



**IMPACT EVALUATION OF GREATER COLOMBO  
WATER SUPPLY PROJECT:  
DEVELOPING A NEW FRAMEWORK**

**REPORT SUBMITTED TO  
JAPAN BANK FOR INTERNATIONAL COOPERATION**

**BY**

**THIRD WORLD CENTRE FOR WATER MANAGEMENT  
MEXICO**

**May 2003**

TABLE OF CONTENTS

CHAPTER I. Introduction	2
CHAPTER II. Impacts on Beneficiaries	6
CHAPTER III. Economic Sustainability	29
CHAPTER IV. Capacity Building and Communication	56
CHAPTER V. Lessons Learnt	70
CHAPTER VI. Conclusions and Recommendations	78
CHAPTER VII. Bibliography	83

## CHAPTER I. INTRODUCTION

The present study on the impact evaluation of the Greater Colombo Water Supply Project was undertaken by the Third World Centre for Water Management at the request of the Japan Bank for International Cooperation (JBIC). The objective of the evaluation was stipulated as follows in the terms of reference for this study:

“With regard to the three projects that make up the Greater Colombo Water Supply Project, an evaluation will be carried out through the examination of the projects benefits to and impacts on residents in target areas, and through analysis of conventional and participatory methods of project planning, implementation and sustainable management. The evaluation is also expected to contribute to the formulation of future Japan's ODA loan projects by providing recommendations regarding sustainability that can be applied widely to other projects”.

It should be noted that this impact evaluation study was undertaken following an earlier brief assignment, which the Centre undertook at the request of JBIC, to develop a framework as to how best an impact evaluation could be carried out for the towns east and the towns south of the Greater Colombo Water Supply Projects. These two projects are being financially supported by loan agreements from JBIC.

The framework for the current evaluation study, and the logic and rationale for the development of the framework, can be found in the earlier report submitted to the Japan Bank for International Cooperation by the Third World centre for Water Management (Biswas, 2002). Since the framework and the evaluation process were discussed in detail in the earlier report, it will not be discussed herein. The proposed framework recommended that much of the work for the current study will focus on impacts assessment, economic sustainability and public participation aspects of the two projects.

The present assessment is based on field studies conducted in Colombo, Sri Lanka, during 6-30 December by Prof. Asit K. Biswas and Dr. Cecilia Tortajada of the Third World centre for Water Management. Dr. Yayoi Tanaka and Mr. Koichi Yawata from the Evaluation Office of the Japan Bank for International Cooperation were present in Colombo during the beginning of the evaluation. The evaluation process formally started with a meeting with the Secretary, Ministry of Housing and Plantation Infrastructure, which was attended by Mr. M. Wickramage, Additional General Manager, National Water Supply and Drainage Board (NWSDB); Mr. D. N. J. Ferdinando, Assistant General Manager (Japanese projects of NWSDB); Mr. Anura Dassanayake, Director, Urban Settlement Improvements Project (USIP) of the Ministry; as well as Dr. Tanaka, Mr. Yawata, Prof. Biswas and Dr. Tortajada.

Following this initial kick-off meeting, the evaluation process started in earnest. The process consisted of two interrelated studies, which were carried out concurrently. The two components were:

1. Socio-economic impacts evaluation for the towns east and the towns south of Colombo Water Supply Projects. This study was led by Prof. Ramani Jayatilaka, Head of the Department of Sociology, University of Colombo, Colombo, Sri Lanka. The Third World Centre for Water Management was responsible for the selection of Prof. Jayatilaka to carry out this study. The entire study, including the preparation of the terms of reference for the study, formulation of the study methodology, and the process used to carry out the study, were finalised jointly by Prof. Jayatilaka and Third World Centre for Water Management following an intensive and extensive set of consultations.

2. All other assessments for the overall evaluation were carried out by Prof. Asit K. Biswas and Dr. Cecilia Tortajada on behalf of the Centre.

Following the end of the field studies, Prof. Biswas and Dr. Tortajada gave a preliminary briefing on the findings of the evaluation to the Secretary, Ministry of Housing and Plantation Infrastructure, Mr. Wickramage, Mr. Ferdinando and Mr. Dissanayake. A similar preliminary briefing was also given to selected staff members of JBIC, Tokyo, on 10 January.

In retrospect, the evaluation faced five major constraints:

1. No immediate studies for the pre-project conditions for the two loan agreements were available. Thus, the initial pre-project conditions, especially in social, economic and environmental terms, had to be estimated through the recall method, through interviews with selected beneficiaries of the projects.

2. The JBIC loan agreement with the Government of Sri Lanka (GoSL) was signed on March 28, 1990 for the towns east project, and on August 12, 1993 for the towns south project. The feasibility studies for both these two projects were carried out well before the dates the loan agreements were actually signed. It was not possible to find any one in JBIC or NWSDB who were associated with the feasibility studies of the two projects in order to get a briefing on the expected outputs of the projects, including the anticipated nature and extent of the beneficiaries, when they were initially formulated. The two loan agreement documents, as is normal for such cases, focused almost exclusively on the financial and economic aspects of the project implementation process.

3. No mid-term evaluation of any of the two projects was carried out. Nor was any report available on any monitoring of the two projects. Absence of information on the immediate pre-project conditions and lack of mid-term monitoring, and regular normal monitoring during the project implementation process, made the end of the project evaluation a somewhat difficult, complex and time-consuming task, certainly significantly much more than normal, for evaluations of similar types and magnitudes of water supply projects.

4. Final Project Completion report for the Towns South of Colombo Water Supply project is still not available.

5. Because of the above four constraints, the time allocated for this evaluation proved to be a serious underestimate, not only in terms of the field investigations, but also for the analyses that had to be carried out subsequently.

One of most positive aspects of the current study, which is somewhat unusual, is the constructive and positive attitudes of all the senior staff members of NWSDB, who were consulted, to this evaluation. Without any exception, the reaction of the NWSDB staff members to the evaluation can be summed up by the view of a senior staff member who said: "In the final analysis, this evaluation is for us, and is for our own use. We need to know from independent and objective experts what we are doing well, and where we can improve, and the reasons for our good or under-performance. Ideally, we should have carried out such comprehensive evaluations ourselves, and not have waited for JBIC to send a team to do it for us".

With such a positive and open attitude, not surprisingly, all the discussions with the NWSDB staff members were free, frank and constructive. It is a great tribute to the NWSDB that not even single staff was defensive, either in terms of discussion or in terms of providing necessary information, which again is highly unusual for similar project evaluations. During the numerous discussions, which were both extensive and intensive, the NWSDB staff objectively and dispassionately pointed out the positive aspects of the execution of the two projects, and the problems and the constraints they had faced, and their suggestions as to how these could be overcome. They promptly provided all the information that were considered necessary, and most times more than what were requested. Anyone the evaluation team wanted to meet with was almost immediately available. The Centre simply has not received such positive approach to evaluation by the Board staff in any other project, anywhere in the world.

The evaluation team thus gratefully acknowledges the total support received from the NWSDB, and would especially like to thank Mr. Wickramage and Mr. Ferdinando, who was the liaison counterpart for us on behalf of the Board, for their wholehearted support to carry out the assessment, and to all other senior staff members of the Board who generously gave us their time, and provided us with whatever information we needed, not only during the assessment in Colombo, but also later in Mexico, when supplemental information was considered necessary. Without such strong support of the Board staff members, this evaluation would not have been possible.

The Centre further acknowledges with gratitude the advice, support, and encouragement received from the Evaluation Division of JBIC, especially Mr. Motonori Tsuno, Dr. Yayoi Tanaka, Mr. Yoshihiro Kumagai, and Mr. Koichi Yawata, and also from Mr. K. Toyama and Mr. Jagath Pethawadu from the JBIC

office in Colombo. All these support from the JBIC and NWSDB staff members went a very long way to make the evaluation mission both most productive and pleasant.

It should be noted that the analyses presented and the statements made in this entire report are those of the Third World Centre for Water Management, and not necessarily those of the Japan Bank for International Cooperation, National Water Supply and Drainage Board, or any institutions or individuals we consulted with, either in Sri Lanka or in Japan, during the conduction of the entire assessment, which included both the field investigations and the resulting analyses.

## CHAPTER II. IMPACTS ON BENEFICIARIES

All major water development projects have social and economic impacts. If the projects are properly planned and implemented, most of these impacts are likely to be the ones that were anticipated during the planning process. Even then, however, there will always be unexpected impacts, since it is impossible to predict *a priori* all potential impacts for any large infrastructural development project, including their magnitudes and spatial and temporal variations. Furthermore, all large development projects are invariably complex, and they have both positive and negative impacts. Thus, the main issue in terms of development decision-making is how best to maximise the positive impacts and minimise the negative impacts so that the overall benefits to the society as a whole are significant, and also that the positive impacts significantly outweigh the negative impacts. Such considerations will contribute to maximising human welfare, and also reduce poverty.

In addition, it is necessary to identify the nature of the beneficiaries from each project. *Consideration of who benefits and who pays the costs of any project is at the heart of the decision-making process for any democratic society.* The issues of equity and income distributions, which may be affected by a project, are also important considerations project authorisation. For example, projects should ultimately contribute to the reduction in income disparities, and not accentuate them. Equally, people who are likely to pay the costs of a project should be given special consideration. They must be transformed to be the beneficiaries of the project, instead of being burdened by the adverse impacts of the project. For water development projects, people who are to be resettled, fall in this general category.

It is thus necessary for major projects to conduct periodic assessments of their impacts, which should include not only physical and technical factors, but also social, economic and environmental parameters, and institutional issues. Accordingly, it is essential, perhaps even mandatory, that a detailed pre-project assessment of social, economic and environmental conditions be carried out for large development projects so that the subsequent changes can be compared with the initial conditions. Without such pre-project assessments, attributions of specific benefits and costs to the project in question become a somewhat difficult and complex task. It is also advisable to consider a mid-term assessment during the project implementation process, so that any corrective measures necessary can be identified and then promptly implemented. Mid-term evaluation is an important consideration, since implementation of all large infrastructural development projects seldom proceeds without the appearance of unanticipated and unplanned impacts and constraints.

For the towns east and the towns south of Colombo Water Supply Projects, no comprehensive benchmark assessments of pre-project social, economic and environmental conditions were carried out, immediately prior to

their implementation. In addition, nor was any mid-term assessment carried out for either of these two projects. Thus, the initial boundary conditions for these two projects are mostly unknown, except in somewhat general terms. Because of this constraint, the present assessment had to use the recall method to estimate the pre-project socio-economic conditions. The recall method basically requires that the project-affected people be sensitively interviewed so that they can be encouraged to recall what were the prevailing conditions when the project implementation was initiated. The method works best when the time lag between the project initiation and completion is somewhat limited. It should be noted that for one of the two projects that is being assessed in the present report was initiated some 10 years ago, which is little too long for consideration through the recall method. Nevertheless, proper use of the recall method should be able to predict the overall trends with considerable degree of certainty, even though the initial boundary conditions cannot be defined accurately because of the somewhat long time lag.

The main objectives of the socio-economic impact evaluation on the beneficiaries that were carried out for the towns east and the towns south of Colombo were the following:

- i) to assess the social and economic impacts of the projects on the people living in the areas concerned;
- ii) to determine the perceptions of the people of the benefits and costs of the projects (it should be noted that in certain instances, perceptions may not be consistent with the reality); and
- iii) to identify both positive and negative impacts of the projects so that whatever corrective actions necessary could be identified, as well as the lessons that could be learnt from the Colombo experiences during the planning and execution processes can be considered for possible incorporation in the planning and design of future water projects, by both the Sri Lankan authorities in their own country, and by JBIC in appropriate developing countries.

It should further be noted that this assessment was carried out fairly soon after the two projects were completed. This means that most of the households had received water only recently. Equally many potential consumers in these areas are likely to be connected to the system in the coming months. Accordingly, some time needs to elapse before most of the impacts become fully visible, or even perceptible, by the inhabitants concerned. This is an especially relevant consideration for low-income households, who basically became potential users of water from the two projects from only about 2001, when special instalment packages were introduced for payment of the water connection charges. As more and more people are connected to the system, it would be desirable to carry out similar impact assessments periodically, at appropriate intervals.

Another constraint to this study that should be noted is that the time available for the assessment was somewhat limited. Ideally, it would have been



desirable to analyse the results of the first set of interviews undertaken for this socio-economic assessment. Following the review and interpretation of these analyses, another set of interviews should have been conducted to find out the answers for many of the questions that arise from the first set of interviews. There was no time available to conduct this second set of interviews to answer some of the new and emerging questions. This is an important factor, especially when it is considered that no assessments were available for the immediate pre-project conditions, and also that no mid-term evaluations were carried out for either of the two projects that were evaluated.

Study Area – For the socio-economic impacts assessment, nine towns were selected, which could be considered to be representative of the two projects areas. Five of these towns are located in the east of Colombo: Battaramulla, Talangama, Kaduwela, Pannipitiya and Malambe. The rest of the four towns are situated in the south of Colombo: Piliyandala, Kesbewa, Keselwatta and Homagama. These towns were selected after an intensive review of the project areas as well as extensive discussions and consultations with the senior NWSDB staff members.

The nature of these nine towns varied from urban, rurban (rural/urban) to rural. While much of the focus in recent years has been directed to urban and rural areas, it is now becoming increasingly evident that for major Asian metropolises like Colombo, “rurban” areas merit increasing attention. The speed and extent of rural outmigration, which in many Asian countries are now accelerating, concomitant with the inability of the major urban centres to provide adequate and appropriate infrastructures, social services and employment opportunities to the new migrants, have meant that a complex new world has rapidly evolved on the edges of the urban agglomerations, having both urban and rural characteristics. Town east and towns south of Colombo have not been an exception to this overall global development trend.

This emerging rurban world is witnessing an explosive population growth, both due to migration and natural increases. These are mostly poor housing areas, where many urban characteristics can be noted, along with activities like farming, horticulture and animal husbandry, which are more appropriate for rural areas. Many urban planners are now predicting that this rurban population is likely to become the biggest concentration of high-density population within the next 2-3 decades, within which period the populations of cities like Colombo are likely to double of what they are at present.

Colombo has not been an exception to this general global trend that can be noted in nearly all developing countries. Also, anecdotal evidences indicate that as these rurban areas are provided with basic infrastructural support like the provision of piped water, electricity, communication and transportation, better social, educational and health facilities, they act as a magnet for additional in-migration. This situation is evident in both towns east and towns south of Colombo. Accordingly, even though the water supply projects have only recently been completed, population in these areas have

already far exceeded to what was forecasted when these two projects were initially planned. Furthermore, the lure of clean and reliable water supply, and absence of water stress during dry periods every year, appear to be acting as a magnet in terms of attracting the migration of more and more people to these areas, even though the land prices have become progressively more and more expensive. Thus, water requirements of these areas are likely to increase further in the coming years to meet the needs of a new influx of migrants, and also to account for additional human and economic activities that this new influx is likely to generate.

According to the Sri Lankan Population and Housing Census of 2001, towns like Kaduwela, Kesbewa, Maharagama and Homagama can be considered to be rural. Panadura also can be considered to be rural, except for a small section, which is decidedly urban. Even though for administrative purposes these areas are considered rural, they show many urban characteristics. It should be noted that during the past few years, towns east of Colombo have developed rapidly, primarily because of the locations of several government institutions and the Sri Jayawardenapura National Hospital in these areas. This is likely to further intensify the population densities of these areas in the coming years.

Impacts Assessment Methodology – The towns east and the towns south of Colombo cover a large area, with a population group ranging from very rich to very poor. Because of this situation, it was decided to increase the number of households to be interviewed from the nine identified areas by 20 percent from what was originally stipulated in the terms of reference for this study, from 500 to 600. All the households selected now have direct water supply connections.

NWSDB has classified its consumers under different categories, like domestic, low-income households, commercial enterprises, schools, religious institutions, government institutions, etc. All households that are not low-income are considered domestic. A list of all the consumers was obtained from NWSDB. From this list, 300 households were selected for the towns east of Colombo, and another 300 from the towns south of Colombo. Furthermore, these 600 households were equally divided between domestic and low-income consumers. This meant that this assessment gave higher weightage to the low-income group compared to the domestic consumers, especially as the total number of low-income households is significantly less than the domestic consumers of NWSDB. The evaluation gave special consideration to assess what were the impacts on low-income consumers. In addition, since the number of potential low-income households in the project areas is very high, the evaluation is likely to provide a more meaningful analysis of the overall situation. The distributions of the households by areas and categories for this survey are shown in Table II.1.

Since time was a very important constraint for completion of this impact assessment, it was decided to use cluster sampling and systematic random sampling techniques in the overall selection of the representative sample for the two projects. This process also had the added advantage of getting a

better representation of the characteristics of the consumers. Fifty sample points were selected systematically for each category, and a cluster of six sample households was then enumerated around the sample point, including the randomly selected sample point itself.

The survey of the 600 households was considered to be the first phase of the survey. During the second phase, data were collected from 35 commercial enterprises selected from five main towns: Talangama, Malambe, Kaduwela, Kesbewa and Piliyandala. Five commercial enterprises were selected randomly from each town. Relevant information was systematically collected from these enterprises through a structured questionnaire. Since the time allocated for the evaluation was extremely limited, selection of commercial enterprises depend on what was feasible within this limited period.

Table II.1. Distribution of households enumerated by towns and economic categories.

