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PERFORMANCE AUDIT REPORT

INDIA

MADRAS WATER SUPPLY AND SANITATION PROJECT
(LOAN 2846/CREDIT 1822-IN)

June 18, 1999

Operations Evaluation Department

Currency Equivalents (annual averages)

Currency Unit = Rupee (Rs)

1986	US$1.00	Rs12.29
1996	US$1.00	Rs35.00
1998	US$1.00	Rs41.90

Abbreviations and Acronyms

CMWSSB	Chennai Metropolitan Water Supply and Sewerage Board (Metro Water)
GOI	Government of India
GTN	Government of Tamil Nadu
lcd	Liters per capita per day
MIS	Management information system
mld	Million liters per day (1,000 c.m. per day)
OAP	Operational Action Plan
O&M	Operation and maintenance
OSS	On-site sanitation
UFW	Unaccounted-for Water
UWSS	Urban Water Supply and Sanitation
WSS	Water Supply and Sanitation

Fiscal Year

Government (GOI and GTN): April 1 – March 31

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The World Bank
Washington, D.C. 20433
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Office of the Director-General
Operations Evaluation

June 18, 1999

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

SUBJECT: Performance Audit Report on India
Madras Water Supply and Sanitation Project (Loan 2846/Credit 1822-IN)

The Madras Water Supply and Sanitation Project (Loan 2846/Credit 1822-IN), involving a Bank loan in the amount of US$53.0 million and an IDA credit in the amount of SDR12.5 million (totaling US$69.0 million) were approved on June 17, 1987. The credit was fully disbursed in April 1991, and the loan closed on March 31, 1996, after one extension of three months; a balance of US$4.7 million (equivalent) was cancelled.

In the late 1980s, as often before, the city of Madras (now called Chennai) experienced severe water shortages. Even in normal times, Chennai remained the lowest supplied metropolitan area in India. The project had the following main *objectives*: increasing water supply by 35 percent and improving reliability of the system; improving and extending the sewage collection and treatment system; improving the use of existing water resources and assisting the Chennai Metropolitan Water Supply and Sewerage Board (Metro Water) to develop a plan to address the medium- and long-term water supply needs in Chennai; assisting Metro Water to improve its cost recovery through increased tariffs, and better billing and collection performance; strengthening of Metro Water's institutional capacity, policy formulation, planning, and management; and initiating a low-cost (on-site) sanitation program. These objectives were to be achieved through four *components*: augmentation of water supply sources; improvements to the water supply and distribution system; improvements to the sewerage system; and technical assistance for institutional strengthening.

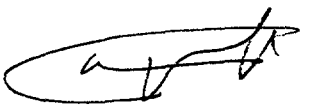
The project was rather large, and perhaps somewhat complex, for a first-time borrower to digest. Combined with that was the less-than-satisfactory preparation of final engineering of key components, and as such the readiness of contract packages for early bidding. As a consequence, progress on project implementation was slow during the early years, but improved later. Some of the physical components were transferred to be implemented under the follow-on second project. Some design changes were necessitated due to the availability of water from the Krishna (a regional water supply system) scheme, not anticipated at appraisal. The project increased water availability by about 60 percent, well over the target, and improved the reliability of supply.

Implementation of policy and institutional strengthening measures proceeded smoothly, although with some initial delay. Metro Water is now a results-oriented agency that emphasizes the quality of service and, thus, customer satisfaction. It has introduced a number of measures to improve its efficiency through private sector participation, staff reductions, and improved management with enhanced autonomy to conduct its business.

Overall, the project set in motion an ambitious program that now, some years after project completion, is resulting in the sustained operation of water supply and sanitation services in Chennai. OED rates project outcome as *satisfactory*, sustainability as *likely*, and institutional development impact

as *substantial*. This agrees fully with the ICR ratings, but OED's ICR review rated the sustainability as *uncertain*. This rating is now upgraded due to continued progress made on institutional improvements, particularly in finance, after project completion.

The audit finds that Metro Water has made considerable progress under the follow-on second project in areas presented as lessons in this project's ICR. When the Bank supports a gradual reform program through repeater investment projects involving water resources, sanitation, and institutional and policy reform issues, as in Chennai, its consistent and continued advice can be critical. This in return requires that the continuity in task management is maintained throughout.



Attachment

Contents

This report was prepared by Klas Ringskog, Task Manager, and Tauno K. Skytta, Consultant. William Hurlbut edited the report. Helen Watkins provided administrative support.

Annexes

Principal Ratings

	ICR	ICR Review	PAR
Outcome	Satisfactory	Satisfactory	Satisfactory
Sustainability	Likely	Uncertain	Likely
Institutional Development	Substantial	Substantial	Substantial
Borrower Performance	Satisfactory	Satisfactory	Satisfactory
Bank Performance	Unsatisfactory	Unsatisfactory	Unsatisfactory

Key Staff Responsible

	Task Manager	Division Chief	Country Director
Appraisal	N. Boyle	Ian Christie	Russell Cheetham
Completion	Michael Whitbread	Shawki Barghouti	Robert Drysdale

Preface

This is a Performance Audit Report (PAR) on the Madras (now called Chennai) Water Supply and Sanitation Project (Ln. 2846-IN/Cr. 1822-IN) in India, for which a Bank loan in the amount of US$53.0 million equivalent and an IDA credit in the amount of SDR12.5 million (totaling US$69.0 million equivalent) were approved on June 17, 1987. The credit was fully disbursed in April 1991. The loan was closed on March 31, 1996, after one extension of three months; a balance of US$4.7 million (equivalent) was cancelled. The Basic Data Sheet on the Project is presented in Annex A.

The PAR was prepared by the Operations Evaluation Department (OED). The Implementation Completion Report (ICR) was prepared by the South Asia Regional Office on February 28, 1997 (Report No. 18344). The PAR is based on the ICR, the President's Report, the project's legal documents, and the Staff Appraisal Report (SAR). In addition, discussions with the borrower, a review of relevant project files and other background material collected during the audit mission in December 1998 were drawn upon in the analysis presented in the PAR.

The ICR provides an accurate account of the project's achievements. The PAR builds on this information and elaborates on particular aspects such as institutional development, including outsourcing of various O&M functions, efficiency of operations, including the reduction of system losses, water resources issues in Chennai, sanitation, and lessons from this intervention.

