,009	2,501,329	2,551,720
Others ^b	<u>50,700</u>	<u>94,070</u>	<u>48,595</u>	<u>76,950</u>	<u>285,145</u>	<u>344,991</u>	<u>372,432</u>
Total Revenue	768,734	922,201	954,437	1,222,737	1,715,154	2,846,320	2,924,152
O&M Expenses							
Salaries	426,530	466,501	557,765	682,271	831,929	915,478	977,480
Repair	26,186	71,890	14,000	31,516	212,779	282,189	273,466
Electricity	315,592	385,241	412,612	506,887	658,383	1,269,634	1,334,795
Others	<u>10,000</u>	<u>18,225</u>	<u>3,212</u>	<u>55</u>	<u>36,145</u>	<u>51,978</u>	<u>57,371</u>
Total Expenses	778,308	941,857	987,589	1,220,729	1,739,236	2,519,279	2,643,112
Net Income	(9,574)	(19,656)	(33,152)	2,008	(24,082)	327,041	281,040
Cash Balance							
Beginning	166,532	156,958	137,302	104,150	236,333	212,251	217,535
Ending	156,958	137,302	104,150	106,158	212,251	539,292	476,922
Electricity Bill Payable	1,252,855	1,487,973	1,487,973	594,341	1,078,225	—	—
Water Bill Receivable	771,725	926,414	848,061	1,414,521	798,900	20,050	37,560

^a Unaudited estimates as of March 1995.

^b Includes connection fees and property sales. Excludes Government.

Source: Jessore Pourashava.

Table 5: Mymensingh Pourashava: Summary of Audited and Unaudited Financial Statements (Taka)

Item	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94 ^a
Revenue							
Water Sales	834,498	1,173,233	1,138,914	1,458,515	1,251,725	1,463,396	1,327,460
Others ^b	<u>68,635</u>	<u>298,986</u>	<u>221,202</u>	<u>117,354</u>	<u>314,998</u>	<u>397,422</u>	<u>373,525</u>
Total Revenue	903,133	1,472,219	1,360,116	1,575,869	1,566,723	1,860,818	1,700,985
O&M Expenses							
Salaries	602,096	673,748	720,768	865,169	1,035,059	1,318,240	1,426,310
Repair	70,159	46,781	26,096	161,968	520,474	444,845	426,735
Electricity	217,063	572,651	354,213	447,137	134,323	83,960	112,937
Others	<u>27,642</u>	<u>94,253</u>	<u>17,149</u>	<u>148,464</u>	<u>10,000</u> ^c	<u>10,000</u> ^c	<u>13,400</u> ^c
Total Expenses	916,960	1,387,433	1,118,226	1,622,738	1,699,856	1,857,045	1,979,382
Net Income	(13,827)	84,786	241,890	(46,869)	(133,133)	3,773	(278,397)
Cash Balance							
Beginning	28,024	14,197	98,983	340,873	294,004	n.a. ^d	n.a. ^d
Ending	14,197	98,983	340,873	294,004	160,867	n.a. ^d	n.a. ^d
Electricity Bill Payable	3,298,975	3,832,394	3,675,092	5,012,538	4,596,651	n.a. ^d	n.a. ^d
Water Bill Receivable	2,171,830	2,467,704	2,389,737	3,396,073	4,025,846	n.a. ^d	n.a. ^d

^a Unaudited estimates, as of March 1995.

^b Includes connection fees and property sales. Excludes Government.

^c Provisional estimates, pending revisions and clarifications.

^d No estimates prepared.

Source: Mymensingh Pourashava.

FINANCIAL REEVALUATION ASSUMPTIONS USED

1. From 1983/84 to 1993/94, all data are based on actual operating and financial performance of the five systems. Costs and revenues during this period have been converted to 1994 prices using the MUV for foreign costs and CPI for local costs. From 1994 onwards, all costs and revenues are presented in 1994 prices.
2. The Project is estimated to have an economic useful life of 30 years, with no salvage value.
3. The operating and maintenance costs of each Project town water system are derived from actual costs, including costs of (i) personnel, (ii) power, (iii) repairs, and (iv) miscellaneous. In 1994 constant prices, the total assumed annual O&M costs were:

Water System	(1994 taka million)
Barisal	3.45
Bogra	1.20
Comilla	2.72
Jessore	1.41
Mymensingh	2.47

4. All revenues from water sales are based on incremental sales, as estimated by the individual *pourashavas*. This was determined by calculating the difference between before and after Project water production, multiplied by the average tariff after the Project components were commissioned. Annual tariff increases are reflected in the yearly revenue forecasts.
5. Average water tariffs have been assumed to grow at an annualized rate of 2 percent per annum for each town, based on the experience of 1993 and 1994.
6. The number of new water connections is forecast to increase from 3,600 in 1991, to 16,000 in September 1994 and to 26,000 connections (the appraisal target) by 1998/99.

SUMMARY OF AFFORDABILITY AND COST RECOVERY DATA
(pourashava level, single tap household connection)

Variable	Barisal	Bogra	Comilla	Jessore	Mymensingh
Person/Household	5.9	5.5	5.5	5.7	5.8
Person/Connection	10.0	9.0	8.0	9.0	8.5
Liter/Capita/Day	80.0	70.0	65.0	75.0	75.0
m ³ /Capita/Month	2.5	2.2	2.2	2.2	2.3
Ave. Total Incremental Production Cost ^a (Tk/m ³)	90	110	145–150	120	110
Average Monthly Water Bill (Tk/month)	75	100	140	110	130
Affordability/Median household income	3,800	4,200	5,500	4,500	5,000
Poverty line/Income per household	3,000	3,000	3,000	3,000	3,000

^a Includes estimates for both capital and O&M costs.

Source: PEM and DPHE estimates.