Area	Category		Total
	Domestic	Low-Income	
Piliyandala	56	77	133
Keselwatta	15	16	31
Kesbewa	12	26	38
Homagama	38	0	38
Battaramulla	50	41	91
Malambe	34	13	47
Kaduwela	36	75	111
Pannipiya	32	36	68
Talangama	27	16	43
Total	300	300	600

In addition, the survey during the second phase included collection of information from different institutions. For example, health-related data were collected from the hospitals and Ministry of Health offices. Demographic and land-related data were collected from the Divisional Secretary offices, and the appropriate offices of Pradeshiya Sabhas. All the data were then collected and analysed by using the SPSS computer programme.

The interviews were carried out by 15 enumerators, all of whom were graduates in sociology from the University of Colombo. A training session was organised for all the enumerators before the surveys were actually carried out. During this training session, the objectives and the purposes of the survey were explained, methodologies that were to be used for the survey and the subsequent analyses of the data were discussed, and the processes through which the results of the surveys will be used, and by whom, were outlined. In addition to a structured questionnaire, which was very specifically developed

for this survey, the enumerators were trained and encouraged to make their own comments on each household they visited, based on their own individual observations, and any other relevant information they could collect during these interviews. In retrospect, these comments provided much valuable information, which were then analysed for the study. All the interviews were carried out in the Sinhalese language.

The questionnaire was pre-tested before the actual household interviews were carried out. Several modifications were made in the questionnaire on the basis of the results of this pre-testing. In addition, after the first two days of the interviews were completed, the results were reviewed. Some additional adjustments were then made to the questionnaire so that better and more relevant information could be elicited from the interviewees.

Socio-economic Profiles of the Households – The 600 households surveyed had a total population of 2,549, which means an average family size of 4.25 persons. This is somewhat less than the national average. The percentage of population over 60 years was 10.7%, which is higher than the average national figure of 9.9% of 1999. The number of female population (50.7%) is slightly higher in the survey sample compared to the male population (49.3%). This is also reflected in the fact that the percentage of the females (11.7%) over the age of 60 is higher than the males (9.9%). The issue of water supply for the elderly is becoming an increasingly important consideration in the current and future Sri Lankan contexts, and thus this aspect would be discussed further later on in this chapter of the report.

The age structure of the heads of the household indicated that the majority of the heads of the households are in the 50-59 years age group (27.3%), followed by the 40-49 years age group (25.8%), 30-39 years (19.3%), and then 60-69 years (15.7%).

Females headed 18.3% of the households surveyed. This is an important consideration for this assessment since the female-headed households are likely to be more vulnerable to poverty, because such households do not have the cushion of economic assistance from the adult males in terms of their support and earning capacities. It should be noted that *such households have become a steadily growing social phenomenon in Sri Lanka*, and has now emerged as an important social issue. The percentage of female-headed households in the areas surveyed (18.3%) is very similar to the national statistics (18.6% according to the 1994 Census, which did not include data from Northern and Eastern provinces). This aspect is an important consideration in term of poverty alleviation issues.

Migration has been an important factor in recent years, which is contributing to increasing population in the townships surveyed. Nearly 60 percent of the households are local in the sense that the heads of the households were born in the areas concerned. The rest of the 40 percent had migrated to the areas from other parts of the country. Migration rates have

increased significantly during the post-1991 period, during which nearly 20% of the families interviewed had moved to the areas. This trend is likely to accelerate further during the post-2000 period, as the towns concerned become more desirable for living as better facilities (water, electricity, transportation, communication, education, medical and social services, etc.) become available. All these developments are likely to put more stress on water availability and other similar infrastructural facilities and social services of the areas.

In terms of education, nearly 17% of the heads of the households had either no schooling (3.5%), or only primary education (13.5%). Nearly 38% of the heads of the households had secondary education (that is, 6-10 years of education). Only 6.7% had access to higher education. *Male heads of households were more educated than the female heads.*

In terms of economic characteristics, *78% of the male heads were employed, compared to only 26% of the female heads*, which gave a gender ratio of 3:1. Nearly half (49%) of the female heads were involved in household work, compared to 78% of the male heads who were skilled labourers. Among the employed female heads, the highest number of individuals was in the clerical/teaching category.

The monthly income of the households ranged from less than Rs. 1000 to over Rs. 20,000. However, majority of the households had incomes within the range Rs. 10,000 – Rs. 20,000. *Slightly more than half of the female-headed household (54%) could be considered to be poor.* This indicates their high level of economic vulnerability. The household incomes comprised of contributions from all the members of the households, and included income from different sources, in addition to the regular income.

*Overwhelming majority of the households owned their own houses (95%), and only about 4% were renting the facilities.* Nearly all the households had radios and televisions (91%), nearly half had refrigerators and gas cookers, and over one-third had telephones. Nearly 15 percent had motor vehicles and washing machines.

Access to Water and Water Use Patterns – The water supply projects for the towns east of Colombo were completed before the towns south of Colombo. Thus, the residents of the towns east of Colombo received their water first. Based on the data available from NWSDB, the numbers of consumers in the domestic and low-income category, who were connected to the system, progressed as follows (in all years, the data are for September) (See Table II.2).

Some interesting conclusions can be drawn from Table II.2. First, the numbers of consumers are increasing steadily in both the towns east and the towns south of Colombo. Second, the low-income households had considerable financial difficulty in paying the water connection charges initially for the towns east of Colombo.

Table II.2. Number of consumers, 1998-1999 and 2001-2002.

Locations	1998	1999	2001	2002
Towns East of Colombo				
Domestic	7,806	10,398	15,267	17,696
Low Income	0	0	396	657
Towns South of Colombo				
Domestic	--	--	4,321	7,626
Low Income	--	--	794	1,799

Accordingly, during the first two years, that is between 1998 and 1999, there were no low-income consumers in these townships. As soon as NWSDB became aware of this financial constraint, they initiated a special payment scheme so that the low-income households could have access to clean water. This new scheme required an initial payments of Rs. 2000, which then is followed by four instalment payment of Rs. 600 each, for a total connection charge of Rs. 4,200. This new instalment payment arrangements have unquestionably resulted in better access to water supply for the poor families. For example, for the towns east of Colombo, there were no low-income consumers in 1998 and 1999. After the instalment payment scheme was introduced, there was one low-income household for nearly each 39 domestic households in 2001. This ratio improved to 1:27 in 2002. Similar improvements can be noted for the towns south of Colombo as well. It is likely that more and more low-income consumers will connect to the water supply system in the coming years. However, it still may be appropriate to review the current instalment scheme for the connection charges to see if the system can be made more economically attractive (say, for example, increase the number of instalments to 6) so that more poor households and also poorer households, can benefit from the water supply system.

*As soon as water supply was available in the townships, slightly over half the households surveyed (51.2%) promptly requested and obtained the water connections. When asked the reasons for the delay in getting the water connections, nearly 61 percent cited financial constraints. The next highest reason that was attributed was that the water connection was considered not necessary since families already had access to well-water. The reasons cited by the households surveyed for the delays in getting water connections are shown in Table II.3.*

Water Availability Before the Projects – Before the two water supply projects were implemented, the only source of water in all the townships was groundwater, which was extracted primarily through wells, and in a few instances through tubewells. Since groundwater levels fluctuate with the various seasons, depending upon the rainfall, a major cause for human sufferings was the unavailability of water during the dry seasons every year.

Table II.3. Reasons cited for delayed water connections.

Reasons for the Delay	%
Financial problems	60.9
Came late to reside	7.8
Land disputes	0.8
No pipeline near the house	4.9
Piped water not necessary due to availability of well	11.9
NWSDDB delayed connection	9.4
Death in the family	0.4
Political reasons	1.6
Had to wait in the list	2.0
Total	100.0

The feasibility study carried out in 1985 for the project for supplying water to the towns east of Colombo indicated the extent of water stress by months over the year, and by geographical areas. This is shown in Table II.4. It indicates that the maximum water stress occurred during the period December-February, when 42-61 percent of the wells (depending upon the towns) had insufficient water. The situation was worst in Kaduwela, where 61% of the wells had inadequate quantities of water during the December-February period. The best condition was in Pannipitiya, where some 42% of the wells had water shortages during the same dry period. September to November season was the optimal season for water availability, when only 6% of the wells in Kaduwela and 2% of the wells in Pannipitiya had inadequate water. Little over 1/3<sup>rd</sup> of the households (36.1%) had to go outside their premises to get water from the wells. Nearly half of the households had to walk less than 10m for getting water.

Since very limited information is now available on the qualities of water that were used by the people before the projects were initiated, several questions were asked by the enumerators to elicit responses in terms of colour, odour, taste and overall contamination of well-water, before they received piped water.

Table II.4. Periods of water stress for towns east of Colombo, 1985.

Period	Battaramulla	Pannipitiya	Kaduwela
December-February	50%	42%	61%
March-May	13%	16%	3%
June-August	22%	19%	18%
September-November	2%	3%	6%
Unspecified	13%	20%	12%
Total Households	100%	100%	100%

The survey indicated that the vast majority of people were happy with the qualities of well water. The percentages of households who felt that their well water was good, average or bad, by the appropriate parameters are as follows.

Colour: Good (80.9%), Neutral (15.4%), Bad (3.7%)

Odour: Good (77.5%), Neutral (19.8%), Bad (2.7%)

Taste: Good (75.3%), Neutral (18.5%), Bad (6.2%)

Contamination: Good (75.9%), Neutral (19.5%), Bad (4.6%)

The above responses show that nearly 95% of the households were reasonably satisfied with the well waters in terms of water qualities, prior to the arrival of piped water. Some regional variations, however, can be noted. It is evident that the residents of Pannipitiya consistently felt that the quality of groundwater is excellent. Not even a single household claimed that well water anywhere in this town was bad in terms of colour, odour, taste or contamination. In contrast, nearly one-quarter of the households in Keselwatta considered that odour of the groundwater was bad, and more than one-third (37.9%) felt that the taste was bad. Probably the reasons for this perception are that Pannipitiya has a good source of groundwater, and the water stress in this town was the least from all the nine townships surveyed. In contrast, the water situation in Keselwatta was the worst. Thus, it is likely that overall the residents of Pannipitiya had a positive attitude towards water, and the residents of Keselwatta had a more negative view of their earlier water sources, based on water availability over the entire year and its quality. These perceptions are reflected in the survey.

It should, however, be noted that the above perceptions are based almost exclusively on the physical characteristics of water: colour, odour, taste and perceived contamination. People generally have no idea on the bacteriological quality of the water of the wells. This, of course, is a very important consideration for health reasons even though the bacterias cannot be seen, tasted or smelt. The households had not carried out analytical tests to determine the qualities of well water, though some families boiled well water before drinking as a precautionary measure.

Water Use After Completion of the Projects – *There is no question that water use patterns have changed significantly after the two projects were completed, even though, as noted earlier, the towns east of Colombo started to receive water four years ago, and towns south only two years ago. Even considering the facts that piped water has been available for a very short period of 2-4 years in the townships surveyed, and still many more families are yet to be connected to the system, many changes can already be noted. It is highly likely that as additional time elapses, and more and more people get connected to the water system, the changes will be more substantial and extensive, and thus more visible.*



Not surprisingly, the changes that can be observed between before and after the piped water supply became available vary from one township to other, and the magnitudes and the extents of the changes depend on a variety of issues including water availability conditions prior to the projects becoming operational, socio-economic and education levels of the people in the townships concerned, and their general perception of the overall water-related situations.

Prior to the implementation of the two projects, *nearly two-thirds of the households surveyed had a well within their properties*. Vast majority of these households (81.6%) have retained these wells, even after piped water became available. Currently, they use both piped and well water for various purposes. *Majority of all households (53.5%) now consume only piped water*. The rest (46.5%) consume both piped and well water. The actual percentages vary significantly from one township to another. For example, 80% of the households in Battaramulla, 77% in Talangama, 67% in Kaduwela and 65% in Keselwatta are exclusively consuming piped water. In contrast, 61% of the households in Piliyandala, 58% in Homagama, 53% in Keshewa and 51% in Malambe are using both piped and well water.

*An important and somewhat unexpected finding of the current assessment is that at present an unusually high number of households are using well water for drinking (30%), and slightly more (33%) for drinking and for other purposes.*

Further studies need to be carried out before these anomalies (including different patterns of water uses in different townships) can be authoritatively analysed and then answered. However, following hypotheses can be offered at this stage for the different patterns of water use witnessed in the nine township surveyed.

Out of the four townships where piped water uses are at present the highest, Battaramulla, Thalangama and Kaduwela belong to the towns east of Colombo, which received piped water earlier than their counterparts in the towns south of Colombo. It is likely that the residents of these towns had more time to adjust to the new conditions, and accordingly have become more accustomed to using piped water supply on a regular basis. In addition, the towns east have more recent migrant population, who have settled in these areas not so long ago, with the establishment of the new parliament, hospital and several government institutions. It is thus possible that:

1. Since piped water was already available when they migrated and settled in these three townships, there was no need to dig wells for water. Thus, they are using piped water exclusively.
2. It is possible that the social, economic and educational levels of these new migrants are somewhat higher than the other townships surveyed. If this hypothesis is correct, significantly higher percentages of the residents of these towns concerned are likely to be aware of the implications of well

water use, especially for drinking, in terms of water quality, and, hence, health. In contrast, they are likely to be more aware that piped water is properly treated on a regular basis, and has good quality control arrangements, which simply does not exist for well water. Thus, they are more likely to use piped water which unquestionably is of better quality, for drinking and cooking purposes.

Keselwatta is the only town from the towns south of Colombo, which has a very high percentage of piped water use. As noted earlier in this chapter, Kelsewatta was the town with a very high water stress throughout the year, and also the residents were dissatisfied with the quality of water they were using in terms of colour, odour, taste and contamination. Thus, water availability as well as water quality were serious concerns, and the residents generally had a negative attitude towards the past water supply system through wells. Accordingly, it was much easier for them to adopt quickly to the new developments, which completely eliminated the regular water stress they had faced in the past and also the new water was of a better quality compared to the past supply. Thus, it was much easier for them to start using piped water extensively as soon as it became available. In addition, Keselwatta is primarily a township inhabited by lower middle class and poor people. Continued water stress may very well be a reason for higher economic class of people to avoid living in this town. Furthermore, because of their lower economic conditions, they probably had limited extra land within their properties, and consequently they could not afford individual wells. Thus, it was more convenient for them to use piped water as soon as it became available.

There are also noteworthy changes on the types of wells used after piped water became available. For example, *unprotected wells outside the households have already disappeared completely, even though piped water has become available only recently*. Furthermore, some 30 percent of the households used wells outside their premises before the two projects were completed. Use of such wells has already declined by an astonishing 83%, and only about 5% of the households now continue to use them.

Perception of Water Quality of Piped Water – In view of the fact that some 30 percent of the households are still using well water for drinking, it is important to consider the perception of the people of the quality of piped water they receive. Table II.5 indicates how the households of the nine townships perceive the quality of piped water.

Prima facie there appears to be an inverse relationship between how the residents perceived well water compared to piped water based on their water situations earlier. For example, in Pannipitiya, where quality of well water has been consistently good and which had the least water stress, highest percentage of households rated piped water as bad (6%), and another 51% showed neutral attitude towards it. In contrast, Keselwatta, which had the worst water conditions, not even a single household rated the piped water as bad, and the highest percentage rated it as good (71%).

Table II.5. Perception of piped water quality by townships.

Area	Percentage of Households			Total
	Good	Bad	Neutral	
Piliyanadala	50.8	1.5	47.7	100.0
Keselwatta	71.0		29.0	100.0
Kesbewa	68.4		31.6	100.0
Homagama	25.7	5.7	68.6	100.0
Battaramulla	60.9		39.1	100.0
Malambe	67.4		32.6	100.0
Kaduwela	52.3	1.9	45.8	100.0
Pannipitiya	43.3	6.0	50.7	100.0
Talangama	61.9		38.1	100.0
Total	54.5	1.7	43.8	100.0

It is also likely that people in certain townships south of Colombo, like in Homagama, have lived there for generations. These areas still maintain many rural characteristics, and people were quite happy with their well water. They may be having some difficulty to adjust to the quality of the tap water, which may not taste as "good" to them for drinking, or preparation of tea, which is a very important social consideration in Sri Lanka. Thus, only one-quarter of the households in this township (lowest of all from the nine townships) considered the quality of piped water as good. More than two-thirds surveyed had a neutral attitude to the tap water.

Perhaps the most important interpretation of Table II.5 is that *negative perception of tap water in terms of quality in all the nine townships was non-existent or very minimal* (zero in 5 townships, and ranged from 1.5 to 6.0 in the other 4 townships). However, very significant percentages of households have a neutral (neither good nor bad) attitude to the quality of piped water, ranging from a high of 69% for Homagama, to a low of 32% in Kesbewa. It is likely that an important cause for these high percentages of neutral attitudes could be due to the presence of residual chlorine in the tap water.

Chlorination was generally never practiced for well water, but is an essential requirement for treating tap water. Since residual chlorine gives tap water a specific taste for drinking and for making tea, it is possible that some people do prefer to use well water which does not have any presence of chlorine. Accordingly, when asked if the households considered residual chlorine to be a problem, slightly over half answered positively (ranging from a low of 30% in Talangama to a high of 67% in Kaduwela). These responses are shown in Table II.6. The reasons for these wide variations between the townships in terms of their attitudes to chlorine are difficult to explain without additional studies.