The draft PAR was sent to the borrower for comments. The comments received are reflected in, and reproduced as Annex E to the PAR.

1. Introduction and Background

1.1 The Madras Water Supply and Sanitation Project was the first Bank-supported urban water supply and sanitation (UWSS) project in Madras,[1] the capital city of the State of Tamil Nadu. An earlier Tamil Nadu Water Supply and Sanitation Project (Cr. 1454-IN) had UWSS components covering three major cities and selected smaller towns in the state (implemented between 1984 and 1994[2]), but it did not include Chennai. There had been eight operations (mostly urban) in India in the water supply and sanitation sector prior to Board approval of the project on June 17, 1987. The project was followed by seven WSS operations (of which three are large-scale rural WSS projects), including the Second Madras Water Supply Project (Ln. 3907-IN), approved by the Board on June 20, 1995; this project is now nearing its mid-term review.[3] A third project for Chennai is under consideration and is currently scheduled for appraisal in FY99.

1.2 At the time of project appraisal, Chennai was the lowest supplied metropolitan area in India with an average supply of 78 lcd[4] inclusive of industry and unaccounted-for water (UFW), estimated at about 20 percent of production. Exclusive of major industrial consumers and UFW, the domestic daily availability in Chennai was below 50 lcd, which is less than the minimum Indian standard for domestic water consumption of 70 to 100 lcd for house connections in urban communities; the standard for public taps is 50 lcd.

1.3 The project is an interesting case for its progress with institutional development. Essential parts of this progress were improvements in financial management and the introduction of service contracts to cover several operational functions. These aspects make the project a justifiable audit case. Furthermore, the project is one of the highest rated in the urban water supply sector in India with good lessons for other projects.

2. The Project

Project Objectives

2.1 The project objectives were to: (a) increase water supply by about 35 percent and improve reliability of the system by providing a lifeline supply in drought years; (b) improve and extend the sewage collection and treatment system; (c) make better use of existing water resources and assist the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB),

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1. Now called Chennai, the name used in this report.

2. OED rated project outcome as *satisfactory*, institutional development impact as *substantial*, and sustainability as *likely*.

3. The project was restructured in July 1997 to drop the water source works component (Veeranam tank and the raw water main) and to focus on water distribution, water conservation, and technical assistance.

4. The corresponding figures for other major cities are: Bombay 253 lcd; New Delhi 220 lcd; Calcutta 190 lcd; and Bangalore 125 lcd; note: lcd stands for liters per capita per day.

commonly known as Metro Water, to develop a plan that addresses the medium- and long-term water supply needs of Chennai; (d) recover a greater proportion of project costs from beneficiaries through improved billing and collections and increased tariffs, as well as from cost reductions through greater operational efficiency; (e) strengthen Metro Water's institutional capacity to shape public water supply policy by improving policy formulation analysis and prioritization through improved planning and management; and (f) initiate a program of low-cost (on-site) sanitation.

Project Components

2.2 The objectives were to be achieved through four components: (i) augmentation of water supply sources; (ii) improvements to the water supply and distribution system; (iii) improvements to the sewerage system; and (iv) institutional strengthening. The details of the components are presented in Annex B.

3. Implementation Experience and Results

3.1 This project significantly improved the availability of water and the reliability of water service in Chennai. Institutional achievements were substantial and Metro Water is today a sound agency, financially and technically, and although it still faces many challenges in providing 24 hour reliable water service in a sustainable manner, it conducts its business under much-improved management. The progress was initiated under the project and has continued after project completion. This section describes the sequence of events in some detail, first on the basis of the ICR findings and then highlighting the key achievements on the basis of the audit's findings and analysis.

Project Highlights from the ICR

3.2 The ICR concluded that project objectives relating to UWSS *physical components* fell short of full achievement at time of closing, despite a project implementation period of eight years. The on-site sanitation (OSS) objective was achieved, but was slightly modified; the trial study of OSS needs, technical options, and institutional requirements was completed and evaluated. As a result, it was decided not to proceed with the OSS pilot scheme, but rather to construct a number of public conveniences with the help of local NGOs.

3.3 The project's *institutional objectives* relating to policy, management, and finance were achieved by closing as all the actions in the Operational Action Plan (OAP) were completed. Particularly important were the improvements in cost recovery, groundwater legislation, and the framework for conjunctive use of water (i.e., using surface water and groundwater sources according to fluctuations of rainy and dry seasons). However, these achievements were initially marred by slow progress in important areas such as timely submission of audit reports, control over staff costs, and performance against targets for internal cash generation.

3.4 Metro Water commenced a program of contracting out important operation and maintenance (O&M) functions to the private sector. Generally this approach to privatization has worked well and, following the positive experience, is to be expanded. The Bank fully supported these initiatives.

3.5 The project improvements constitute the first phase of the UWSS master plan for Chennai, which is now being carried forward in the follow-on second project (Ln. 3907-IN). The institutional strengthening that was accomplished in the project is expected to lead to progressive and permanent improvements in Metro Water's efficiency and performance. The ICR recognized that great challenges still remain before the preliminary improvements have been fully realized and made sustainable. The ICR findings and lessons are reproduced in Annex C.

3.6 The ICR Review by OED rated the outcome of the project as *satisfactory* and institutional development impact as *substantial.* These ratings are consistent with those in the ICR. OED rated sustainability as *uncertain* as opposed to the ICR's rating of *likely* because the financial performance of Metro Water improved only during the last year of the project. Bank performance was rated as *unsatisfactory* because: (i) the project was poorly prepared and not ready for implementation at appraisal; (ii) insufficient priority was given to low-cost measures to conserve water (now being rectified in the second project); and (iii) insufficient supervision during the first five years of the project. OED also presented two lessons for project appraisal related to readiness of design of components and policy reform measures.

Project Achievements

General Implementation Experience

3.7 The main problem seems to have been that not enough time was allowed for a new borrower to become familiar with Bank procedures. Furthermore, there was no additional Bank supervision effort in the early stages to increase borrower awareness. The main concern with project implementation at this stage was slow progress, particularly with physical works and some key technical studies. Procurement performance, in particular, was slow until the concluding stages of implementation.

3.8 Around 1992, revised implementation schedules were worked out and implementation progress improved significantly. At the end, the Bank agreed to extend the implementation period by nine months, but some remaining works were still under way at the time of the audit mission. Other specific factors causing implementation delays mentioned in the ICR, and still valid today, are discussed in Annex D.

3.9 Lack of continuity of senior staff at Metro Water was noted by supervision missions as a possible problem causing delays in the early stages. Later this issue was rectified, and today there are no signs of this.

3.10 In general, implementation of policy and institutional strengthening measures mostly proceeded smoothly although with some delay. Financial strengthening and cost recovery were particularly successful toward the end. Other noteworthy achievements were the policy of conjunctive use of water, and the introduction of groundwater legislation. This overall good performance reflects CMWSSB's readiness for reform.

3.11 The audit mission collected specific information and data detailing the achievements of the project. This information and data were thoroughly discussed and reviewed with officials of Metro Water to obtain a full understanding of project outcome. Field visits were made to inspect certain critical facilities and verify their operational status. The following sections describe the outcome of this review and analysis of the data.

Current Status of Unfinished Components

3.12 Some components remained unfinished at the time of project closing. Estimates for their completion at the time of the audit mission were as follows:

Components	Estimated Completion	Status
Clear water pumping station at Red Hills treatment plant	March 1999	Commissioned April 1999
Improvements to selected sewage pumping stations	June 1999	Rescheduled for October 1999
New inflow pumps at the main sewage treatment plan	Being completed	Commissioned in December 1999

The field visits to the above sites confirmed that the new estimates were realistic.[5] There are also some remaining items in the distribution network and sewerage system still under construction.

Water Resource Development

3.13 The water resource improvements were defined at project appraisal at a time when there were major uncertainties about the availability of water from the Krishna scheme.[6] The design of the project included construction of a link canal between the Araniar and Kortaliyar rivers (A-K link canal) to convey flood waters for short periods during monsoon rains. As the Krishna water finally became available in 1996 (September 29, 1996), the A-K link canal was dropped as the Krishna canal serves the same purpose. In addition, (i) the transfer main between the Redhills and Kilpauk treatment plants was dropped due to revisions to the alignments of the distribution system caused by the Krishna scheme, (ii) construction of three check-dams instead of five due to site problems, and (iii) reduction in new trunk mains from 95 km down to 35 km due to the changed supply situation (the Krishna scheme).

3.14 The original plan also called for well-field augmentation up to the total capacity of 55 mld,[7] transfer of flood waters (A-K link canal), and systematic conjunctive use of well-field supply and surface water sources. Works to augment groundwater supplies to the city were completed, but the outputs fell short of expectations due to over-optimistic projections of groundwater yield. It was expected that the construction of check-dams would help to recharge the aquifer from the Kortaliyar River, thus increasing the yield. The new wells were used up to

5. Post-mission reports indicate that these dates are being met. Furthermore, Metro Water in its comments (dated June 16, 1999) provided the status information presented in the table.

6. No Bank funding was involved.

7. Million liters, or 1,000 c.m., per day.

their design capacity for the first two years after completion. After the water table dropped drastically, the pumping capacity was curtailed.[8]

3.15 The expected and actual change in the immediate water resource improvements (in mld) are as follows:

Component	Target capacity	Actual capacity
Well fields	55	20
Transfer of floodwaters (A-K canal)	27	27
Conjunctive use	20	0
Total improvement	102	47

3.16 The conjunctive use of wells and surface water became impracticable after the supply from the Krishna scheme began in late 1996. The current overall supply situation (in mld) is as follows:

Source	Capacity
Existing supply from old sources[9]	293
Immediate improvements	47
Krishna scheme (current supply)	240
Total supply capacity	580

3.17 The above capacity gives an average daily supply of nearly 130 lcd, assuming the population relying on these sources is about 4.5 million[10] (i.e., the city of Chennai). This is some 60 percent higher than the pre-project level. Thus, the supply to the city improved significantly. The reliability of the service has also improved as the new system is less sensitive to the effects of droughts, and the availability of supply has increased from the pre-project level of some two hours a day to a consistent supply of four hours a day. Of course all these improvements cannot be attributed to the project alone, but the project provided the infrastructure to treat and distribute the increased amount of water made available by the Krishna scheme. The Bank and the borrower collaborated well on these issues and worked flexibly, adjusting the design of the project to fit the realities of the situation, which were not fully known at the time of project appraisal. Other questions related to *quality at entry* are discussed later in the report (paras. 5.7 and 5.8).

3.18 New groundwater legislation was enacted by the Government of Tamil Nadu (GTN). This legislation covers all aquifers within and adjacent to the city area and provides for the licensing of groundwater extractors, enforcement of permitted flows, and monitoring of groundwater levels. Furthermore, Metro Water has introduced a *rainwater harvesting* policy within the city area, which requires that all new buildings, and old buildings that apply for new service connections, implement appropriate rainwater harvesting measures. Although this may not yield significant quantities of water, it can help to enhance groundwater recharge within the city limits and stabilize the water table locally. This is particularly important considering the

8. The sustained yield was found to be about 20 mld.

9. As per the SAR, para. 2.05

10. Metro Water's quarterly report as of June 1998 states the population served at 4.3 million.

frequent droughts that occur in the Chennai area; partial failure of monsoon rains is a cyclical event that occurs, on average, once every seven years.[11] Some 70 percent of the residential properties in Chennai still have groundwater wells in their compound. If the drought becomes serious, these wells can provide at least a lifeline supply of water. Of course, water quality is a concern with some of these wells, but as the sanitation improves, the water quality issue becomes less of a problem.

Institutional Development

3.19 Metro Water took action on all the main institutional elements of the OAP, i.e., (i) a tariff study and tariff reforms; (ii) billing and collection improvements; (iii) installation of a management information system MIS; (iv) introduction of performance-based budgeting; (v) extensive computerization; (vi) staff training; and (vii) improvements to the planning and execution of O&M functions. All these actions had been achieved by project completion, although the progress was somewhat slow. The high degree of borrower ownership for the financial reforms and improvements was evident throughout project implementation. In general, these actions strengthened the planning and policy formulation capacity of the agency.

3.20 Procurement was an area of substantial institutional weakness and poor performance. Generally, procedures were excessively slow and inefficient. Problems were made worse by low delegation of authority from GTN to Metro Water for procurement decisions,[12] which required time-consuming referrals to GTN for many decisions that were not especially significant. During the project, GTN eventually assumed all decision-making responsibility thereby adding to delays and the scope of interference. After project completion in 1997, however, GTN amended the act (No. 56) so that CMWSSB now has the full authority to make decisions on contract approvals and awards. To a large degree, procurement delays were the main reason for the project's long implementation period. Metro Water confirms that the time lag between receipt of tenders and award of contract is half or is of that in the past (ranges now between 30 to 90 days). Therefore it is likely that, with the better authority to deal with procurement matters since 1997, the second project will be completed in much shorter time, perhaps in six years.