Perception of the Performance of NWSDB – It is important to analyse the perception of the people of the institutional performance of NWSDB, since it is the Board that has been responsible for the construction, operation and maintenance of the two water supply projects, and charge the people for the services they receive. The Board is the “face” of water, whom the consumers have to deal with in their daily interactions with the availability of water.

When asked how did the households judge the overall performance of NWSDB, nearly three-quarters judged it to be good to very good, and another one-quarter considered it to be average. Only one-fifth of one percent considered the Board's work to be “very bad”.

When asked about the levels of satisfaction with the services received from the Board, an incredible 93.4% of the consumers said they were satisfied or highly satisfied with the services that have received from the Board. Only 6.6% declared to be unsatisfied.

Table II.6. Perception of residual chlorine as an issue.

Area	Percentage of Households		Total %
	Chlorine a Problem	Chlorine not a Problem	
Piliyndala	55.7	44.3	100.0
Keselwatta	41.9	58.1	100.0
Kesbewa	60.5	39.5	100.0
Homagama	60.5	39.5	100.0
Battaramulla	34.9	65.1	100.0
Malambe	46.8	53.2	100.0
Kaduwela	67.0	33.0	100.0
Pannipitiya	50.0	50.0	100.0
Talangama	30.0	70.0	100.0
Total	51.5	48.5	100.0

It is further worth nothing that the overall view of the Board's performance was identical, irrespective of the towns and socio-economic classes surveyed. This is an important finding since it clearly indicates that the Board is egalitarian in its approach to consumers: it does not favour prosperous areas over poor neighbourhoods, or rich consumers over the poor.

*The Third World Centre for Water Management has extensive worked on water issues in 17 developing countries. Based on the people's perception of the Board's performances thus far, it has to be said that it is one of the best institutional performance the Centre has found in any developing country. The*

*institutional performance of the Board is discussed in detail in Chapter 4 of this report.*<sup>1</sup>

Some households pointed out that sometimes they ran into problems because of interrupted water supply. The comparatively wealthy people did not experience this problem, since they had overhead water storage tanks. The issue of interrupted water supply was thus a problem with the poorer households only, who could not afford overhead tanks.

Nearly 90 percent of the households said they had never experienced leakages.

In terms of water bills, nearly all (97.4%) said that they received them on time on a regular basis. *In terms of water pricing, slightly more two-third of the households felt that the price was "not so high"*. Around 28% considered the price to be high and another 5% to be very high.

Nearly four-fifth of the households said that they could afford to pay for the water, and similar number felt that their water bills were accurate. However, a full 84% of the families surveyed said that they would not approve an additional increase in water tariff, and another 9% had no comments.

Overall Analysis of the Impacts – All major infrastructural development projects have primary, secondary and tertiary impacts on the people and the environment, some of which are positive and the others are adverse. However, often it is not easy to prove that the impacts are the direct consequences of a project, since all development activities are complex phenomena, and scientifically it may not be possible to prescribe an impact exclusively to a specific project. Thus, in this section only those impacts will be considered which can be linked directly to the two water supply projects with considerable degree of certainty.

Impacts of Piped Water Availability – For a variety of reasons, households have decided to take piped water connections, for which they are paying based on their consumption of specific quantities of water. Three important facts should be noted in this context.

- Well water is free, but piped water has a cost associated with it.
- No one forced the families to take house connections: they did it voluntarily.

---

<sup>1</sup> In its comments on this paragraph, JBIC pointed out "It is too early to say that the NWSDB is one of the best institutional performances, just judging from the satisfaction level from the users who are already served by NWSDB. If you consider the opinion of the people who have not been served by them, the analysis may have been different". We disagree. The various performance indicators for NWSDB in Chapter 4 indicate that the improvement of the institutional performances by any of these indicators, during the past 10 years, have been remarkable. In addition, during the entire implementation processes for the two projects, no monitoring and evaluation was carried out. No attempt has ever been made to find out the views of people that not have been served. Thus, it is premature and unfair to judge an institution by only one criterion on which no reliable information is available at present.

---

---

- Unlike many developing countries, where people have to walk several kilometres to collect water, the towns east and the towns south of Colombo did not have similar high-level of water availability stress.

Households decided to take water connections, and pay for water, because they perceived many inherent advantages for doing so. Various reasons were put forward as to why people felt household connections are desirable, and often essential. Among the reasons cited are the following:

- having water directly in the household is a great convenience;
- many wells became dry during the drought periods, forcing people to travel longer distances to collect water;
- not sufficient water for all the households could be found in the wells during the dry periods; which sometimes contributed to the generation of conflicts between the families using the same well;
- well water was sometimes considered polluted;
- physical exertions were high for drawing water from the deep wells; use of electric motors required high capital investment and regular running costs;
- not possible to dig wells in some properties because of hard soil or rocks;
- not enough land available within the individual properties to dig wells;
- availability of piped water within the house is a boon to the sick and the elderly; and
- families felt a sense of security that their daughters and wives could take baths within their houses, instead of in the open areas near the wells during normal times, and in nearby rivers and streams during the dry periods.

An important issue that did not come up during the survey is increasing land fragmentation. As more and more people move to these towns, a trend that is likely to continue in the foreseeable future, the areas are becoming rapidly urbanised, with increasing population densities. As the land values in the townships increase, average family land holdings will become smaller and smaller, which means finding spaces for wells would not be an economically attractive option, or desirable because of health considerations, since appropriate distances must be maintained between the septic tanks and the wells.

In addition, as new housing schemes were constructed in the recent past, and as more similar new schemes emerge, water demands in the towns will continue to increase substantially. There simply is not enough groundwater in the areas to provide adequate quantity and quality of water to satisfy the expected rapidly escalating demands from residential, commercial and industrial establishments. Many people thus may have foreseen the water problems of the future, and thus they may have decided not to depend on the wells to avoid the anticipated problems.

Also, as low lands and paddy fields in townships are being increasingly reclaimed for urban uses, a major concern now is water contamination of the wells during the rainy seasons. In addition, many small-scale industries, and car-repair workshops are dumping their liquid waste on land, without obtaining the required authorisation or providing the necessary treatments. Consequently, these hazardous wastes are infiltrating to the groundwater, and contributing to contamination. During the assessment, some families mentioned to the Centre staff that they were beginning to find strange and unusual tastes for their well water, which they felt was due to water contamination. Thus, some families felt that it was fortunate for them that they are receiving piped water since the quality groundwater is deteriorating.

Thus, an objective review of the present situation, and realistic forecast for the future, indicate that the two water supply projects were constructed in the nick of time: further delays would have contributed to unacceptable human sufferings, especially for the poorer families, because of higher water stress and increasing deterioration of water quality. While a few households complained of interrupted water supply during the survey, it should be noted that even this supply is a very significant improvement over the earlier situation, when many families suffered serious water stresses during December-February period every year.

Another issue is health. Since well water is not treated, it is advisable that it is boiled before drinking. However, boiling of water needs fuel, and thus money. Poor people may not have the financial resources to boil water to ensure their health conditions remain good.

Accordingly, during the survey families were asked if they boiled well water and/or piped water. Table II.7 shows the results by the economic levels of the households. As to be expected, the survey indicated that the rich families invariably boiled piped water, as they used to do with well water. The percentages of families boiling piped water, and earlier well water, declined steadily as one moved from upper middle class to the poor.

A closer scrutiny of the Table II.7, however, indicates some interesting conclusions. These are:

- Overall, more people are boiling piped water compared to well water.
- The difference is more pronounced for the upper middle class, where nearly half (51%) of the families used to boil well water. This percentage has increased by nearly 20%, since now 60% are boiling piped water.
- Not much difference can be observed for the lower middle class.
- Lower percentages of poor families are boiling piped water (18.3%), compared to well water (20.5)

Table II.7. Percentages of households boiling well water and piped water by economic class.

Economic Class	Well Water		Piped Water	
	Boiled	Not Boiled	Boiled	Not boiled
Rich	100	-----	100	-----
Upper Middle	51.1	48.9	60	40
Lower Middle	25.2	74.8	26.1	73.9
Poor	20.5	79.5	18.3	81.7
Total	26.7	73.5	27.1	72.9

These are interesting and important findings. Additional studies should be conducted to see if the perceptions are correct, and if so what are the problems and how these can be solved. If the perceptions are not reflections of reality, what could be done to change the prevailing perceptions?

The project completion report for the towns east of Colombo expected that families would save fuel costs since it is not necessary to boil piped water. *The survey indicates that exactly the reverse has happened.*

The reason(s) for this counter-intuitive development cannot be outlined at this stage without additional studies.

Some of the households pointed out that the availability of the house connections has had tremendous beneficial impacts on the elderly, the disabled and the sick. An analysis of the Sri Lankan census data indicates that the percentage of elderly (60 years and above) in the total population is increasing, whereas those under 15 are declining. As noted earlier, 10.7% of the population in the surveyed households are elderly. This percentage of elderly people is likely to increase further in the future. This has been another unanticipated benefit for the provision of piped water in the houses.

The survey did not collect data on the number of handicapped people in the households surveyed, but the enumerators observed such persons in many households. It was also not easy to collect data on the number of handicapped people living in the various townships from the Administrative Divisions. Irrespective of the absence of data, it can be said definitively that *provision of piped water had unquestionably positive social impacts on households having elderly, handicapped and sick people.*

In terms of social interactions, the projects had both positive and negative impacts. On the positive side, people are relieved that the conflicts between the neighbours over the use of well water, especially during dry periods, have now basically disappeared.

On the negative side, some households felt that interactions with the neighbours occurred at the wells earlier, where they met to collect water, take baths or wash clothes. Such interactions have now declined and in many cases



have totally disappeared. In contrast, some families felt that availability of piped water has given them more leisure time since they do not have to travel to the well any more, which is allowing them to see their neighbours more frequently.

On the basis of the survey results, it appears, that the changes in social interactions depend on the economic levels of the households. The rich families felt that there has been no change due to the projects. However, the percentages of households that felt that there have been changes increased as one moved down the economic ladder, from 4.8% for the upper middle class, to 14.3% in the lower middle class and 20.3% for the poor families. Thus, *the poorer families are observing more beneficial changes due to the introduction of house connections.*

Economic Impacts – The study was unable to find any major significant economic impact on the families. Only limited impacts could be noted in some lower middle class and poor families. This is because the connection charges (instalment payments) and monthly payments are additional expenses, which they did not have before, since well water used to be free. Hence, some families have started small-scale new activities to earn extra incomes to pay for the additional expenses that are being incurred for water. These new activities included preparation and selling of sweets, sewing garments and selling them, renting part of the house, or increasing the rent to cover the water costs, etc.

Some households pointed out that the availability of piped water has saved the following expenses:

- Periodic cleaning of well to ensure clean water is no longer necessary.
- The households that used electric pumps said that their monthly electricity bills have come down significantly since the motors are not used as intensively as before

Health Impacts – It is generally considered that one of the major benefits of the provision of clean water is in terms of improvement of the health conditions of the people. However, based on the interviews carried out for the study, *no definitive conclusion can be drawn in terms of the improvement of the health conditions of the people.* The reasons for this inconclusive finding could be the following:

- Piped water has been available only recently. More time need to elapse before health improvements, if any, can be identified.
- Health is an area where in-depth interviews need to be conducted, which then have to be followed up on a regular basis, with close relationships with the interviewees. Several visits have to be made to the same households to collect qualitative and quantitative health data. This process simply was not possible under the time constraint within which the assessment had to be carried out.

- People do not remember health issues after a short period of time (say 1-2 years or even less), unless the illnesses are serious. Thus, one time interview, using the recall method, has limited use in terms of identifying potential health impacts and trends. Regular and systematic studies will have to be undertaken if the health impacts are to be reliably estimated.
- Health is affected by many factors, only one of which is water. It is thus a difficult task to isolate only the impacts of water on health. A multi-variate analysis will be necessary.

Based on the interviews carried out, vast majority of the households felt that their health conditions were “normal” before the project. Interestingly, *a majority of the respondents said that their health conditions have deteriorated after the two projects.* It is difficult to say whether it is only a perception or a reality. If this assertion is true, on medical and scientific grounds it is not possible that the health conditions can deteriorate because of provision of clean water. In fact, exactly the reverse is to be expected. This hypothesis is further strengthened by the finding that when asked specifically about the extent of the incidents of water-borne diseases before and after the projects, people felt that there was no change.

Health data were collected from the offices of the Ministry of Health and one hospital. There are no discernable trends for water-related diseases since 1998, when water became available.

Several respondents, however, felt that before the projects, infectious diseases used to spread quite quickly due to the use of common wells, and aggregation people around such wells. This probably was more applicable to poor households who did not have their own wells, and thus had to use common wells. Some households also pointed out that often women had back pains because of drawing of water from the wells. This has now basically disappeared.

More detailed investigation are necessary over a far longer period of time, before health impacts due to the two projects can be determined definitely.

Environmental Impacts – *The main environmental impact of the two projects is unquestionably due to wastewater generation, for which there are no facilities for collection, treatment and disposal at present.* Because of the two water projects, new water is being continuously and regularly introduced into the township. Since households do not “consume” water, nearly 100% of water introduced has to be disposed of as wastewater. Unfortunately, the townships at present do not have sewerage systems to collect the wastewater generated, and then treat and dispose them in an environmentally-safe manner. Accordingly, wastewaters are disposed of on the land nearby, either in gardens or communal lands, or drained to the streets. None of these disposal practices are satisfactory, or environmentally sound, and carry significant health risks.

When asked, vast majority of the households felt that drainage facilities were same before and after the project. It ranged from about a low of 50% in Talangama to a high of 84% in Kesbewa. Surprisingly, however, very significant percentages of the respondents from Talangama (42%), Kelsewatta (36%), Battaramulla (34%), Pannipitiya (28%) and Hamagama (28%) felt that drainage facilities have improved after the projects. Only small percentages (3 to 13%) felt that the situation had worsened.

Without specific information on the pre-project drainage conditions, it is difficult to comment definitively of the accuracy of the perceptions of the people. Prima facie it is difficult to see any scientific rationale as to how the drainage conditions could have improved. Based on similar experiences from other countries, introduction of piped water increases per capita water consumption, compared to earlier use of well water. In addition, all the new water used is external to the area where they are used. In contrast, well water came from the same area. Thus, it is difficult to see how the situation could have been remained the same as the pre-project conditions, let alone its improvement. Further studies need to be carried out to explain this anomaly.

Introduction of sewerage systems is still many years in the future. As more and more households join the two new water systems, more and more wastewaters will be introduced into the townships. This is likely to worsen the situation steadily. Considerations are now being given to introduce sewerage systems. The costs are likely to be high. Under the most optimistic scenario, it is highly unlikely that all the towns east and south of Colombo will have access to operational sewerages systems for at least another decade. Ideally, it would have been desirable to consider water supply and sewerage systems as two integrated components of the same project.

Disposal of wastewater to the gardens, common land or streets have major health and environmental implications. For example, stagnant pools of dirty water will provide good habitats for disease vectors like mosquitoes. This could increase incidences of diseases like malaria and dengue, unless very specific and regular actions are taken to control mosquito breeding.

In addition, in a few instances, social conflicts have arisen because wastewaters from one house are being drained to the properties of the neighbours and/or becoming stagnant pools in front of the houses of the neighbours. Such conflicts are likely to increase in the future.

Gender Impacts – The general development thinking is that while availability of potable water has beneficial impacts on the entire households, the impacts often are greater on women compared to men. It is also generally assumed that the impacts are generally greater on poorer women as compared to their richer counterparts. This is because it has been the traditional role of women to collect and store water, especially in poorer

families. Thus, the fact that clean water is delivered straight to households has meant that women have to perform one daily chore less.

Because of these expectations, the survey had a special set of questions which were specifically directed to adult female members of the households to better understand their perceptions of the benefits they may have received from availability of water from the two projects.

When asked who in the family made the decision to apply for water connections, the economic level of the family was an important factor. For example, for the rich families, two-third of the decisions were made jointly by husbands and wives, and the other one-third were made only by the husbands themselves. Rich wives exclusively did not make any water connection decision. However, as one progressed down the economic levels, wives became increasingly more important decision-makers. Thus, for both upper and lower middle class families, nearly half the decisions were made jointly, and then one-quarter by the husbands and then another one-quarter by the wives. For poorer families, where wives and children had to go out to collect water, 40% of the decisions were made by wives, around 12% by husbands, 10% by children and 38% jointly. For lower middle class, children made nearly 5% of the decisions. The analyses of the responses by economic classes are shown in Table II.8.

Table II.8. Household members responsible for making decisions for water connection.

Class	Decision Maker %				Total %
	Wife	Husband	Jointly	Children	
Rich		33.3	66.7		100.0
Upper Middle	23.1	23.1	53.8		100.0
Lower Middle	23.3	22.5	48.7	5.5	100.0
Poor	40.4	11.7	38.0	9.9	100.0
Total	30.4	18.1	44.8	6.7	100.0

When asked the reasons as to why water connections were requested, the responses also varied by economic classes. Convenience was the dominant reason for all the social classes, ranging from 80% for the rich families, and then steadily declining by classes to reach 50% for the poor. The second important reason was that no other source of water was available. In this case, the responses were exactly the reverse: 20% for the rich and upper middle class families, and increasing to 50% for the poor. Quality of water was an important consideration for 25% of the poor families, who felt well-water was not appropriate for drinking. However, water quality was not a factor for rich families, presumably because they had their own wells, which they themselves maintained properly.