3.21 Metro Water has also computerized its management information systems (MIS) in areas such as financial management (including billing and monitoring of collections), inventory, personnel management, connection register, and customer complaints. Many functions are effectively decentralized within CMWSSB so that, for instance, Depot Engineers are able to monitor the status of fee collections in their respective operational zones, if need be, on a daily basis. This has enabled the management of Metro Water to monitor operations more effectively and to establish a comprehensive operational database that helps in preparing future plans.

3.22 In the early years of the project, workforce levels continued to rise until 1990. At this time, they first stabilized and then began to decline. But the fact is that CMWSSB remains overstaffed. For example, the ratio of salaries and wages to total operating costs stood at about 57 percent at the time of project completion and slightly lower, at 53 percent, in 1998. This compares with less than 40 percent, which is typical for water utilities in industrial countries

11. The latest severe drought took place in 1983-84.

12. All contracts with the value of Rs 10 million (about US$28,600 equivalent, at the time of project completion) or above had to be referred to GTN for approval.

(despite their much higher unit labor costs). The total staff of CMWSSB peaked at about 7,600 in 1990 and fell by 20 percent, to about 6,300, in 1996; it is now less than 6,000. Correspondingly, the staff index was reported at about 30 staff per 1,000 consumer connections in 1998, still high, but down from about 40 and 60 staff per 1,000 connections in 1996 (closing) and 1987 (appraisal), respectively. Metro Water now reports that the target of 20 staff per 1,000 connections will be achieved in the next few years.

CMWSSB's Financial Management

3.23 A key covenant [4.02 (a)] of the Project Agreement was to "*take necessary measures to provide sufficient internal cash generation for capital expenditures.*" This proved difficult to comply with as Metro Water lacked autonomy to set tariffs at adequate levels. In the middle years, from FY90 to FY94 during project implementation, internal cash generation at CMWSSB fell short of agreed targets. Only in the last year, following the first substantial tariff revision on April 1, 1994, was Metro Water able to produce acceptable financial results. Internal cash generation rose to Rs 298 million in FY95 against the appraisal target of Rs 134 million. Thereafter, on the basis of its enhanced autonomy to deal with these matters, Metro Water raised tariffs again in April 1997 by 30 percent and in October 1998 by 25 percent. This has helped Metro Water maintain a reasonable level of financial health. Most recent financial projections indicate that Metro Water can be expected to meet its covenanted targets in the future, including that of internal cash generation.

3.24 Metro Water has in the past few years continued to be in a position to meet cost recovery requirements as spelled out in the second project, and its financial projections predict even better results for the current fiscal year. Its collection ratio has also improved; after being at the level of about 60 percent for most of the 1990s, the ratio was well over 80 percent in FY98 and climbed to over 90 percent for the first half of FY99.

O&M Functions

3.25 One of the first areas of focus in improving Metro Water's O&M functions was to address the leak detection and mains rehabilitation to reduce the physical side of the unaccounted-for water (UFW) ratio. A comprehensive program was developed and it was implemented in two phases under the project, both phases covering about 10 percent of the system, i.e., 20 percent of the system in total. The results have been encouraging, and the water production and sales data provided by Metro Water indicate that UFW is currently at the level of about 20 percent. This is a rather rough estimate, and perhaps unreliable, as practically all domestic service connections, representing well over 60 percent of the total water sales, are unmetered. Another estimate[13] shows that UFW is now at 35 percent, and projected to reach the 20 percent level in 10 years as the leak detection and rehabilitation program progresses. The main benefit of the leak detection program under the project was, however, that it served as a useful training exercise, and through it Metro Water developed a workable procedure that is now being expanded under the Second Madras Water Supply Project (Ln. 3907-IN).

3.26 Metro Water has commenced and expanded a program of private participation through contracting out (i.e., outsourcing) important functions including operations at 60 percent of the sewage pumping stations, one of its sewage treatment plants and the new Redhills Water

13. An estimate that is based on latest field results from the ongoing leak detection program.

Treatment Plant. This experience has been positive, and the privatization program has been substantially expanded since project completion. The audit mission was told that Metro Water's intention is to privatize the operation of all its sewage pumping stations on a gradual schedule as the staff retires or is otherwise transferred so as to minimize labor problems. Furthermore, Metro Water now handles many routine functions, such as vehicle and equipment repair and maintenance and property maintenance, through private firms. None of the contracts are properly designed on performance-based criteria, however, and all are rather short-term. It would be important now to analyze the operational and financial gains in full detail to formulate a sound basis for establishing a clear management procedure for future contracts.

Sanitation Program

3.27 Metro Water successfully carried out a trial study of OSS needs, technical options, and institutional requirements, as was required, and an evaluation was undertaken. This trial was intended to precede an OSS program in the Chennai Metropolitan Area involving an initial construction of 4,000 units. However, following evaluation of the trial, Metro Water decided not to proceed to implement the pilot units, chiefly due to low demand demonstrated for individual on-site units. Instead, public conveniences were constructed by local NGOs at 58 locations in the metropolitan region. Many NGOs expressed willingness to continue and enhance their involvement (see para. 3.29 below) in such activities and even include composting (perhaps biogas), local drainage improvements, and other environmental concerns.

Customer Relations

3.28 Metro Water is perhaps the first major water supply organization in India to publish a "*Citizen's Charter,*" which became effective July 1, 1998. In the charter it gives its mission statement, presents its current operations and future plans, and most important, specifies its criteria for good service. This includes details such as "*new service connection to be provided within 30 days from registration of an application; repairs to be carried out within six hours of a reported service fault; customer complaints to be resolved within seven days; calls to customer service numbers to be answered within 90 seconds*" to mention a few. Metro Water is committed to monitor staff performance, including that of the general manager, against the standards and will report on results in the Annual Report. During the year, the general manager will receive a weekly summary report on customer complaints for monitoring purposes.

3.29 Civil society is also represented on the board of Metro Water. At the local level, it is possible to get the consumers' voice heard through monthly meetings that are being organized regularly by the area offices of Metro Water; every second Saturday of the month is a public grievance day. The audit mission met with representatives of several NGOs that are active in the water field. In the meeting, NGOs expressed their general satisfaction with the improved water supply and sanitation situation in Chennai. They particularly voiced their satisfaction with efforts Metro Water is taking to enhance consumer participation through area meetings, as well as in sanitation and other relevant activities.

4. Issues for the Future

Water Sources

4.1 The project provided support for the first phase of the WSS master plan implementation. Shortly before completion, the second project (Ln. 3907-IN) was made effective and its components became the second phase of the master plan, which was substantially updated under the project, especially with regard to water source issues due to the commissioning of the Krishna scheme in 1996. The water source question remains a long-term issue and needs to be adequately addressed in the near future. The Bank can play an important role in this area through the third project now under consideration.

4.2 Source works constructed under the project have been in operation for some time; they include tubewells, check-dams and river linkages, and elements of the transmission system. For these facilities, operational arrangements are in place and are satisfactory. Injection wells for the control of saline intrusion are also operational. Analysis of several years' worth of monitoring data on saline intrusion (provided by Metro Water) determined that the wells are operating successfully. Continued reliability of the Krishna scheme as a source of supply for Chennai is a crucial question for effective and full utilization of the assets constructed under the project. Metro Water is also in the process of undertaking further groundwater investigations in various areas of Chennai, including that of the A-K basin. During the audit mission, the terms of reference for these investigations were discussed and the selection of consultants was being finalized.

4.3 Although all the above is necessary and important in the long-run in a water-shortage city such as the Chennai Metropolitan Area, the most immediate results are achieved through effective water conservation measures. As discussed above, Metro Water has already introduced such measures as leak detection and rehabilitation of the distribution system, rainwater harvesting, and promotion of water saving devices in sanitary plumbing installations. It is crucial that these efforts be continued effectively and expanded. Equally important is that Metro Water introduce water pricing policies that encourage water conservation and discourage wasteful use of water.

Sanitation

4.4 Chennai has five drainage zones, of which four have been provided with sewage treatment works[14] with a total capacity of about 270 mld, i.e., less than 50 percent of the total capacity of the water supply system. One of the zones drains directly to the sea through an outfall but without any treatment. In the zones that have treatment, the plants are generally overloaded and significant overflow takes place, in most cases to nearby rivers. There are also some low-lying areas (pockets) that are technically difficult to sewer; Metro Water has identified about 70 such pockets, of which some 80 percent are under engineering design; improvements are scheduled to be carried out under local funding[15] in the year 2000.

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14. 1 lagoon, 1 activated sludge plant, 1 primary treatment plant, and 1 plant that was upgraded from a trickling filter to an activated sludge plant under the project

15. Funding has been earmarked from the Housing and Urban Development Corporation of the GOI.

4.5 The kind of sanitation problems described above have important environmental implications, some local but some also city-wide. Therefore, Metro Water is now preparing proposals for inclusion to the proposed third project for (i) improving the remaining pockets, (ii) expanding and upgrading existing sewage treatment plants, and (iii) constructing major interceptor sewers and pumping stations.

Institutional Development

4.6 As can be seen in paras. 3.19 – 3.22 above, CMWSSB's continues to make progress in performance improvements and efficiency. For example, the downward pressure on staff numbers continues, and efforts to make tariff review an annual event are pursued. Another example is the broad-based MIS, which is now functional but needs to be made an integral part of the managerial process in all aspects of Metro Water's operations. Furthermore, the program of contracting out important operations to the private sector has generally worked well and, encouraged by the positive experience, is being expanded. The set of operational indicators were generated for use in the second project, which is under way. All these are important considerations for the third project.

Sustainability

4.7 The institutional improvements achieved so far, particularly in finance, are leading to progressive and sustained improvements in CMWSSB's efficiency and performance. Nevertheless, some areas of institutional improvement need to be further pursued to continue the process of institutional reform and growth. Follow-on project activities provide further assurance that the investments already undertaken will be utilized and that the project benefits will be fully realized.

5. Assessment of Performance

Project's Ratings

5.1 The project was rather large, and perhaps a bit complicated for a first-time borrower to digest. Combined with that was the less-than-satisfactory preparation of final engineering for key components prior to project appraisal, which hindered readiness of contract packages for early bidding. As it turned out, a number of legislative actions were also required on the part of GTN before Metro Water was able to achieve its institutional goals. Metro Water has continued the positive progress that it began to show toward the end of project implementation. It now has adequate autonomy to set tariffs, authority to deal independently even with major procurement matters, and most important, has continued to improve its management practices and customer service. Metro Water's financial standing has improved further from that shown in the ICR, which is a firm reassurance of the sustainability of project benefits.[16] Overall, the project set in

16. The ICR recalculated the ERR at 12 percent using the actual project costs and benefits measured on the basis of incremental water sales; the ERR estimate at appraisal was 8 percent.

motion an ambitious program that now is resulting in the sustained operation of improved water supply and sanitation services in Chennai.

5.2 Accordingly, the audit confirms the earlier ICR review ratings of outcome and institutional development impact as *satisfactory* and *substantial*, respectively. The sustainability rating is now upgraded from *uncertain* to *likely*.

5.3 All important covenants and other commitments were complied with by credit closing, but some with considerable delay. However, the Bank's supervision was effective in seeking covenant compliance when performance fell short. The audit finds no violation of ODs (or OMSs) in the preparation and implementation of the project.

Borrower Performance

5.4 *Preparation.* The project was appraised and approved by the Bank when only limited detailed engineering designs had been completed for water production and distribution, and for sewerage, the two main components of the project. This was chiefly because of CMWSSB's unwillingness to employ consultants, for example, for sewage pumping station design, despite limited in-house capability.

5.5 *Implementation.* As a consequence, progress on project implementation was slow during the early years. Only toward the very end of the project did progress pick up. Still, the project was not within the allotted schedule, and some unfinished works had to be carried over to the follow-on project.

5.6 The implementation of policy and institutional improvements at CMWSSB was slow initially, but all relevant elements of the OAP were completed within the project period. After project completion, this positive progress continued, and Metro Water has become an effective agency with a clear vision of its future. It is mainly for this reason (as already anticipated in the ICR), that the overall performance of the borrower has been rated as *satisfactory,* despite the tardy procurement of works and technical studies.