When asked if women received any benefits from the two water supply projects, most felt that it had made a difference to their lives. Several benefits were attributed and these often varied by economic classes. For example, nearly two-third of the poor families felt that an important benefit was saving of time. The comparative figure for the rich women was 20%. All the families felt that water supply made washing easier (60% for rich families, and gradually increasing by class to 80 percent of poor families) Similarly, 40% the rich women found it made cooking easier, and this percentage increased to 64% for poor families. Surprisingly, however, 10% of only rich women felt that piped water had increased the health conditions of the family. This benefit was not perceived by any other social classes. Further studies will be necessary to explain the reason of this exclusive perception by the rich.

It is thus very evident from this survey that women from all economic classes feel that the two water supply projects have made very significant differences to their lives. However, the extent and type of the benefits received varied from one social class to another. The results are shown in Table II.9.

Table II.9. Benefits perceived by women by economic classes in percentages of families.

Benefits	Class categories %				Total %
	Rich	Upper Middle	Lower Middle	Poor	
Find easy to do washing	60.0	60.6	73.0	79.3	74.2
Find easy to cook	40.0	50.0	66.2	63.7	63.2
Could save time	20.0	57.6	60.5	63.4	61.0
More leisure		1.5	0.7	3.6	2.0
Health has improved in the family	20.0			0.4	0.3
No difference			1.1	1.2	1.0

### CHAPTER III. ECONOMIC SUSTAINABILITY

The economic sustainability of the towns east and the towns south of Colombo water supply projects are important considerations. Both are expensive projects, and the loans obtained from JBIC have to be reimbursed by the Government of Sri Lanka, preferably from the benefits obtained by the people from these projects through cost-recovery from the consumers. It is thus essential that the benefits from these two projects to the consumers be assured to flow continuously over a long-term basis. In other words, NWSDB must be an efficient service-oriented institution, and must have sufficient income to ensure that not only its water supply schemes are efficiently operated and maintained, but also additional investments can be made regularly to provide water supply, sewerage and wastewater treatment services to all the existing customers, and also to new domestic and commercial consumers and other relevant institutions.

The Board currently provides 26.5% of the national population with piped water. The draft national water policy provides a target of total urban coverage by the year 2010. The investment requirements to reach this target will be quite high. In addition, commensurate progress in sewerage services and wastewater treatment facilities is missing at present. It should be noted that water supply and sewerage developments and wastewater treatment processes must progress hand in hand with water supply developments in the future. Introduction of only water supply to the most of the urban areas of Sri Lanka, without concomitant arrangements for the construction of sewer systems and wastewater treatment plants, will create serious human health and environmental problems for the populace as a whole.

The future capital expenditures only to provide adequate sewerage and wastewater treatment services in the urban areas of Sri Lanka, including the Greater Colombo region, are likely to be extraordinarily high. All these heavy investments for both the water supply and the sanitation sectors have to be budgeted for in the future capital requirements of the Board. Thus, economic sustainability of the two projects, as well as the economic viability of the Board as a whole to meet its future financial needs, will be very important considerations for the coming years. In other words, economic sustainability of the two projects and the economic sustainability of the Board are intimately interlinked. If the current institutional arrangements for water management in Sri Lanka continue, one cannot be separated from the other.

Since the Board has to pursue national policies, and not individual project by project policies, it is essential to consider its current policies and financial performances in order to get a clearer picture of the economic sustainability of its existing projects, which includes both the towns east and the towns south water supply projects. In other words, the macro policies and performances of the Board at the national level, will to a very significant extent decide the economic sustainabilities of the two projects that have been

assessed in this report. Future funding requirements needed to meet the targets of the water supply and sanitation sectors are also important consideration to assess the future economic sustainability of the Board. While this aspect is a very important issue, detailed analysis of economic and institutional sustainabilities is beyond this paper.

National policy on water supply and sanitation – According to the draft Sri Lankan national water policy, provision of “safe drinking water and access to sanitation services is a fundamental element” for the social and economic development of the country. The policy notes that “while coverage levels and service quality have improved markedly over the past decade, the need for water services has outstripped the government’s ability to provide sufficient water and sanitation and ensure equitable access to the citizens throughout the country.” This policy goal is to be applauded, since achievements of this goal will go a long way to improve the existing quality of life of the people. The draft policy further correctly concludes that one of the important issues that have “outstripped the government’s ability” is the need for funds for capital investments in new water supply and sewerage projects. In addition to this funding requirements, efficient operation and maintenance of the existing projects will also become an increasingly important issue in the coming years, especially as the number of new water supply and sewerage projects is likely to increase very significantly in the future. Thus, with the shortages in the government funding, which already has become a serious constraint to assure future developments on a timely basis, it is essential that the customers of the Board at least pay for the full operation and maintenance costs of the existing and proposed water supply and sewerage projects, and if possible increasing percentages of the investment costs in the future. The Sri Lankan government cannot subsidise the operation and maintenance costs, as well as the high capital investment costs, of all these projects, for all the people, heavily over an indefinite period.

This of course is not a special situation that is valid only for a country like Sri Lanka: nearly all other developing countries are facing very similar problems in the water supply and sanitation sectors, and also somewhat same type of economic constraints. For all developing countries, the time for free availability of the government-subsidised water and sanitation services has now become history. The consumers must pay for these services based on the twin principles of economic efficiency and equity. However, it should be noted that many developing countries are taking different approaches to overcome the financial constraints, and also adopting new management practices to improve their technical and economic performances, and concurrently provide better water and sanitation services to an increasing majority of their citizens. NWSDB needs to carefully assess these new approaches that are being tried in different countries to see to what extent they can be applied under the Sri Lankan conditions, perhaps with appropriate modifications that are considered necessary.

Because of these developments and the perceived constraints, GoSL has initiated a reform programme for the water sector which includes, among other items, establishment of a regulatory commission for water supply and sewerage, and contracting private operators in selected regions to improve operational efficiency and to attract private sector investment finance. Both the sector reform programme, and the increasing involvement of the private sector are likely to be important factors to improve the existing situations further in the future. Experiences from other parts of the world indicate that the private sector is likely to play an increasingly important role in the future. Thus, public-private partnership in the water sector is likely to be an increasingly important consideration for Sri Lanka in the future.

The draft national water policy (2002) proposes the following steps to enhance the economic viability of the Board's activities, which have special implications for the sustainability of the towns east and the towns south of Colombo water supply projects. The proposed steps in the draft policy that are relevant for the present assessment are the following:

- Water tariffs in the urban areas should be set at such a level that it should be possible to recover operating costs and depreciation, and should be gradually increased "to recover the full supply cost of providing services, including debt service and a reasonable rate of return".
- Cross subsidies between commercial/industrial consumers and domestic consumers should be reduced to a reasonable level. However, what constitutes a "reasonable level", or how it can be estimated, is not specified in the policy. It should be further noted that at present there are cross-subsidies also between projects, which also need to be progressively reduced, and perhaps eliminated for most cases, unless there are very special and specific justifications for maintaining them on an individual basis.
- Sewerage tariff that covers operation and maintenance costs shall be introduced, based on water consumption for the sewered areas, and also as and when sewerage services are introduced to these new areas.
- For low-income people, appropriate life-line tariff should be available to ensure the affordability of water of sufficient quantity and quality to satisfy both basic consumption and hygienic requirements. It should be noted that a process which identifies and appropriate life-line tariff for the poor, without subsidising the rich, has not been easy to formulate, neither in Sri Lanka, nor in any other developing country. This aspect will require further intensified research in order to identify the various policy-options available to formulate an appropriate life-line tariff for the poor under the Sri Lankan conditions, which unnecessarily does not subsidise the rich, who can pay for the services they receive.
- Operational efficiencies of the water supply systems should be improved, and the levels of non-revenue water in all projects should be significantly reduced from their current high levels. This aspect is a very important consideration for Sri Lanka, both for existing and new projects.
- Water demand management programmes should be implemented to reduce the levels of the current consumptions. In addition to the



proposed economic instruments, other possible alternatives should be considered (for example, education and communications) to intensify the use of demand management practices.

All the above policy recommendations are unquestionably steps in the right direction to enhance the financial conditions of the Board, and also to further improve its management practices. When these draft policies are fully implemented, they will go a long way to assure the economic sustainabilities of the individual water projects as well as that of the Board. On the basis of discussions with senior officials, it is highly likely that the draft policy will soon be approved officially by the Sri Lankan Government. *If so, the appropriateness of the overall government policy for the water and sanitation sectors can no longer be questioned, especially in terms of the necessary improvements in the economic sustainability of the existing and the new projects.*

*While the proposed policy is unquestionably a step in the right direction, the main consideration for the future will not be the adequacy, or even the appropriateness and desirability of the policy, but its proper and timely implementation, especially as it will mean steady increases in the water and sewerage charges in the coming years in order to assure full cost recovery within a reasonable period of time. The charges that the customers will have to pay for water will be much higher than what they are at present, most probably by a very significant amount in the coming years, especially when sewerage and wastewater treatment services will be introduced, the extent of which are very limited in the country at the present time. This also means that special attention needs to be paid in terms of equity, so that the poor families are not penalised by higher water and sewerage charges, which they may not be able to afford.*

Water Tariffs – Since, under the current conditions, the final decision to increase the water tariffs in Sri Lanka depends primarily on a political process, it is difficult to predict at present as to what extent the politicians will allow the tariffs to be increased to the level necessary for full cost recovery on a timely and consistent basis. With the quality of the current senior management in the Board, there should not be any problem in the sense that it can request the necessary tariff increases in a timely manner, as stipulated in the draft national water policy. However, the approval of the higher tariff structure is beyond the current mandate of the Board. It still basically remains as primarily a political process, which means that the increases requested by the Board, may or may not be considered and approved by the politicians in a timely manner. The general experiences in developing countries have been that politicians generally prefer to decide to “go slow” to increase tariffs before impending elections, either in the main urban areas or centrally, or because of the personal interests and ambitions of the Ministers concerned. Sri Lanka is not an exception to this general trend.

The political situation in Sri Lanka has unquestionably improved during the past decade, and the people and the politicians are now more aware

than ever before in human history that the consumers must pay for water, sewerage and wastewater treatment services in order to continue to get a good service and universal coverage in the country. The Government simply does not have enough funds to continue to invest heavily in these sectors and pay for their timely and proper operation and maintenance, and, in addition, provide a subsidised service to all the country's residents. Thus, unless some radical improvements are made in the autonomy and the responsibilities of NWSDB, one possibility still remains that the political process may not allow the water tariffs to be increased regularly, at appropriate intervals, to the level necessary for assuming full cost recovery. There is a good possibility that prices will be allowed to increase, but not all the time, and not to the level necessary, and also not exactly promptly when they are requested by the Board. These aspects can already be witnessed in the recent past. Furthermore, the multilateral and bilateral donor agencies have also becoming increasingly aware in recent years of the importance of practicing water pricing in terms of cost recovery and water conservation. Most of these agencies are now requiring as a part of their loan agreements that the Government initiates and/or increases water tariffs to more appropriate economic levels.

The urban domestic water tariffs in Sri Lanka are still heavily subsidised by the Government, and by cross-subsidies between consumers, and also between various projects. These various subsidies, however, have been steadily declining, especially during the past ten years. For the Greater Colombo Urban Water Supply schemes, the current Government subsidies include:

- 50 percent subsidy for the foreign loan components, as has been the case for the two JBIC loans; and
- 100 percent subsidy for the Sri Lankan Government contributions that is available in the local funds.

In other words, the Board is required to pay back to the Government only 50% of the foreign loans, at an annual interest of 10%, over a period of 24 years, with another two years of grace period, if considered necessary. Furthermore, the Board returns the funds to the Government in the Sri Lankan rupees: the Government assumes the entire foreign exchange risk, which could be quite substantial under many conditions.

The revenue collection for the urban water supply in Sri Lanka started in 1982, only some two decades ago. Considerable progress has been made since that time, especially during the 1990s, and there have been continuous improvements in the methods used to set the tariff structures, the levels of the tariffs, and the collection of the revenues outstanding from the consumers. These progressive increases in the tariff structures from 1981–83 to 2002 are shown in Table III.1. Viewed in a different fashion, the provision of free water services to the urban consumers of Sri Lanka really became history in 1982.

Other Economic Considerations – Because of the increasing investments in the water sector, the total debt service costs for the Board have steadily increased from Rs. 208 million in 1997, to Rs. 521 million in 1999, Rs. 684 million in

2000, Rs. 704 million in 2001, and Rs. 854 million in 2002. With heavy investments necessary for the next 10 years to meet the targets for the urban water supply and sewerage services, as stipulated in the draft water sector policy, the level of the debt service for the Board will increase steadily and most likely very appreciably in the foreseeable future. Because of these increasing debt service payments, fiscal prudence and higher institutional efficiency will become two very important requirements for the Board in the future.

In order to meet this increasing debt service costs, as well as higher operation and maintenance costs, and reduced cross-subsidies between the consumers and the projects, the water tariffs will have to be increased steadily and regularly over the next decade and beyond, and also NWSDB has to become increasingly more efficient so that its costs of providing the necessary services efficiently can be reduced to as low a level as possible, and also as early as feasible.

The income of the Board from the sale of water at present depends not only on the prevailing tariffs but also on the number of connections, amount of water used by the various categories of users, billing accuracy, and the bill collection efficiency of the Board. All these issues will be considered one by one next.

The growth in the number of water connections provided by the Board has been excellent, and this is shown in Table III.2 for the 1991-2002 period.

*The above Table indicates that within a short period of only 12 years, the number of connections provided by the Board has increased by 827 percent since 1990. While this can be considered to be a very commendable progress, the connection rate has to be further accelerated if the targets established by the draft policy are to be met, especially in terms of universal coverage for the urban sector by the year 2010. Reaching the draft policy goal in only about another 8 years will be a very challenging task under the best of circumstances.*

The average monthly consumption of water for 2000 and 2001, and the average household monthly bills for the same years are shown in Table III.3. These factors also have bearings on the total income of the Board, and thus ultimately on the economic sustainability of the individual projects.

Table III.1. Progressive increases in the tariff structures for water, 1981-2002.

Categories	1981-83	1984 January	1990 April	1991 January	1991 August	1992 January	1993 January	1994 January	1997 January	1997 October	1998 March	1999 August	2001 January	2002 January
<b>Direct Billing</b>														
Service charge (Rs/month)	0	0	5.00 <sup>1</sup>	5.00 <sup>1</sup>	5.00 <sup>1</sup>	5.00 <sup>1</sup>								
Domestic	-	-	-	-	-	-	6.00	6.00	15.00				40.00	50.00
Non-domestic	-	-	-	-	-	-	10.00	20.00	200.00					
½"	-	-	-	-	-	-	-	-	-	50.00	50.00	60.00	60.00	70.00
¾"	-	-	-	-	-	-	-	-	-	100.00	100.00	120.00	120.00	140.00
1"	-	-	-	-	-	-	-	-	-	200.00	200.00	240.00	240.00	280.00
1.5"-3"	-	-	-	-	-	-	-	-	-	500.00	500.00	600.00	600.00	700.00
Above 3"	-	-	-	-	-	-	-	-	-	1000.00	1000.00	1200.00	1200.00	1400.00
<b>Domestic (Rs/cm m)</b>														
0-10	0.20	0.20	Free	1.00	0.60	0.65	0.75	0.75	0.60	25.00**	30.00*	35.00*	1.00	1.25
11-15	0.75	1.00	1.00	1.50	1.00	1.10	1.20	1.30	1.50	1.80	2.50	2.75	2.00	2.50
16-20	0.75	1.00	1.00	1.50	1.00	1.10	1.20	1.30	1.50	1.80	2.50	2.75	5.00	6.50
21-25	1.00	3.00	3.00	4.50	3.50	4.00	4.50	4.80	5.00	6.00	7.50	9.50	13.00	20.00
26-30	-	-	-	-	-	-	-	4.80	9.60	12.00	15.00	18.00	24.00	45.00
31-40	1.75	5.50	5.50	8.00	7.00	7.50	8.50	9.40	12.50	15.00	18.00	20.00	30.00	45.00
41-50	1.75	5.50	5.50	8.00	7.00	7.50	8.50	12.00	18.00	20.00	20.00	25.00	40.00	45.00
51-75	1.75	11.00	11.00	19.50	19.50	20.00	25.00	25.00	32.50	35.00	35.00	38.00	45.00	45.00
Over 75	-	-	-	-	-	-	-	-	-	-	-	40.00	45.00	45.00
<b>Government quarters</b>	Domestic tariff	Domestic tariff	Domestic tariff	Domestic tariff	Domestic tariff	Domestic tariff	Domestic tariff	Domestic tariff	7.00	Domestic tariff	Domestic tariff	Domestic tariff	Domestic tariff	Domestic tariff
<b>Stand Post</b>	Free	0.80	0.80	1.00	1.00	1.25	1.50	1.75	3.00	4.00	5.00	5.00	6.00	7.00

Table continues in the next page

Categories	1981 -83	1984 January	1990 April	1991 January	1991 August	1992 January	1993 January	1994 January	1997 January	1997 October	1998 March	1999 August	2001 January	2002 January
Non-domestic (Rs/cu m) Government institutions and commercial	2.75	5.50	11.00	19.50	19.50	20.00	21.00	22.00	25.00	25.00	27.50	30.00	35.00	42.00
Tourist hotels	9.00	9.00	16.50	25.00	25.00	27.00	27.00	27.00	27.00	27.00	30.00	30.00	35.00	42.00
Industries	5.50	9.00	16.50	25.00	25.00	25.00	25.00	25.00	25.00	25.00	27.50	30.00	35.00	42.00
Shipping	9.00	15.00	50.00	75.00	75.00	80.00	80.00	80.00	80.00	100.00	110.00	120.00	125.00	140.00
Religious institutions	2	2	2	2	2	2	2	2	2.00	2.50	3.00	3.00	3.00	4.00
Board of Investment (free trade) <sup>3</sup>												22.00	24.00	26.00
Unmetered flat rate (Rs/month) Domestic	0	30.00	100.00	100.00	80.00	100.00	150.00	150.00	250.00	300.00	400.00	400.00	400.00	
Non-domestic	0	40.00	500.00	500.00	500.00	750.00	1000.00	1500.00	2500.00	3000.00	4000.00	4000.00	3500.00	

Table continues in the next page

Categories	1981-83	1984 January	1990 April	1991 January	1991 August	1992 January	1993 January	1994 January	1997 January	1997 October	1998 March	1999 August	2001 January	2002 January
Bulk billing (Rs/cu m) <sup>4</sup>														
Without electricity	NA	NA	1.75	2.50	2.50	2.70	-	3.40	-	-	-	-	-	-
With electricity	NA	NA	NA	4.00	3.80	4.00	4.45	4.90	5.75	7.25	8.00	8.00	8.00	9.00

(Source NWSDB Documents)

NA - Not-available

\* - These figures show **both** the amount for service charge and for domestic consumption 0-10 cu m.