Bank Performance

5.7 *Identification, preparation, and appraisal.* The Bank resources used between identification and Board presentation were about 60 percent of a typical amount of staff-weeks for a project of this type. Judged against contemporary practices at the time, the level of Bank input in assisting this first-time borrower was low. This, together with complex water resources issues and the urgency of water supply improvements in Chennai, led to the lack of readiness at appraisal with consequent slow implementation of the key components of the project. Nevertheless, the Bank played an important role in convincing the borrower of the cost savings of proceeding with the development of groundwater expected to be used conjunctively with the existing surface water sources.

5.8 The Bank deployed a full complement of required skills for the appraisal of the project. The appraisal was thorough in assessing the financial, legislative, commercial, and institutional aspects of the project, but insufficient attention was given to technical and engineering aspects as

well as the inefficient and time-consuming nature of the decision-making process for procurement.

5.9 *Supervision.* During project implementation, the evolving development of the Krishna scheme required important project design changes. Overall, supervision missions took place with appropriate frequency and commitment of resources, but proportionately greater Bank effort in the first few years would have been beneficial to the borrower. The two key skills, financial analysis and sanitary engineering were always represented. Task management, however, changed six times during preparation and implementation. This turnover of task managers probably reduced the Bank's effectiveness somewhat, a fact also brought up by Metro Water during the audit mission. Supervision missions appeared to be unable to focus on the principal causes of the problems of delay in procurement and technical studies, and were not able to rectify them. The Bank maintained sufficient pressure on the borrower to reduce staffing levels and revise tariffs, with some success later in the process.

5.10 The mid-term review (in May 1994, when 75 percent of the implementation time had passed) was carried out too late to be effective. Supervision missions also misled Bank management at times, as Form 590 ratings for implementation status were always satisfactory and development impact was sometimes rated even highly satisfactory. This was totally inconsistent with the slow progress. Despite the valiant effort by the Bank to supervise the project effectively during the latter part of project implementation, the Bank's overall performance is rated as *unsatisfactory*.

6. Conclusions and Lessons

6.1 Metro Water largely met the objectives of the project. What is most important is that Metro Water is now a results-oriented agency that emphasizes the quality of service and, thus, customer satisfaction. It has introduced a number of measures to improve its efficiency through private sector participation, staff reductions, and improved management with enhanced autonomy to conduct its business.

6.2 The project did not suffer from such factors as unrealistic borrower expectations at the time of appraisal, unavailability of counterpart funds, or major complexity, riskiness and size, which often are found to cause problems in Bank-supported projects in India. Nor were there difficulties with land acquisition.

6.3 *ICR lessons.* The ICR presented several project-specific lessons, which are reproduced in Annex C. The audit finds that considerable progress has been made in many of these areas, but performance indicators, cost recovery, and consolidation of institutional gains still need to be considered in the preparation of the third project.

6.4 *ICR review lessons.* The ICR review summarized two lessons from the project as follows:

- Appraisal of projects should only be carried out after all technical studies, detailed engineering, and bidding documents for the first package of works have been prepared, and

tenders have been invited and evaluated. This is especially important with a first time borrower.

- Where important policy reforms in key areas, such as water conservation and tariff increases, are required, project appraisal should be conditional on the borrower implementing the key policy measures.

The audit finds that Metro Water has a good understanding of these aspects and endorses their application in future projects.

6.5 *Generic lessons*. In addition to the above, the audit draws lessons from the project that have wider application:

- To deal effectively with critical water source issues, it is important to have a clear-cut long-term development plan before moving ahead with project implementation. Water conservation measures should always be given the highest priority in such a plan.

- Sanitation has important environmental implications, both locally and city-wide, when the water supply capacity is increased on a large scale as in Chennai. It is necessary to develop a plan and an implementation program to ensure that the necessary actions will be taken in a timely manner to collect and treat increased sewage flows. In this effort, local NGOs can play a beneficial role.

- To achieve sustained results in long-term institutional reforms, it is necessary to set up a gradual implementation program supported through a series of investment steps, as demonstrated in Chennai. Further, to ensure sound progress, it is essential to establish a realistic set of performance indicators for O&M of services at the outset.

- Outsourcing can be an efficient way of carrying out many O&M functions when an agency is adapting more sound financial policies. Such contracts should, however, be based on clear performance criteria and cover terms long enough to encourage effective competition.

6.6 When the Bank supports reform programs and finances related investments, its advice can be critical in helping the borrower develop appropriate strategies for policy reforms, commercialize operations, and fund investments. It is therefore important that task management continuity is maintained throughout the project and, if handing over of task management is unavoidable, it should be done with adequate care.

ANNEX A

Basic Data Sheet

MADRAS WATER SUPPLY AND SANITATION PROJECT (LOAN 2846/CREDIT 1822-IN)

Key Project Data *(amounts in US$ million)*

	Appraisal estimate	*Actual or Current estimate*	*Actual as % of Appraisal estimate*
Total project costs	112.2	91.3	81.4

Cumulative Estimated and Actual Disbursements

	FY88	*FY89*	*FY90*	*FY91*	*FY92*	*FY93*	*FY94*	*FY95*	*FY96*	*FY97*
Appraisal estimate (US$M)	7.3	18.5	31.4	42.8	52.9	60.9	66.5	68.4	69.0	69.0
Actual (US$M)	3.5	7.4	12.3	16.7	16.7	16.7	16.7	16.7	16.7	16.7
Actual as % of appraisal	47.9	40.0	39.2	53.7	59.0	60.3	68.3	76.6	76.0	94.2

Date of final disbursement: August 19, 1996

Project Dates

	Original	*Actual*
Identification	-	Nov. 85
Preparation	-	Dec. 85
Appraisal	Jul. 86	Dec. 86
Negotiations	Nov. 86	May. 87
Board Presentation	Jan. 87	Jun. 87
Signing	-	Dec. 87
Effectiveness	-	Mar. 88
Mid-term review	-	May. 94
Project completion	Jun. 95	Mar. 96
Credit closing	Dec. 95	

Staff Inputs (staff weeks)