1 - 50 rupees to all consumers.

2 - 10% of domestic fares.

3 - Commercial rate, bulk sales.

4 - Bulk billing refers to sales to municipalities. From January 1997, where no value appears, it means that there is only one tariff for billing with and without electricity.

Table III.2. Number of Connections by Categories.

Categories	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Up to September 2002
Domestic	177,432	201,908	228,680	252,354	281,737	312,531	347,447	391,720	446,730	520,662	598,528	644,948
Schools	747	911	915	1,068	1,172	1,210	1,283	1,353	1,469	1,619	2,367	1,881
Stand post	1,962	3,022	4,556	4,828	5,087	5,354	5,531	6,651	8,204	7,816	7,545	7,438
Government	3,181	3,585	3,820	4,110	4,321	4,588	4,810	5,137	5,512	6,138	6,674	6,877
Commercial	15,800	17,813	19,253	20,145	22,257	24,277	26,285	28,709	32,101	35,442	39,216	41,177
Tourist Hotel	190	210	226	257	286	301	304	333	341	360	375	381
Shipping	17	8	8	8	8	7	8	6	9	8	8	10
Industries	452	611	725	791	927	1,019	1,102	1,213	1,309	1,554	1,632	1,699
Institutions	1,887	2,194	629	554	533	606	439	442	479	518	567	601
Religious	-	-	1,867	2,160	2,284	2,396	2,758	2,997	3,210	3,514	3,732	3,991
TOTAL	201,748	230,262	260,679	286,275	318,612	352,289	389,967	438,561	499,364	577,631	660,644	709,003

Source NWSD Documents

Table III.3. Average monthly consumption and bill per household,  
2000-2001

Areas	Monthly consumption (m <sup>3</sup> )		Monthly bill (Rs.)	
	2000	2001	2000	2001
Greater Colombo	22.4	21.95	196.62	235.17
Regions	17.7	16.5	113.02	125.67
Average, Sri Lanka	19.67	19.15	154.27	178.95

(Source: NWSDB Documents)

If a longer-term trend is analysed in terms of average monthly household consumptions, the trend from the year 1996 has been one of a regularly declining one. For example, an average household consumed 25.2 m<sup>3</sup> of water per month in Greater Colombo, and 18.8 m<sup>3</sup> in the regions in 1996. These consumption levels have steadily declined to 21.6 m<sup>3</sup> and 16.3 m<sup>3</sup>, respectively, by the 2002 (the figures are for up to September for both the years concerned). This indicates that there was a net reduction of household consumption by 14.28% in Greater Colombo, and 13.3% in the regions, within this seven-year period only. It should be noted that this reduction in consumption is also a current objective of the Board so that more people can share effectively the same quantity of available water.

Viewed differently, at the per capita level, similar trends can be observed. In 1995, per capita consumption in Colombo was around 200 litres. The consumption level has now come down to about 140 litres, primarily through water pricing mechanism. If this can be further reduced to 100 litres, a level that is feasible, the current total demand of 246,000 m<sup>3</sup>/day, could be reduced to 185,000 m<sup>3</sup>/day, thus reducing the current demand by about 60,000 m<sup>3</sup>/day. It is interesting to note that the Phase 1 of the Kalu Ganga project will deliver the identical amount of water, that is, 60,000 m<sup>3</sup>/day, but at a capita investment of \$84 million U.S. dollars. Thus, soft options, like demand management, promotion of water conservation, etc., need increasingly more attention to meet the identical social goals. Many times some of the soft options can be implemented at cheaper economic and environmental costs, and within a much shorter time-scale, compared to hard options like development of new water sources.

An analysis of the above Table also indicates that the average water consumption in the Greater Colombo area declined by about 2%, and in the regions by 6.8%, over the identical period of 2000-2001. However, during the same period, the average household bill increased by about 20% in Colombo and by 11.2% in the regions. While this is to be expected in terms of overall direction because of increasing focus on demand management practices by the Board, especially through higher tariffs, an interesting anomaly can be



noted. Even though the increase in the average household bill in Colombo was higher than the regions by about 46%, the decline in water consumption in the regions during the corresponding period was significantly higher than in Colombo. This anomaly can perhaps be explained by the facts that the average income of the households in Colombo was higher than in the regions, and the average household water bill, even after the increase of the tariffs, is still quite low, around only one percent of the average household income. Thus, unless the average monthly expenditures on water become a higher proportion of the monthly average household income, their effectiveness in terms of demand management is likely to be limited. Demand elasticities for water are likely to be significant at somewhat higher tariffs.

In terms of water sold and income to the Board, some interesting conclusions can be drawn based on the information available from Table III.4, which shows the data for 2001. Slightly over 60% of all water produced was sold to the domestic consumers, but it accounted for about 36% of the total revenue of the Board from the total water sales. In contrast, the various government institutions consumed around 11.33% of the water sold, but accounted for 25.18% of the revenue, and the commercial units consumed 9.15% of water sold, and paid 21.05% of the revenue. This indicates that the domestic consumers are still being subsidised to a very significant degree. According to the draft water policy, these types of cross subsidies are to be reduced to "reasonable" levels, which will mean that the domestic consumers will have to pay progressively higher charges amounts for water in the future.

Table III.4. Quantities of water sold and revenues by consumer categories, 2001.

Categories	Quantities sold (1000 m <sup>3</sup> )	Percentages	Revenues (million Rs.)	Percentages
Domestic	134,691	60.39	1,258.50	35.97
Government	25,276	11.33	880.86	25.18
Commercial	20,410	9.15	736.45	21.05
Standposts	14,129	6.34	83.84	2.40

(Source: NWSDB Reports)

For the 2002, the forecasted monthly water consumption patterns by different users were as follows:

- domestic – 62%;
- non-domestic – 26%;
- standposts – 6%;
- bulk – 2%;
- religious/schools – 2%;

- BOI – 1%; and
- others – 1%.

Another important factor that has an impact on the total revenue is the efficiency of the collection of the bills by the Board. Table III.5 shows the actual amount collected against the water bills for the period 1993-2001. In terms of bill collection, it has to be admitted that *the performance of the Board has been exemplary during the past decades, and this high level of revenue collection is seldom matched in other developing countries*. The total bill collection efficiency varied from a low of 89% to a high of 99% during these nine years. The bill collection efficiencies of the Board for the 1993-2001 period are shown in Figure III.1.

Table III.5. Percentage of Collection Against Revenue (Rs. 1000), 1993-2001.

YEARS	REVENUE			COLLECTION			% COLLECTION AGAINST REVENUE		
	Domestic	Non domestic	Total	Domestic	Non domestic	Total	Domestic	Non domestic	Total
1993	260,389	890,765	1,151,154	255,582	836,078	1,091,660	98	94	95
1994	309,007	1,020,738	1,329,745	259,624	951,423	1,211,047	84	93	91
1995	356,694	1,167,558	1,524,252	336,643	1,110,180	1,446,823	94	95	95
1996	373,009	1,191,356	1,564,365	348,198	1,195,241	1,523,439	93	100	99
1997	545,817	1,484,508	2,030,325	451,523	1,367,074	1,818,597	83	92	90
1998	714,257	1,760,861	2,475,188	629,901	1,626,542	2,256,443	88	92	91
1999	802,232	1,912,136	2,714,368	698,984	1,726,878	2,425,862	87	90	89
2000	963,925	2,042,556	3,006,481	1,017,500	1,962,121	2,979,621	106	96	99
2001	1,284,627	2,213,778	3,498,405	1,234,486	2,123,119	3,357,605	96	96	96

(Source: NWSDB)

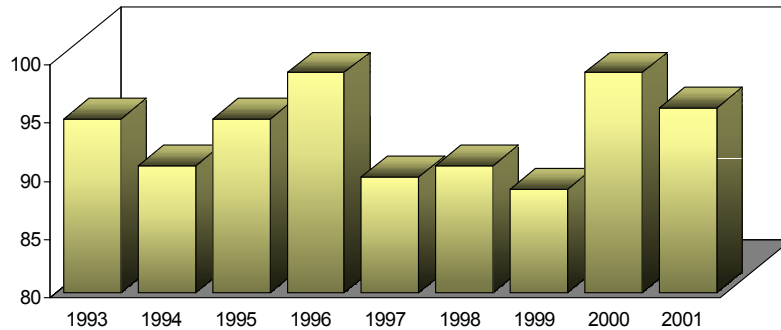


Figure III.1. Bill collection efficiencies of the Board, 1993-2001.

One of the reasons as to why the Board has an excellent bill recovery record is because it has an elaborate, well-established and transparent process. Consumers are well aware of this process (Figure III.2), and they are aware that if the bill continues to be unpaid, the water connection will be cut-off. In addition to the disruptions and inconvenience it will invariably cause to the various household activities, there is an additional reconnection charge which has to be paid. The connection charge, after disconnections, is Rs. 500 for the households and Rs. 1500 for all others.

The Board is proposing an incentive-disincentive system for prompt bill payments. A 4 percent discount on the bill will be allowed for advance payments of the bills. A 2 percent discount in the next month's bill will be made if the bill is paid within 4 days of its receipt. In addition, it is proposed that a deterrent charge of Rs. 100 will be levied from 2003 for non-payment. These progressive developments are likely to ensure that the Board continues to have excellent bill recovery record.

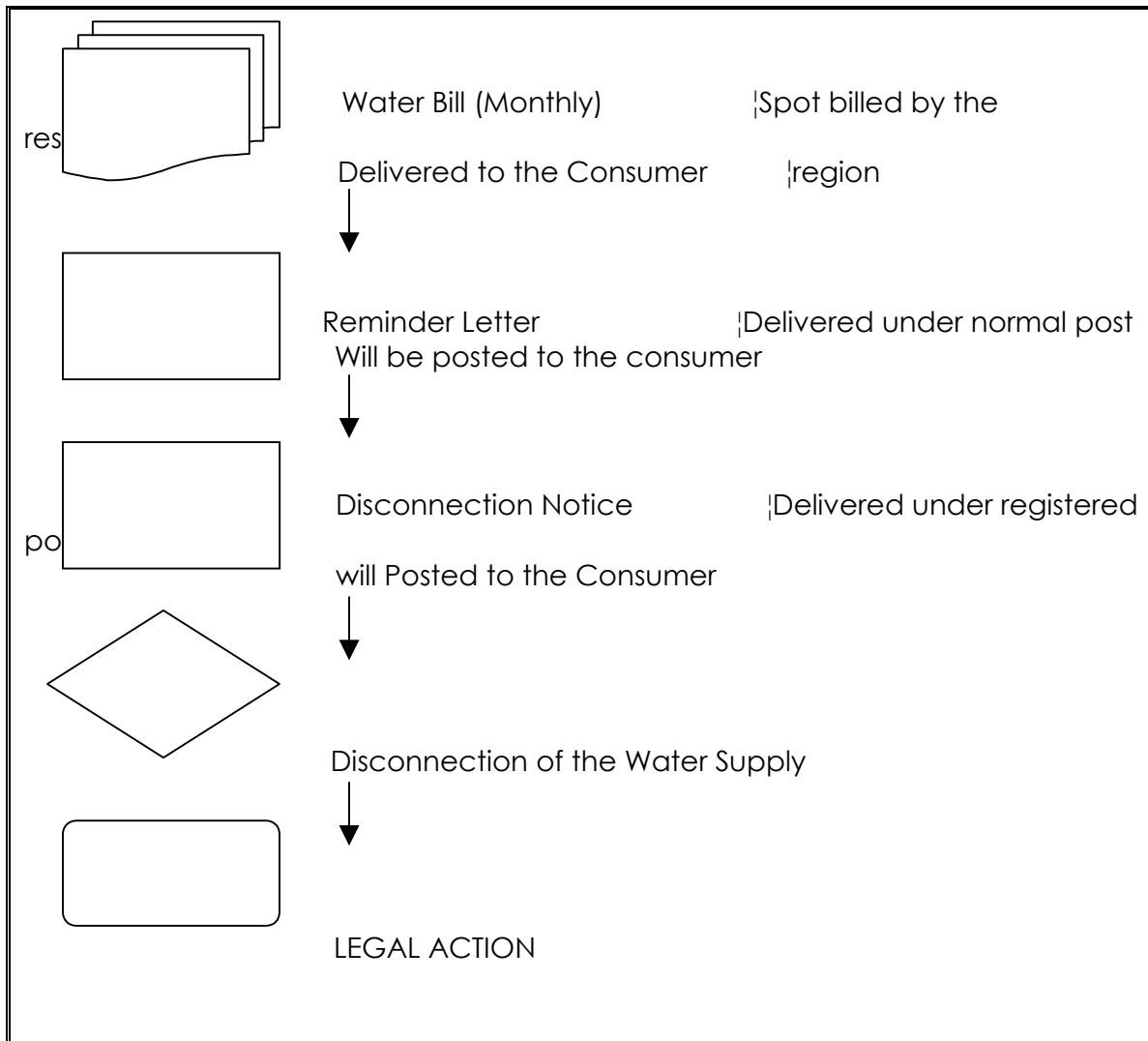


Figure III.2. Bill Recovery Process.

Non-revenue Water – A very important economic loss to the Board has been due to the extent of non-revenue water (NRW), which is defined by the difference between the quantity of water produced and the quantity billed for. At present NWSDB is billing for only about 65% of the total amount of water it produces in the Greater Colombo area. In other words, the balance of 35% of the water produced unfortunately does not generate any revenue. This means that if the entire non-revenue water loss can be completely eliminated (this of course is not possible), the Board's income will increase by more than 50% at the current prevailing water tariffs. The non-revenue components for Greater Colombo are shown in Table III.6 on a monthly basis, from September 2001 and September 2002.

If Colombo City is considered, NRW accounts for more than half the quantity of water are billed for. The composition of NRW for NWSDB as a whole and Colombo City are shown in Table III.7. The NRW rates are high, but such high rates of NRW are not exactly uncommon in the major urban centres of developing countries, which generally range from 40 to 60 percent. The NRW component in the Colombo City is thus somewhat at the higher end of this spectrum. In other words, these losses mean that in Colombo City, NWSDB losses slightly more than half of its possible revenue.

The high rate of NRW in Colombo City is because it has an old water supply system, which needs major and expensive renovation. Equally high losses from the tenement gardens (informal settlements) ave continued for a very long time. Based on experiences in other developing countries, having similar political and democratic system as Sri Lanka, it would be a somewhat difficult task to reduce the losses from the tenement gardens because of political constraints and interference.

The towns east and the towns south of Colombo are new projects, and hence the non-revenue water from these two areas is at present less than the NWSDB averages. Table III.8 shows the annual averages of NRW for these two project areas, as well as for Colombo City and the Greater Colombo area for comparison purposes.

Table III.6. Non-revenue components for Greater Colombo on a monthly basis, September 2001 to September 2002.

(Source: NWSDB Documents)

Mm <sup>3</sup> /month	2001				2002								
	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Water Produced	17.32	17.95	17.58	18.39	18.25	16.05	18.18	17.68	18.17	17.57	18.46	18.67	18.17
Water Sold	10.77	11.03	10.8	11.37	11.23	10.16	11.47	11.21	11.48	11.11	11.71	11.71	11.51
NRW*	6.55	6.92	6.78	7.02	7.02	5.89	6.71	6.47	6.69	6.46	6.75	6.96	6.66
NRW as % of Water Produced	37.8	38.6	38.6	38.2	38.45	36.7	36.9	36.6	36.8	36.8	36.6	37.3	36.7

Table III.7. Non-revenue water for NWSDB and Colombo City as percentages of water produced.

Type of losses	Overall NWSDB	Colombo City
Leakages	23	25
Tenement gardens, standposts	4	15
Illegal connections	4	8
Metering errors	4	5
Total losses	35	53

(Source NWSDB)

Table III.8. Non-revenue water, 1998, 1999, 2000 and 2001

Area	NRW as % of water produced			
	1998	1999	2000	2001
Towns East and South	31.7	29.7	26.6	25.2
Greater Colombo	41.4	39.4	38.7	25.2
Colombo City	54.3	52.2	53.8	54.4

(Source: NWSDB)

The economic implications of NRW for the Board has been estimated by the Ministry of Finance of the Government of Sri Lanka in 2002 as follows:

- The estimated NRW in 2002 is sufficient to supply 420,000 new households, assuming an average consumption per month, per household, of 25 units.
- The estimated loss of revenue due to NRW for 2001 was Rs. 2,016 million.
- Operation and maintenance (O & M) cost per m<sup>3</sup> of water in 2001 was Rs. 20.20. If NRW can be eliminated, the cost could be reduced to Rs. 13.01. In other words, O & M cost per unit of NRW was Rs. 7.19m which is a net loss to the Board.
- If NRW can be reduced to 30%, the Board could earn Rs. 4,108 million in 2002, with the same production but without any tariff increase. In this case the additional cash requirements from water tariffs would have been only Rs. 162 million, and not Rs. 665 million, as was forecasted by the Board.
- Since 1998, all the tariff revisions had assumptions that NRW would be reduced by 3% annually. However, actual reduction in NRW over the 1998-2001 period has been only about 1%.



These estimates of the Ministry of Finance indicate the importance of NRW for future efficient and equitable management of the water resources in Sri Lanka.

The segregated data are available for non-revenue water components for towns east and the towns south of Colombo are available from February 2002. These are shown in Table III.9, on a monthly basis, along with data for Greater Colombo and Colombo City for comparison purposes. It is interesting to note the following facts:

- Even though the towns east and the towns south of Colombo water supply projects are new, non-revenue water for the towns south account for little over one-quarter of the water produced, and for the towns east, NRW is over one-fifth. These are somewhat high losses for nearly implemented projects.
- Towns south is a comparatively newer project, compared to the towns east. Normally, newer projects have lower NRW. However, *NRW in towns south is consistently about 5% (one-quarter) more, when compared to towns east.* The reasons for these consistent higher losses cannot be identified at present, without conducting additional studies.

JBIC currently has a new project with NWSDB on reduction of non-revenue water. Since the earlier loans by JBIC facilitated the construction of the towns east and the towns south of Colombo water supply projects, and the new NRW project is also receiving JBIC support, it would be desirable, and indeed most logical to study the reasons as to why the two water projects, even though constructed and completed very recently, are having NRW components which are on somewhat high side. Determined attempts should be made to reduce the NRW component of water produced for these two projects to around 15 percent initially, and then to around 10-12 percent. It should be noted that the current NRW component in Singapore is only six percent and, in Tokyo, it is seven percent. Even if the NRW component from these two projects could be reduced to 12 percent in the foreseeable future, the losses will still remain at the double of that of Singapore. Reduction of NRW is an important consideration for the following reasons:

- It is by far the cheapest and the quickest method to increase the availability of water supply through "softer" methods by reducing the NRW component of water produced, compared to the "harder" options of construction of new water supply development projects to bring additional water from new sources.
- Reduction of NRW will immediately increase the revenue of NWSDB.
- More consumers can be provided with house connections from the saving of water due to the reduction in the NRW component. If urgent actions

are taken to reduce the NRW component, new consumers can begin to receive benefits within a short period of about 10-12 months, compared to 6-15 years for planning and implementation of construction projects.

On the basis of information collected during the present evaluation, it appears that out of the 85,000 connections in Colombo City (this accounts for approximately 25% of total connection in the Greater Colombo area), nearly 30,000 households receive estimated bills, and at least another 20,000 water-meters are defective in this area.

Thus, installation of some 50,000 new meters alone on an urgent basis, will probably reduce the extent of NRW component in Colombo City by 15-17% within a limited period of 1-2 years. People in the poorer household could be encouraged to take house connections, which will be metered, but with more attractive economic options made available for the payment of the connection charges. These "softer" options to reduce NRW do not consider water losses due to leakages, which need to be tackled as well. Leak reduction will be more expensive and will take a somewhat longer time, compared to the above option.

Policy options for Improving Economic Sustainability – There are many policy options available to improve the economic sustainability of providing water services. These options are not mutually exclusive. Among the options that could be considered are the following:

**1. Make the Board increasingly more efficient on terms of staffing** – There is no question that the Board was heavily overstaffed a decade ago. For example, in 1991 the ratio of staff members in the Board per thousand connections was extremely high, at 33. This is shown in Figure III.3. This is still high, when compared to other countries:

Figure III.3. Staff Members per 1000 connections

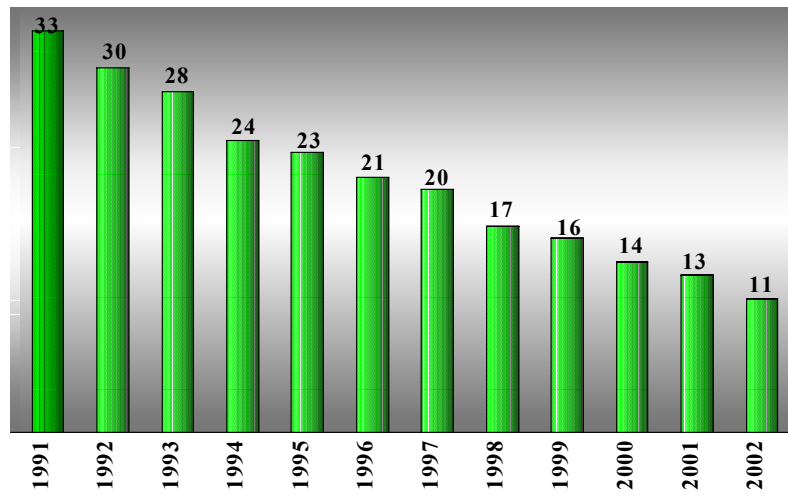


Table III.9. Composition of non-revenue water, September 2001 - September 2002.

Areas	2001				2002								
	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Greater Colombo	37.8	38.6	38.6	38.2	38.5	36.7	36.9	36.6	36.8	36.8	36.6	37.3	36.7
Towns South	24.59	25.67	25.15	26.0	26.3	24.5	24.59	23.99	24.06	24.1	25.16	26.64	26.88
Towns East						19.94	21.87	21.23	19.06	20.15	19.48	21.92	21.53
Colombo City	53.7	54.19	52.97	52.86	52.97	52.6	52.91	52.42	52.09	52.06	51.61	51.65	51.39

(Source NWSDB)

Singapore: 2 employees per 1000 connections  
Figure III.3. Staff Members per 1000 connections.

Developed countries: mean around 2.1-2.2 employees per 1000 connections

Thailand: 5 employees per 1000 connections

According to NWSDB, the water tariff for the year 2002 was formulated with the following assumptions:

- Number of new connections: 58,850
- Average number of persons per household: 5
- Replacement of 10 percentage of meters
- Reduction in the number of employees per 1000 connections: 0.5
- Reduction in non-revenue water component: 3%
- Estimated collection of bills: 98%
- 20% of capital budget (local component) to be recovered as overheads

These assumptions mean continuing advances in the efficiency of the Board. Assuming these assumptions can be realised, the efficiency improvement expected in 2002 over 2001 are shown in Table III.10.

Thus, even though the progress in reducing over-staffing in the Board has been excellent during the past decade, much progress still have to be made in the coming years.

The situation can be viewed in another way. In 2002, the personnel cost as percentage of the total operating cost was approximately 43% for the Board. In the developed world the corresponding figure is around 30%. Thus there is still considerable scope to reduce staffing situation of the Board.

*Cross subsidies* – Cross-subsidies between the different consumer categories and between the different projects need to be reduced. The cross-subsidies between the consumer categories are being progressively reduced. For example, cross-subsidy between domestic and non-domestic customers have already been reduced to 1:5.06. However, similar reduction in cross-subsidies is not taking place between projects.

Table III.10. Improvements forecasted over 2001-2002 period.

Improvements	2001	2002
Total number of domestic connections at the end of the year	596,330	652.360
Total number of non-domestic connections at the end of the year	7,283	7,591

Monthly production of water (1000 m <sup>3</sup> )	28,681	29,630
Monthly sale of water (1000 m <sup>3</sup> )	18,476	19,972
Non-revenue water	35.6%	32.6%
Number of Employees (excluding construction staff)	7,283	7,591
Number of employees (1000 connections)	11.31	10.80

(Source NWSDB)

Calculations made by the Sri Lankan Ministry of Finance (2002) indicate that the operation and the maintenance costs of all projects are expected to be covered by the tariff revision of 2002. However, recovery of scheme-wise operation and maintenance cost is still a long way off. With the earlier tariff that was valid in 2001, 137 projects were considered to be loss-making, and 44 were profitable. Even with the new revised tariffs, a vast majority of the loss-making schemes will still remain loss-making. In other words, some water projects pay more than their fair share of the O & M costs, whereas the majority of the projects pay less than their actual O & M costs.

The Ministry of Finance (2002) further notes that “during the past few years several projects were approved by the Cabinet subject to the implementation of scheme-wise tariff in those particular schemes. But they were not implemented”.

Thus, consideration and implementation of project-specific tariff is necessary for better decision-making. During the fieldwork for this evaluation, it was not possible to collect definitive information on the current status of cost-recovery for the towns east and the towns south of Colombo water supply projects. If project-specific tariff structures are implemented, this type of information will be readily available, so that the economic sustainability of individual water projects can be properly assessed.

Private Sector Involvement – The issue of economic sustainability cannot be answered by water tariffs and current revenues only: other factors need to be considered as well. Among these other factors are institutional efficiencies and non-revenue water. Logically and rationally, consumers should not be expected to pay for the inefficiencies and shortcomings of any institution, through higher prices. Accordingly, if full cost recovery for water and sanitation services is to be the final objective, it is essential that all water-related services be made as efficient and as logical as possible, so that the water users are prepared to pay higher prices that are consistent with a lean operation.

In this connection, it may be desirable to consider the possibility of outsourcing many of the activities that are currently being done by the Board.

It should be noted that the Board has been increasingly outsourcing more and more activities in the recent years. It is thus not a new phenomena for the Board, but much more remains to be done.

Probably the most important group of people in the Board that the water users are in regular contact with are the meter-readers. The time allocated for the current evaluation was simply inadequate to assess the performances of the meter-readers, since this itself alone would have taken about half the time allocated for the entire evaluation. However, during the social and economic assessment, some households mentioned that they felt that there was some corruption in the meter-reading process. We cannot establish definitively the correctness or otherwise of this perception. However, the current practices of the Board, where meter-readers are given specific areas to cover consistently over a very long period of time, have not produced good results in other developing countries. Such territorial control by meter-readers often has resulted in increases in their unauthorised incomes, since for certain personnel, personal interest may override the overall public interest. In order to counteract the occurrences of such problems the meter-readers needed to be rotated very frequently in terms of the areas they cover, so as to ensure the potential of unauthorised incomes is significantly reduced, or even totally eliminated. For example, such very frequent rotations are practiced in Singapore, where corruption for meter reading has been virtually reduced to zero.

Based on our experiences in other South Asian countries, we estimate that the Board's income could probably be increased within the range of Rs. 225-Rs. 350 million by proper, accurate and efficient meter-reading. In addition, such transformations could be made within a very short period of only about 1-2 months.

It would, however, most likely to be a very difficult political process for the Board to change the current meter-reading practices, and change the territories of the meter-readers, who are highly organised, very frequently. The meter-readers will in all probability, resist such a move very strongly because of their own personal vested interests.

Accordingly, one realistic solution to improve the situation could be to outsource the meter-reading to the private sector. This will mean that the overall cost of meter-reading will be reduced significantly because not only the number of meter-readers will be less, but also since the private sector is unlikely to pay the existing high salaries and fringe benefits that they currently receive.

In addition, the Board could provide an incentive to the private sector that they will receive a percentage of additional revenue that they may be able to generate from the existing consumers. If these proposed steps are applied, it is likely that the net benefit to the Board, in terms of additional revenue and reduced cost of the provision of meter services, will be in excess of Rs. 400 million.

There are many other activities that the Board could consider outsourcing to the private sector. Among these possibilities are:

- Leakage detection and repair;
- bill collection;
- new water connections; and
- vehicle maintenance and fleet management

All these activities, both individually and collectively, are likely to contribute to steady advances to both the economic sustainability of the projects and steady improvements in the financial performances of the Board.



CHAPTER IV.  
CAPACITY BUILDING AND COMMUNICATION

During the evaluation of the towns east and the towns south of Colombo water supply projects, one of the issues that became increasingly evident is the importance of capacity building and communication for the Board as a whole, if the two projects are to deliver the outputs expected from them on a long-term basis. Neither of these two issues has thus far received adequate attention in order to maximise the impacts of the projects through achieving higher efficiencies by building up the capacities of the institution responsible for delivery of appropriate quantities qualities of and water to all the users, and regular communication with the users and politicians. It should be noted that both of these issues have received inadequate attention, not only in Sri Lanka but also from developing countries in other parts of the world. Yet, all the present indications are that these two items are likely to become very important issues within the next ten years, certainly significantly more than what they are at present. It is thus imperative that all JBIC projects must consider capacity building within the specific projects carefully and systematically.

Capacity Building – The magnitudes and complexities of water planning and management practices have changed significantly during the 1990s, so much so that many of the earlier approaches, techniques and solutions that were used extensively for planning and management purposes may not be any longer appropriate and/or socially, politically and institutionally acceptable. Issues like decentralization, public and stakeholders participation, private sector involvement, water pricing, water rights, social and environmental considerations, transparent governance, impacts of globalisation on the water sector, and increasing emphasis on poverty alleviation, were often not explicitly and/or comprehensively considered in the water management processes prior to the 1990 period, or even during the 1990s, in most countries. Even now, many of the above-mentioned issues are not receiving adequate consideration from the water managers and the national policy-makers in most developing countries.

The introduction and consideration of these new and evolving concepts have unquestionably improved and broadened the scope of the water management policies and practices, but it has also meant that there has to be very substantial changes in current planning and management practices, if the future expectations and goals of the water and sanitation sectors can be met. All the existing and foreseeable trends indicate that the management processes and practices will become increasingly more complex in the future, and will also differ in some significant ways from what are being practiced at present. All these new developments mean that training and capacity building must receive priority attention so that all the professionals involved in water management become not only aware of their new and evolving responsibilities, but also can carry out their respective tasks efficiently. In other words, capacity building and training cannot be considered to be a one-shot process any more. It should be a continuous

effort for years to come for all the staff members of the Board so they are made continually aware of new ideas and developments, which could contribute to increasingly better water management practices.

In the case of Sri Lanka, the capacity building programmes within the Board, including the two projects that were evaluated, have to reflect the changing requirements of the water sector, and expectations from the public of the performances of the Board. This means that the Board must have staff members who are knowledgeable, experienced and multi-dimensional in character, and also forward-looking in nature, so that they can anticipate future water-related problems from technical, social, political and financial viewpoints, and then recommend cost-effective and implementable solutions in a timely manner.

It is now becoming increasingly evident that many of the current and emerging water problems cannot be solved efficiently and in a timely manner with the knowledge and the experiences of the past developments and practices, and also the past management and administrative mind-sets. Thus, for the Board to successfully plan and manage the water resources of Sri Lanka in the future, including the two water projects that are being assessed in this report, it is essential to have a critical mass of properly trained, experienced and forward-looking managers and experts, representing various relevant disciplines and sectors of water-related issues. The management of water projects in the future will require both much deeper and broader knowledge of issues and problems, certainly at a higher level than what has been experienced in the past, or being observed at present. These requirements not only refer to the engineering and technical personnel but also to staff members in the commercial, financial, administrative and communication areas.

During the current evaluation mission, it became evident that capacity building and training should become a priority consideration for the Board, otherwise its future sustainability cannot be assured in terms of a tightly-managed, lean and efficient institution, and its relationships with the public and the policy-makers may fall far short of what may be expected from it in the future. In spite of these requirements, capacity building within the frameworks of the two projects was subject to begin neglect by both JBIC and the Board. There are many reasons as to why capacity building should receive much higher priority than it has received in the past or receiving at present, both from the Board itself and donors like JBIC. Some of these reasons will be analysed next.

First, the world of water management is changing very fast. It is likely that *during the next 20 years, water management practices are likely to change more than the past 2000 years*. Thus, the extent and magnitudes of these changes are likely to be unprecedented during the next two decades, a factor that neither the national institutions nor the donor agencies have considered thus far. In one way, such a development should not be a surprise. For example, if one examines carefully the assumptions and the hypothesis of

the towns east of Colombo water supply projects that was planned in the mid-1980s, and was subsequently reviewed and approved by JBIC, these have changed radically during the intervening 15 years or so. This statement should not be construed as a criticism of either the Board or JBIC, but simply that the development paradigms continue to and in some cases change, somewhat radically, and one should not criticise any institution for following the then prevailing practices, based on the hindsight of new knowledge that is available at present. In addition, even the current paradigms are highly likely to change, or evolve even faster, in the future. Thus, to paraphrase Lewis Carroll, the Board has to run even faster in terms of acquiring new knowledge to stay in the same place! All these developments mean that capacity building must receive a much higher priority than it has been received thus far, by both the Board and the donors like JBIC. Capacity building must be taken seriously, and funds earmarked for capacity building initially should not be reduced, and funds available are spent wisely and efficiently. There have major deficiencies in these areas of both the JBIC projects.