	Planned		*Revised*		*Actual*		*Total*	
	Weeks	*US$*	*Weeks*	*US$*	*Weeks*	*US$*	*Weeks*	*US$*
Through Appraisal	N/A	N/A	N/A	N/A	N/A	N/A	47.6	122.5
Appraisal – Board	N/A	N/A	N/A	N/A	N/A	N/A	34.3	88.2
Board – Effectiveness	N/A	N/A	N/A	N/A	N/A	N/A	12.0	30.3
Supervision	N/A	N/A	N/A	N/A	N/A	N/A	101.7	281.8
Completion	22.0	40.0	---	---	---	---	18.0	35.7
Total	N/A	N/A	N/A	N/A	N/A	N/A	213.6	558.5

Annex A

Mission Data

	Date (month/year)	No. of persons	Staff days in field	Specializations represented	Performance Ratings: Implementation Status	Performance Ratings: Development Impact	Types of problems
Through Appraisal	Nov. 85	3	18	FA, SE, EC	-	-	-
	May 86	1	3	FA	-	-	-
	June 86	3	n/k	FA	-	-	-
Appraisal through Board approval	Dec. 86	6	12	FA, SE, LOL, O&M	-	-	-
Board approval through effectiveness	Mar. 88	1	5	SE	-	-	2 special conditions of appraisal were action on tariffs/revenues and groundwater legislation
Supervision	Jul. 88	3	11	SE, FA, EC (part)	2	2	Slow start. Financial performance weak below covenanted targets. Increases in staff nos.
	Apr.89	2	8	FA, EC (part)	2	2	Concern over financial weakness and institutional aspects, including GTN on-lending terms, staffing.
	July 89	2	18	FA, SE	2	2	Sharp drop in project expenditures and very slow disbursements. Financial and institutional weaknesses. GTN on-lending terms. Some redesign due to changes in scope of project. Implementation progress appears to be picking up for works.
	April. 90	6	22	FA, SE, Pro, Train	2	1	Re-occurrence of slow implementation progress for works, due partly to design changes. Concern over poor construction quality.
	Jan. 91	7	7	DC, FA, SE, L, LCS	2	1	Re-occurrence of slow implementation progress for works, due partly to design changes. Concern over poor construction quality.

Annex A

	Jun. 92	5	14	FA, SE, LCS, Inst.	2	1	Pace of implementation quickened. Some procurement problems remain. Shortfall on revenue covenant. On-lending (GTN to MMWSSB) not in compliance
	July 93	2	14	FA, SE	2	2	Implementation pace slowed again
	Jan. 94	3	5	FA, SE	2	2	Continuing procurement problems. Redesign to reflect new source of supply (Veeranam).
	May 94 (Mid- term Review	3	11	FA, SE	S	S	Implementation progressing reasonably well but due to slow start some works will remain unfinished. Sharp deterioration in financial performance due to drought.
	Sept. 95	2	12	FA, SE,	S	S	Slowing pace of implementation. Very slow on leak detection and repair.
	Sept. 95	3	12	FA, SE R&R	S	S	Implications of request for one-year extension considered.
Completion	May 96	3	8	FA, SE, LCS	-	-	-

Key to specialized staff skills: FA – Financial Analyst; SE – Sanitary engineer, EC – Economist; LO- Loan Officer; L-Lawyer; O&M – Operations and Maintenance specialist; proc – Procurement specialist; train – training specialist; LCS – Low Cost Sanitation specialist; R&R - Relocation and Rehabilitation specialist; Inst. – Institutional specialist; DC – Division Chief

Annex B

Madras Water Supply and Sanitation Project (Loan 2846/Credit 1822-IN)

Project Components

The four major components were as follows:

(a) *Augmentation of water supply sources.* (Base cost US$44.1 million).This component would increase the amount of water supplied to Chennai by 102 mld and improve reliable supply in drought years through a surface/groundwater conjunctive use program. It included: (i) the development of 3 new well fields in the Kortaliar basin; (ii) construction of check dams across the Kortaliar River to retain the seasonal floods and increase groundwater recharge; and (iii) seasonal transfer of flood waters from the Arani River into the Kortaliar River by linking them with a canal. Concurrently, 33 mld of secondary waste water effluent was expected to be utilized by industrial consumption in the Manali industrial park;

(b) *Improvements to the water supply and distribution system.* (Base costUS$11.1 million). This component would rehabilitate, upgrade, and extend the water supply and distribution system in Chennai. The component consists of construction of: (i) transmission mains; (ii) ground-level storage tanks; and (iii) pumping stations, to distribute the additional water and to strengthen the operation of the existing distribution network;

(c) *Improvements to the sewerage system.* (Base cost US$11.3 million). This component would improve the effectiveness of, and extend, the existing sewage collection system and provide services to slums and low lying areas of Chennai. It consists of: (i) laying of new and replacement sewers; (ii) improving 10 sewage pumping stations: (iii) and provision of collection, transmission and disposal arrangements for sewage in low lying areas and slums; and

(d) *Institutional strengthening.* (Base cost US$7.6 million). Through provision of training, technical assistance, and an employee "Incentive Program", this component would: (i) strengthen the productivity of Metro Water in three key areas of operational and financial activity (engineering design and planning; operations and maintenance; and financial recovery); (ii) promote regulation of groundwater extraction; (iii) plan and develop medium and long-term water supply solutions; (iv) introduce a low cost (on-site) sanitation program; and (v) improve policy formulation, analysis, and prioritization.

Annex C

Madras Water Supply and Sanitation Project (Loan 2846/Credit 1822-IN)

Main Findings and Lessons in the ICR:

1. *Identification, Preparation and Appraisal*:

(a) where the Borrower is reluctant to undertake policy reform in certain key areas, as with water conservation measures, it is appropriate for the Bank to seek some actions early on, preferably prior to appraisal;

(b) in accordance with current Bank practice, this project should have been appraised only when fully prepared in terms of technical studies, engineering design, procurement procedures implementation plan to enable implementation to proceed in eamest immediately following effectiveness;

(c) as agreed delegations of authority to the implementing agency for procurement were unilaterally withdrawn by GOTN they should have been backed by covenants to ensure they remained in place.

2. *Implementation*:

(a) the Bank should have provided above-average levels of supervision support to a first-time Borrower in the first few years of implementation to facilitate the process of learning about procedures and methods. The high turnover of Bank Task Managers (6 in the 9 years from identification to closing) hampered continuity and probably reduced the Bank's effectiveness;

(b) the eight years of implementation from effectiveness to closing, as planned at appraisal, was possibly responsible for the development of a somewhat relaxed approach to preparation and implementation activities, and a shorter period might have engendered a greater sense of Borrower urgency;

(c) an implementation plan should have been prepared with performance indicators and regular reporting against which implementation progress could have been assessed by Bank and Borrower; and,

(d) the considerable institutional and policy strengthening achievements in the areas of conjunctive use of water, groundwater legislation and, especially, cost recovery reflected the attention given to these issues by the Bank throughout the project cycle.