Second, the Board has to transform itself from a predominantly technical institution, as it has been in the past, to a more service-oriented organisation, which could be able to provide good water services to its customers at the least possible cost, and in a socially, responsible and environmentally acceptable manner. The technical component of the Board will continue to remain important, but during the next ten years and beyond, the Board will have to give higher emphasis to commercial and financial aspects, its relationships to the water users, and education and communication with the public and policy-makers, compared to what was given in the past. Thus, the roles and functions of the Board are very likely to change very significantly during the coming decade, as will the expectations of the performances of the Board from the public and decision-makers.

If cost recovery from water and sanitation services are to be achieved, as stipulated in the draft water policy paper (2002) the users will have to pay steadily increasing prices for water during the next decade, and possibly for a much longer period. The day when the customers could receive free or heavily-subsidised water is now over in Sri Lanka. Users will have to pay increasingly higher costs to receive appropriate quantity and good quality of water, and pay for sewerage and wastewater treatment services. These increases will be significantly higher than the rate of expected inflations. Thus, consumers will expect to receive good service from the Board so that they perceive that they are receiving good value for increasingly higher payments for water and wastewater management services. Thus, the relationship of the Board with the consumers will move to a very different plane, which engineers alone will not find easy to provide. Thus, in addition to technical skills, the Board must develop excellent relationships and communications with its entire customer base, which was not of such high priority concern earlier.

Third, as the provision of water supply and sanitation to all the people of Sri Lanka becomes an increasingly important political and social objective, the Board must consider new ways of doing things, which are more cost-effective, socio-politically acceptable and environmentally desirable than

ever before. It needs to think “outside the box”, so that the solutions that were not tried before could be considered for possible implementation. It thus must review new practices which countries like Brazil, Chile or Morocco are pioneering in different areas of water management, and not look exclusively for solutions from advanced countries like USA, United Kingdom, France or Japan, which have been mostly the case in the past, or at present. For example, the latest Moroccan practice of water pricing for standposts will be more useful to the Board, compared to anything USA or Japan can offer, simply because these advanced countries do not have standposts anymore. Thus, instead of reducing the number of standposts, as the Board is doing at present, it can also consider making them revenue-generators, as has been the case in Morocco. Similarly, new solutions and management practices that have been developed recently in countries like Brazil, Chile or Morocco, are likely to be more useful to, and appropriate for, Sri Lanka, because of similarities in economic, social, institutional and legal conditions, compared to USA or Japan.

Fourth, unless the Board is radically restructured to become an autonomous body, with its own separate but higher salary and incentives structures, it will become increasingly difficult for the Board to hire good managers or specialists at the prevailing civil service pay rates. Thus, the Board has to give accelerated attention to “grow” the necessary experts in-house, so that this new cadre of experts can successfully use their knowledge and skills to solve the existing and emerging problems, and continually contribute to increasing the performance levels of the Board.

Fifth, in Sri Lanka, a large number of water infrastructural projects are either being constructed at present, or are in the planning phase for possible construction in the foreseeable future. In terms of water projects, one of the important challenges for the Board will certainly be to negotiate with the national and international funding agencies and consulting companies not only in engineering and technical terms, but also in financial, political, social and even environmental terms. For this, appropriate numbers of the staff of the Board should be trained to the level necessary so that they can successfully carry out the tasks that have been mandated to it, successfully, cost-effectively, and in a timely manner.

Current capacity building in the Board – Based on the information available from the Manpower Development and Training Division of the Board, the number of people trained during the years 2000 and 2001 are shown in Table IV.1.

Table IV.1. Number of trainees, 2000 and 2001.

Type of Training	Number of trainees	
	2000	2001
Formal in-house training	4111	1907
Training for school children	-	1522
Training for other agencies	2344	12
External in-country training	170	156
External overseas training	70	55
On-the-job training	140	104

(Source: NWSDB)

The table shows that while the total number of people trained by the Board each year is quite high. However, nearly all the senior and middle managers the evaluation team interacted with were not happy with the current capacity building programme, both in terms of policy and overall implementation. The consistent view that the evaluation team received is that irrespective of the number of people that are being trained each year, their impacts on the performance of the Board appear to be marginal. If this is correct, there appears to be serious structural problems in the Board in terms of its policy, and implementation of its capacity building programme, since they do not appear to be contributing to the desired or the expected results.

A serious evaluation needs to be carried out as to why the training programme is not as effective as it should be. However, based on the limited evaluation carried out by the Centre, following constraints can be pointed out.

1. Capacity building requires a different type of managers, who are not only knowledgeable on different aspects of human resources development (HRD), but also what options are available to build specific capacities within limited time periods and costs. It simply is not the best policy to take an engineer from the Board, with no, or very limited experience, in the area of HRD, and promote that person to be the head of the Manpower Development and Training Board. The person responsible for capacity building for the Board must be knowledgeable in this area, and must know what are the options available for capacity building for various professional groups at different levels, both within the country and outside, how specific capacity building programmes can be structured, and who can carry out these programmes efficiently. The head should be aware of the latest developments to facilitate capacity building process.

2. Some of the training programmes are not properly structured, both in terms of subjects covered, or selection of candidates. People may be trained in some areas but they may not work in those areas after they are trained, or

shortly after they are trained. Choice of trainees can also be substantially improved, as can the selection of the trainers.

The focus of the Training Department at present appears to be on the number of people trained, but not on the quality, relevance and appropriateness of the training programmes. It is better to train a smaller number of carefully selected candidates in a proper manner, compared to a much larger group of people in an ad-hoc and improper fashion.

3. There is no evaluation of the quality and impacts of the training programme on the performances of the trainees, and thus ultimately on the Board. Such an evaluation needs to be urgently carried out, preferably by an independent and competent expert, so that an objective assessment will be available to the Board to restructure its existing training programme. For example, an objective evaluation of the training programmes undertaken abroad under the two projects will most probably indicate that they had no perceptible impacts on either the project or the Board.

**Capacity building for the towns east and the towns south of Colombo water supply projects** – In terms of training provided abroad under the towns east and the towns south of Colombo water supply projects, it appears that they have not proved effective at all. Some senior managers of the Board labelled them as “incentive travel” or even “sight-seeing and shopping trip”. Such criticisms may be a little harsh, but there is considerable truth to them. Candidates selected for the overseas training were not necessarily working in the projects concerned, under which the training programmes were financed. The best and the most appropriate persons from the projects were often not selected. The current policy on the selection of the candidates for any overseas study tour, give more emphasis on who had not been to a overseas visit in recent times, compared to who in the projects should receive training. However, since the training programmes that were carried out under the two JBIC projects appear to be somewhat general, it is doubtful that even though the Board had selected the “right” candidates, they would have learnt much from what was organised for them, a general training programme which could not have had any perceptible impact on the subsequent performance of the project. There is, thus, very considerable scope to improve both the quality of the future training programme, as well as the process through which the candidates are selected. It would be correct to say that even if no candidate was sent for training under the JBIC projects, it would have had any perceptible difference in the performances of the project, or that of the Board. In addition, majority of the people that were sent for overseas training do not work for the Board at present. Thus, both JBIC and NWSDB should evaluate the impacts, if any, of such training activities, and both must take appropriate steps to improve the situation very significantly.

Effectiveness of current capacity building programme – The effectiveness of any programme on capacity building in an institution depends to a significant extent on the importance given by it to human resources development. In the case of the Board, a serious needs assessment

for training is still lacking, where the priorities, programmes and activities of the Board could be defined (both the present and the future), as well as the necessary types of skills that need to be developed in the staff in order to carry out expected activities. For example, in interviews with several staff members of the Board, some of the concerns that were expressed included the fact that even though the Board now has to carry out new activities like marketing, billing, communication, etc., training in these areas are receiving inadequate attention. Engineering and technical aspects continue to be the main focus of the current training programme. As the Board changes from a primarily technical institution, as it was in the past, to a more versatile technical-cum-service oriented institution, the training programme should reorient itself to meet these new requirements. During this transition phase, the new areas where adequate expertise does not exist in the Board should receive priority attention. Business as usual in terms of the existing training programme is no longer a viable option for the Board.

Most of the professionals in the Board generally acquire their knowledge primarily by conducting their day-to-day tasks on a routine basis. Generally they do not receive special training so that they can carry out their tasks more efficiently from the very beginning. In other words, the training is basically informal and "hands on" variety. Hence, it would be desirable for the Board to carry out a needs assessment for its training for the next 5-years. It should be based on the specific priority needs of the institution, both present and for the next 5 years. For the preparation of such a needs assessment report, it will be necessary to discuss the requirements with the senior managers of the Board, review the needs of middle and junior levels of professionals, as well interview people outside the Board, who deal with the activities of the Board at both national and international levels on a regular basis. Preparation of a future-oriented needs assessment report, and its subsequent implementation, will go a long way to expedite the development of a good cadre of professionals in the areas where they are most needed.

If such a needs assessment is available, JBIC projects can be so structured that its training programmes are compatible to the overall requirements.

Regarding the quality and quantity of the training courses, one possible option could be to develop links with the appropriate universities and research centres in Sri Lanka, which could then become an integral component of a long-term capacity building programme. Selected NGOs could also be considered, especially in terms of training at local levels to encourage active participation of appropriate and informed stakeholders, both within and outside the Board.

In order to assure that the trainees continue working in the Board, the Manpower Development and Training Division makes mandatory for the staff who has received serious training, to work in the Board for a certain minimum time period. However, many people who have attended training programmes have left the institutions after this time is over, and in a few cases,

even before. While this is prevalent not only in the Board but also in many other government institutions in Sri Lanka, the Board should re-evaluate this situation. The institutions cannot afford to invest funds to train staff members, who will leave the organisation shortly after the training is over. It would be useful to consider how best to improve, if not the salaries, the working environment within the Board so that it can retain trained staff over a longer period. Many times, if the staff members can be motivated in terms of activities, goals and achievements, they may continue to work with a lower salary than they can get from the private sector.

The Training Division currently requires that a trainee who has completed a course to prepare a report which includes a review of the training activities, and how the person has benefited from the effort. If this requirement is taken seriously, it could be a worthwhile effort. Unfortunately, these reports are seldom analysed properly in terms of the usefulness of any specific training programme. This process has thus basically degenerated into a paper exercise, which is of no use to the Board for any monitoring and evaluation of any specific training activity. The evaluation team selected some of these reports at random for analysis. For example, Mr. M.J.M. Peiris attended a training course on Finance and Administration, in Japan, from 11 to 25 June 1998. His comments on how the training obtained could be made use of in the Board in particular, and in the country in general, notes: "the training was very useful to carry out day to day work in National Water Supply & Drainage Board, Administration & Financial Divisions. Our planning strategies monitoring and working environment should be improved when compared with their capabilities." Another example is the report by Mr. K.R. Ranasinghe who attended a training course on Public Finance and Administration in Water Supply from 11 to 23 June 1998, also in Tokyo. It does not include any comment whatsoever on how the training could be made use of in the Board in particular, and the country in general. Such value reports, regrettably are the norms, rather than being exceptions.

A report of a group on an "Overseas training under Greater Colombo Extension Project," as also analysed. A group of eight officials went to Thailand, Philippines, Japan and Singapore, for a total of 29 days, to learn "planning and design of water supply projects; operation and maintenance of water supply schemes; study of mechanical and electrical works of existing installations; and administrative procedures." It is not very productive or useful to organise a training programme in four countries, over only four weeks on four very complex and different issues, which are mostly not related to one another. For example, it is highly unlikely that the trainee who was interested in the study of mechanical and electrical installations will have any interest in administrative procedures, and vice versa. It is difficult to justify the relevance and the cost of such training programmes.

It is thus evident that neither the Training Department of the Board nor the trainees take these feedbacks seriously. Nor does any one in the Board has any idea as to what were the documents that were given to the trainee, and where these documents are. They are not available at the Board Library,



which could have been a possible repository of such documentations. Nor are the trainees abroad expected to share their new knowledge with their colleagues, or send any memorandum to the senior managers as to which aspects of the activities of the Board could be changed, and why and how, in the light of new knowledge and experience. Thus, whatever knowledge an individual obtains from training abroad remains highly personal.

Capacity building abroad, is expensive. On the basis of the analysis carried out, it appears that:

- Training programmes abroad were not tailored to the needs of the trainees.
- Too many places are some times often visited by the trainees, without any clear consideration of the objectives of the specific training course, or the need for visiting so many locations. Thus, training becomes somewhat general and superficial.
- Trainees, with very varied interests, some times participate in the same training course. Because of such diversified interests no group receives adequate training.
- There is no real requirement from the trainees on their return. Neither the trainees nor the Training Department takes feedbacks on the training courses or appropriateness seriously.

It is thus strongly recommended that these types of training abroad be stopped from immediate effect, until and unless proper training programmes can be specifically organised for carefully selected trainees, training is taken seriously by both the Training Department and the trainees, and the trainees should be clearly made aware of the expectations from them upon their return. In addition, training should be organised where the trainees receive the best and the most relevant training. The locations need not be restricted only to Bangkok or Tokyo. Other locations should be considered, which could be more relevant in terms of the activities of the Board.

*It is now essential that the entire training Department be restructured so that it becomes proactive and dynamic.* The Department should make a special effort to identify the training needs of the Board, and then devise effective training programmes to fulfil the needs in a cost-effective and timely manner. It can then efficiently assist JBIC projects to conduct appropriate training programmes.

Project-related Training – The training section in the Terms of Reference (TOR) of a JBIC-related project proposal, when a contract is to be awarded to a consultant, should receive careful scrutiny. It appears that every one agrees training is important, but in reality, it receives one of the lowest priorities from all parties.

When the TOR for a project proposal is developed, a good and relevant training programme should be formulated, which should be beneficial both to the Board and its staff members. On the basis of our review,

the project proposals lack specificity in terms of needs, programmes, locations, durations, number of people to be trained, at what level, for what purpose, at what stages of the projects specific training programmes should be carried out, etc. In addition, unfortunately, *it seems that one of the first item that gets reduced significantly later in terms of funding, is training*. Thus, not only the budget for training is reduced as negotiations proceed with the consultant, but also these reduced funds are not later used efficiently. On the basis of the review carried out for the training programme abroad, its need, relevance and appropriateness can be seriously questioned, unless the entire process is radically reformulated to ensure that training programmes abroad actually bring benefits to the Board. JBIC thus should carefully look into such areas in future projects.

It is thus advisable that in future projects, the capacity building programme should be formulated in sufficient details so that it is possible to specify the types of the training programmes needed, for whom, at what stage of the project, and by whom and how they will be carried out.

Throughout several interviews, there were numerous comments related to the fact that there are not enough skilled project managers in the Board at present. Since the Board has to accelerate project development activities to meet the targets specified in the policy for the water and sanitation sectors, provision of training on project management skills should receive priority attention.

It is equally important to bear in mind that the training programmes should be structured not so much in terms of what the donor countries can provide, but on what the institutions of the recipient countries need.

It seems that priority is now given to training in engineering aspects of the work of the Board. Since the mandate of the Board extends well beyond engineering, training programmes need to be significantly improved to give the non-engineering professionals more knowledge in terms of management approaches, as well as broader understanding of social, economic, environmental and institutional issues. Such broadening of the current engineering focused training can only enhance the future performance of the Board.

Formulation of Training Need Programme for the Board – It is important to carry out a comprehensive assessment of the training requirements for the Board as a whole. It should address both short-term (up to 3-5 years) and long-term requirements. Such an assessment should include the following interrelated steps:

- consider the legal and institutional mandates of the Board in terms of its goals, objectives and functions, so that the types of expertise that are needed to fulfil them could be developed;
- discuss with senior management as to what they consider to be the current priority activities and issues, and their views of critical concerns

for the future, and the capacities needed within the institutions to address these issues efficiently;

- discuss with middle- and junior-level staff members as to their opinions of the areas where capacity needs to be built up, and also what additional training that could be given to them so that they can carry out their tasks more efficiently;
- discuss with selected partner institutions as to their views of the areas where capacities should be further built up within the Board; and
- consult with some well-known international authorities as to what are likely to be emerging critical water issues during the next 10 years, and what type of capacities the Board should develop to meet these future challenges successfully.

Based on these discussions, reviews and analyses, a draft report should be prepared on capacity building requirements for the Board for the next 5-10 years. The report should further identify what are the short-and long-term needs for capacity building, and provide some suggestions of priority areas in both of these two categories. It should further outline how the training needs will be met, who will be responsible for carrying out the training programmes and where, costs and a time-table for carrying out the programme.

Finally, the nature, magnitudes and complexities of the current water problems and the ones that are expected to emerge in the coming years are likely to be very different compared to the earlier generation of problems faced. Because the definitions of water problems are changing, societal norms are evolving, social and environmental requirements are becoming different, technological options are not similar to what they were earlier, it is necessary to find management alternatives that are techno-economically efficient, socio-environmentally feasible, and politically and institutionally acceptable. These rapid changes have already made the difficult task of managing water resources efficiently even more harder. The training programme that should be formulated should also consider types of new requirements.

Capacity building processes must be formulated in a systematic way, with a long-term support and commitment from the senior management of the Board. Thus, it is recommended that the Board develop a well thought out comprehensive training programme, in contrast to its current ad-hoc approaches. The process decided upon must be dynamic, with periodic evaluations of the targets and the impacts of training exercises. Based on these evaluations, whenever necessary, the programme must be modified and updated. Equally important is the fact that people in charge of training programmes are knowledgeable in this area.