Annex D

Madras Water Supply and Sanitation Project (Loan 2846/Credit 1822-IN)

Factors Causing Implementation Delays

Factors not subject to CMWSSB control: (i) In several years throughout the project period, the Madras region was subject to *severe drought*. This caused great distraction for CMWSSB management and tied up engineering and other technical skills and resources to deal with the deepening crisis. The engineers were diverted from the preparation and supervision of the project's long-term studies and investments towards solving the short-term problems of obtaining more water for the city (which was secured partly from great distances by train and ship), and its equitable distribution in the city. The droughts undoubtedly played a part in the delays in preparation and procurement of project works; and (ii) Additionally, the droughts caused Government to consider the development *of a new source* for Chennai using water from the *Veeranam irrigation tank* some 235 km. to the south. Between 1993 and 1995, this Veeranam concept was developed into the Second Project. As a consequence of the decision to proceed with this new source of supply, redesign of the water distribution master plan for the city was needed which also caused implementation delay.

Factors subject to CMWSSB control: (i) Apart from the delays attributable to the drought and its consequences, there was *slow progress* in the preparation and procurement of works and technical studies. For example, an 18 month delay occurred in the consultants' contract award for the master plan update in 1991 which had further delay implications for downstream scheme designs and contracts for works. Another example was the 12 months delay in contract award for works at Redhills Water Treatment Plant; (ii) *Low delegation levels* from GTN to CMWSSB for procurement decisions were partly to blame; (iii) There was a *reluctance to employ consultants* even when in-house capacity was clearly inadequate, as with the design of sewage pumping stations; (iv) There were many *small contracts* which added to the administrative burdens; and (v) project *management skills* in CMWSSB were weak.

ANNEX E

Comments from the Borrower

Chennai Metropolitan Water Supply and Sewerage Board

C.P. SINGH I.A.S.,
Managing Director

LETTER NO.CMWSSB/TCP/LN2846/99, DATED JUNE 15, 1999

To
Mr. Gregory Ingram,
Manager,
Sector and Thematic Evaluations Group,
Operations Evaluation Dept.,
World Bank,
1818-H Street,
Washington DC.
20433 USA.

Sub: CMWSSB – India – Madras Water Supply & Sanitation Project (Loan 2846/Credit 1822-IN) – Draft Performance Audit Report – Comments – Regarding.

Ref: Your letter of date May 26, 1999.

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Thank you for your letter enclosing therewith a copy of the Draft Performance Audit Report on the Madras Water Supply & Sanitation Project - Loan 2846/Credit 1822-IN for our comments. We have reviewed the Draft Performance Audit Report and generally find it interesting informative and well documented. We are happy with the OED's upgradation of the sustainability as "likely". We are also happy to inform you that initiatives at institutional improvements are being continued and with the support from on going Second Chennai Project I am sure we will have more gratifying results in the immediate future.

2. More by way of clarification on some of the points, we have the following comments to make:

   i) The on site sanitation objectives (Para 3.2) was mainly completion of a study by implementation of a pilot project and as such we would consider the on site sanitation objectives to have been fully achieved.

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ii) The current status of the unfinished components at the time of project closing is:

Component	Estimated Completion
i) Clear Water Pumping Station at Redhills Treatment Plant.	Commissioned on April 01, 1999
ii) Improvements to selected sewage pumping stations.	October 1999*
iii) New Inflow pumps at main Sewage treatment Plant	Commissioned in 1998.

* The improvements to selected sewage pumping stations work could not be completed as programmed, due to financial problems of the contracting company despite our best efforts and even after extending a special loan to the contractors.

iii) Regarding procurement procedures (para 3.20), the granting of full authority by GOTN has enabled us to take quicker decisions on contract approvals and award of works. An analysis of the contracts awarded under the on going Second Chennai Project reveals that the time lag between receipt of tenders and award of contract now ranges from 30 to maximum of 90 days in normal cases (where technical or other clarifications from bidders were not needed) as compared to about 150 to 180 days required earlier. As stated in the Draft Report, we would, therefore, like to confirm that the Second Project will be completed well on schedule.

iv) On computerisation (para 3.21), Metrowater is planning for substantial improvements to the network system on the basis of Information Technology Planning Study (ITPS), organized through consultants for which we have sought the concurrence of the Bank to take up works under the on going Second Chennai Project and we hope that the Bank would extend support.

v) Regarding workforce levels (para 3.22), we are of the opinion that it may not be appropriate to compare with water utilities in advance countries, due to peculiar nature of the problems in water distribution and sewerage system maintenance faced at Chennai. However, we have programmed to reach a staff index level of 20 per 1000 connections in the next few years.

vi) Regarding internal cash generations by Metrowater for funding its projects, (para 3.23), we would like to state that for the Proposed Third Chennai Project an internal generation of up to 34.4% of the project cost is proposed to be made by Metrowater which you will agree is substantial and is an indicator of financial health built inter alia due to the result of implementation of bank's institutional reform measures.

vii) Regarding water conservation and discouragement on wasteful use (para 4.3), we are pursuing our Leak Detection and Rectification programme as also metering strategy, for the present and these will check the wasteful use substantially.

ANNEX E

viii) Regarding lessons learned from I.C.R. review (Para 6.4), we would like to observe that while it is possible for carrying out the appraisal after technical studies, detailed engineering and bid documents for the first package of works have been prepared it may be difficult to invite tenders and evaluate them prior to appraisal in the absence of commitment about the availability of World Bank financing.

ix) We fully agree and endorse the generic lessons (para 6.5). It is precisely in order to improve the sanitation and environmental health of Chennai City residents, we have posed the proposed Third Chennai Project in which 85% of the works are related to improvements to the Sewerage Systems and Sanitation. It is in this background that we seek early appraisal and clearance of the Third Project by the Bank.

We are thankful for the observations made in para 1.3 and elsewhere in other places regarding institutional improvements that have taken place in Metrowater and we would like to assure the bank that Metrowater would continue its progress in reforms to reach even greater heights.

Yours sincerely,

(C.P.SINGH)
16/6/99