Communication – As the Board becomes to be viewed increasingly as the providers of an essential public service, that is provision of clean water and sanitation, its extent and quality of communication with the general public and policy makers should reach a much higher dimension compared to what it is at present. The reasons for this need for an accelerated

communication are many, and only some of the important ones will be discussed next.

General Public – The general public is the main users of the services provided by the Board. Provision of water and sewerage services in an urban area is a monopoly. The users are expected to pay in the future the full prices for the services they receive. Thus, it is necessary for the Board to initiate a dialogue with its users through various practical means on many issues, among which could be the following.

1. **Provision of information on water related issues** – Nearly 30 percent of the households surveyed during the current assessment for the towns east and the towns south of Colombo water supply projects are still using well water for drinking. While more work is needed, in terms of a follow-up social survey to determine the reason(s) as to why people are preferring well water over tap water, *prima facie* it appears to be an issue which could be resolved by better and more regular communication with the consumers, and provision of essential information to the consumers. Chemical and microbiological tests were carried out for the Centre by an independent and reputable organisation, the Sri Lanka Standards Institution, which has international certification from the World Health Organisation of the United Nations to carry out water quality analyses. This Institution collected samples from selected households that are currently prefer to drink well water, instead of tap water. The samples taken from each household included both well water and tap water. The chemical and microbiological tests of samples taken from these households clearly established the fact that the tap water is of excellent quality, and well within the drinking water standards in Sri Lanka. In contrast, the samples taken from the wells are invariably contaminated, and the extent of contamination generally varied from one well to another. Hence, *even though there is absolutely no question that the quality of tap water is significantly better than well water, some households still prefer to drink well water, many times without boiling.*

An important objective of the towns east and the towns south water supply projects is to improve the health of the people by providing a reliable water service with good quality water. There is no question that the service provided by NWSDB is reliable and the quality of water is excellent. Hence, this part of the objective has now been achieved, and it is no longer an issue.

What has not been achieved is the fact that a significant percentage of the households are still not using the tap water for drinking. The fact that they are continuing to drink contaminated well water means that their health conditions are unlikely to have improved significantly, compared to the pre-project conditions, at least due to water-related causes.

It is likely that the main issue for this unexpected finding is the presence of residual chlorine in tap water, which may give the water a slightly different taste. This taste may be somewhat strange for the users, because they were not used to it earlier. Since well water was never chlorinated, people are not

used to the taste of chlorine, and this may be the reason as to why many households are preferring well water for drinking, instead of better quality of tap water.

Analyses by the Sri Lanka Standards Institutions detected residual chlorine in all the samples of tap water. This, however, is to be expected, since chlorine is an essential requirement for the water treatment process. Except for one sample, all other samples were within the permissible level of chlorine for drinking water under the Sri Lankan standard. Since, health-wise chlorine is necessary to purify water, its presence within the permissible level makes it a non-issue, at least in terms of health. However, taste-wise, it is likely that chlorine is an important issue, which may make certain households prefer using well water compared to tap water for drinking, and also for making tea, which is a very important social drink in Sri Lanka.

While social and cultural conditions and preferences may vary from one country to another, based on the experiences of the Centre in other developing countries, it is highly likely that this anomaly can be resolved to a significant extent if NWSDB initiates a good information and communication programme with its users. Such a programme could include providing explanation to the consumers of the differences between the qualities of tap water and well water, and implications in terms of health for using water from the two sources.

It is the Centre's view that until and unless a good communication and information policy for the Board is formulated and then properly implemented, some of the expected benefits from the towns east and the towns south of Colombo water supply projects may not materialise. If they materialise, they may need a much longer time frame over which they may surface, which would neither be beneficial to the people or to the two projects.

**2. Rationale for increasing water charges** – Water in Sri Lanka, not so long ago, was either highly subsidised, or it was free. Water prices have increased steadily in recent years, and it needs to increase much further on a regular basis during the next 10 years, and most probably beyond, to account for full cost recovery for water supply, and new charges for the construction of sewerage and wastewater treatment plants. These increase will be in addition to the normal inflation rates that will be observed in the country in the future.

To a certain extent, the urban residents of Sri Lanka have now been weaned from the idea of receiving highly subsidised water, or free water, from the government. The socio-economic survey of the households carried out for the assessments of these two projects indicated that people in general felt that the current level of water pricing is reasonable, and they can afford to pay them, even though certain households felt some economic constraints to pay this additional amount for water from their existing family budget.

When asked if they would approve higher water rates, an overwhelming majority were against it. While such oppositions to price

increases are not unusual, it also indicates that future increases in water pricing may meet some social opposition. It is thus essential to have a well-planned and executed public information and communication programme which will explain to the water users the reasons why water prices have to be increased regularly to provide an increasingly better and more reliable water and sewerage services. Without such a dialogue, there is likely to be increasing social opposition to steadily higher water prices.

**3. Water conservation** – The Board needs to encourage its users to practice water conservation, irrespective of the quantities of water they use, or the amounts they pay for them. This will require establishment of a dialogue with the consumers, which in turn will need very substantial advance in the current communication and information strategies of NWSDB.

Policy Makers – Under the present system, authorisation to increase water tariffs is primarily a political process. While the draft policy makes it very clear that the goal is to ensure that the consumers should pay the costs for their water supply and sanitation services, the policy by itself will not be enough to ensure regular increases in water tariffs to meet this goal. It is thus essential that the Board continues to keep a regular dialogue with the appropriate politicians and parliamentarians, and indicate to them the efficiency improvements that are being made in the performances of the Board, progresses made for improving water supply and sanitation services, and need to increase water prices to reflect the cost of providing the water supply and sanitation services.

It is essential for the Board to keep regular dialogue with the people, policy makers and the media. It should be noted that all these three target groups are closely interlinked: one influences the others, and is in turn influenced by the others. Hence, the communication strategy should target all the three groups concurrently and in an interrelated way, and on a regular basis.

If the formulation and implementation of the communication strategy is not properly done, NWSDB is likely to face serious oppositions to get the necessary authorisations for getting the appropriate tariff increases in a timely manner. This will affect the long-term economic sustainability of not only the two water projects but also of the Board.

It should be noted that the issues related to communication and information are specialised tasks. Thus, it will be necessary to find a competent communication specialist, with good linkages to the media, to head this Department. It would be counter-productive to put an engineer to be the head of such an increasingly important Department. The person in charge should have excellent communication skills, and not necessarily technical expertise.

CHAPTER V.  
LESSONS LEARNT

Many lessons can be learnt from such a major in-depth evaluation. Some of the lessons that could be learnt are referred to in the earlier part of this assessment report, either explicitly or implicitly. Equally some lessons could be learnt from very specific issues that arose during the assessment process, which have not been discussed in-depth earlier.

1. Availability of reliable information on immediate pre-project conditions – The main reason as to why water supply projects are constructed is to improve the quality of life of the people. Thus, the construction of water supply projects is not an end by itself, but is a means, albeit very important means, to an end, which is the improvement in the welfare of the people in the project areas. Thus, it is essential that the social, economic and environment conditions are determined shortly before the project implementation process begins, so that these could be compared with ex-post conditions.

If such benchmark data are available, it is possible to estimate with considerable degree of reliability what are the impacts of the projects on the people of the area, country as a whole and on the environment. For the towns east of Colombo water supply projects, a pre-project assessment report was available. However, this assessment was carried out well over 5 years before the project implementation process started. Accordingly, many changes occurred during this intervening period, which are not known at present. Equally, the 1985 report did not consider many issues in reasonable depth, for example, on environmental factors. Thus, even for the towns east of Colombo water supply project, reliable and detailed pre-project conditions are not known.

For the towns south of Colombo water supply project, no pre-project benchmark study of social, economic and environmental conditions is available. Naturally, this lacuna is more serious compared to the earlier project

Accordingly, for both the towns east and the towns south of Colombo water supply projects, it was a difficult and complex task to assess the precise impacts on the beneficiaries because of the construction of the two projects. Even in spite of this constraint, it is evident that the two projects have had substantial positive impacts on the quality of life of the people in the project areas, even though they have been operational for a short period.

The lesson learnt is that *for future projects, it would be desirable to carry out benchmark surveys of the social, economic and environmental conditions of the project areas, shortly before implementation of the projects are initiated.*

2. Need for mid-term evaluation and regular monitoring of the projects – For both the projects, no mid-term evaluation was carried out. For major infrastructural development projects, it is desirable to carry out in-depth mid-term evaluations. Such evaluations, in addition to determining the progress made in all the relevant areas, also can identify the constraints that are being faced because of unexpected and/or unforeseen conditions that were not considered in the planning stages. A serious attempt can then be made to ensure how best these constraints could be overcome cost-effectively and within a short period. Without such mid-term evaluations, some problems may not receive adequate attention until fairly late in the execution process.

A serious and in-depth mid-term evaluation can also determine if any mid-course correction in project implementation is warranted. Without such mid-term evaluations, it is possible that some problems may not be properly identified, and appropriate and timely countermeasures may not be taken. This may delay in the timely flow of the anticipated benefits.

The absence of mid-term evaluation for these two projects was further compounded by the absence of regular monitoring, at least on an annual basis. If any monitoring was ever undertaken by JBIC, the reports are not available at the NWSDB office or at the JBIC office in Colombo.

Fortunately, the two projects did not run into major problems, which is a tribute to the performances of the Board, the Consultant and the Contractor. However, for such large infrastructural development projects, construction of which span over some 7-8 years, *it is essential that mid-term evaluations and regular monitoring be carried out.*

3. Tendering and procurement processes – Both these two projects took much longer time than expected, which delayed the project completion schedule. These delays were due to tendering and procurement problems. Such delays are not abnormal in the Sri Lankan context for large projects, and both JBIC and the Board are well aware of the constraints posed by the main delays occur during the period between calling of the tenders and the final decisions to award the contracts. Contract documents are often not very specific, which makes it difficult to evaluate the tenders authoritatively. This allows opportunities for intensive lobbying for specific contractors, and also provide time for political interferences. Conceptually large tenders should take about 8 months to arrive at a final decision. In contrast, they often take two years or more. All the major funding agencies, including JBIC, are aware of these problems, as is the Sri Lankan Government. They have made several representations to the Sri Lankan Government. The tendering and procurement process has improved in recent years, but more improvements and streamlining are necessary. It should be note that these delays are not exclusively for JBIC or NWSDB related projects: the situation is identical for all large projects that go through the tendering process, irrespective of the donor or the Ministry concerned. It is thus a generic problem and not a project-specific issue. The process needs to be further streamlined, but at the same time it is essential that it should be transparent, fair and appropriate checks and balances should be put into place so as to



ensure that potential for corruption or influence-peddling is minimised, or even eliminated. Rushing a major project through the tendering process may save time, but it may create different types of problems. Accordingly, other factors should be concurrently considered to ensure a fair and a clean process, that is also as fast as possible.

Intensive discussions have taken place between the Sri Lankan Government and all the major donors in recent months to streamline and improve the tendering and the procurement processes. If this issue can be solved in the foreseeable future, it would be of major benefit to the GoSL, since it will not only make the projects more economically efficient, but also eliminate a major irritant between GoSL and the donors, which has existed for a considerable time.

4. Relations with Road Development Authority (RDA) – Both the projects witnessed some delays in implementation because of the difficulties in coordinating pipe-laying activities with RDA. Water supply pipes often have to be laid along or across the roads. The responsibilities for the roads lie with RDA, and thus NWSDB must obtain prior authorisation from RDA to dig up the roads to lay pipes along them, or across them. Such activities naturally disrupt the traffic flow, and create some problems for the road users. Thus, planning between RDA and NWSDB is necessary in terms of construction schedule.

While disruptions are unavoidable, what is necessary is better coordination between NWSDB and RDA in terms of advanced planning so that construction plans and schedules can be jointly agreed to by the two parties. Both sides should negotiate an acceptable schedule, which will not only attempt to minimise construction delays for laying pipes along roads, or across roads, but also reduce undue inconvenience to the road users, and simultaneously ensure that the costs are kept to a minimum.

Since these delays were witnessed in both the projects, it is necessary to decide how best this problem can be resolved. JBIC has funded projects for both NWSDB and RDA. It could thus consider playing the role of catalyst to bring both NWSDB and RDA together, at a high level, to resolve the problems related to unnecessary construction delays.

5. Focus on “soft” issues – The main focus during the implementation of both the projects was on “hard” issues, that is the construction of the two projects. Unquestionably, construction of the projects is the most important and the most substantial component of the loans. However, there are “softer” issues which have not received adequate attention. Among these “softer” issues are the following.

- Capacity building for the Board staff received insufficient attention during both the projects from all the three parties concerned. In future projects, capacity building should be given more serious and specific consideration.

- Some applied investigations should have received attention to ensure the sustainability of the projects, and also to enhance their poverty alleviation impacts. Among these areas are the following:
  - The current lifeline tariff is mostly having the opposite effect than the one intended. It is subsidising the richer households instead of the poor. This is because richer households consist of nuclear families of 3-4 members. Assuming a family of 3, and the subsidised quantity of 25 m<sup>3</sup> of water per month, each person can use 277 litres per day at the subsidised rate. In contrast, 2-3 generations live together in poor households. Assuming 10 persons live in a poor household, per capita subsidised water use is reduced to about 83 litres. Hence, a new and more targeted tariff structure should be devised, where the poor are not only subsidised, and also receive adequate quantity of water, but the rich pay for their consumptions.
  - What type of connection charge payment schedules could encourage even more poor households to join the system.
  - Currently a significant percentage of domestic consumers are using water which constitutes the lowest tariff, that is, the most highly subsidised part of the tariff, the first 25 m<sup>3</sup>. This naturally affects the Board's total income, and thus the economic sustainability of the projects. Accordingly, what type of tariff structures can be considered, consistent with the principles of efficiency, equity and fairness, that can maximise the total income of the Board.
  - Survey of the poor households that have not yet obtained house connections in order to identify what are the constraints they are facing, and what actions need to be taken so that these could be overcome promptly.
- Formulation and implementation of a communication strategy which can enable the Board to better understand and appreciate the needs and perceptions of its consumers. In parallel, attempts should be made to involve the public in as many areas as feasible and practicable.
- Institutional arrangements and strengthening which can improve the performances of the Board. If cost recovery is to be an objective, the consumers should not be expected to pay for the inefficiencies in the Board. Thus, the Board become increasingly more efficient. How we can the institutional efficiencies of the Board be further increased?
- What roles the private sector can play to improve the performances of the Board? Can items like meter reading, billing and bill collection, leak detection and repair vehicle maintenance and management, etc., can

be outsourced to the private sector, if they can perform these tasks more efficiently, and economically than the Board?

- Review of management practices in other selected developing countries to find out which practices would be useful and applicable to Sri Lanka, and also what modifications may be necessary for their successful application to the Sri Lankan conditions.

6. Relations between NWSDB, Consultant and Contractor – There are some grey areas which need further attention. For example, the Sri Lankan standards are often related to the British standards. Naturally, NWSDB follows the Sri Lankan codes of practice and standards, which are not necessarily the same as those prevalent in Japan. The Consultants are more familiar with the Japanese codes, compared to the Sri Lankan codes, which in some instances are different. The Chinese contractor is not very familiar with either the Sri Lankan or Japanese codes, but with the Chinese practices. While there is much better understanding of the Sri Lankan codes by the Japanese consultants and the Chinese contractors at present, the situations during the early parts of the two projects had the potential to create some problems. Fortunately, no serious problem occurred. However, this is an area that needs additional attention from all the parties concerned, including JBIC.

There are also grey areas in terms of responsibilities and accountabilities between the activities of the Board, Consultant and Contractor. In any large infrastructural project, issues like preparation of the structural designs, approval of the structural designs, construction of the structures, and supervision of the construction of the structures, are interrelated. In the view of the Centre, the responsibilities and accountabilities of the three parties Board, Consultant and Contractor are some times not very clear. Accordingly, if a constructed structure proves to be defective, it may not be an easy task under the existing arrangements to decide which party or parties from the three concerned, be responsible to rectify the problem, and thus pay the cost of repair. This also can create unnecessary tensions between the three parties, which could sour their interrelationships.

Fortunately, there was no serious problem in the two projects, where this accountability issue had to be seriously tested. However, there was problem in terms of leakage in the Miriswata Water Tower, where this issue did arise. There were differences of opinions between the Board, the Consultant and the Contractor as who is responsibility, and thus liable, for this failure. While the Consultant ultimately paid for this rectification, albeit somewhat reluctantly, there could be differences of opinions as to who should be held responsible for this leakage problem. Fortunately in this case, the rectification costs for eliminating leakage in the Tower was not very significant (probably within \$30,000 - \$40,000 range), and thus did not become a critical issue. However, if the rectification costs had been in the range of several hundreds of thousands of dollars, instead of a few tens of thousands of dollars, the issue could have been serious, and ended up in a legal challenge. Such a development would have seriously affected the project completion of

schedule, and even could have had adverse impacts on the subsequent construction of the project because of soured relations between the three parties.

If it is thus essential that JBIC, NWSDB, the Consultant and the Contractor agree before the project implementation starts, as to which party is responsible for what activities, under what circumstances, who pays for the corrective measures, how much and on what basis should this be determined. In other words, the process should be made more clear and transparent.

Since the Evaluation Team did not have access to the actual contracts of the Consultant and the Contractor, it is not possible to make any comment on their indemnity covers and performance guarantees. These are issues that need to be examined, especially if serious disagreement arise in future projects.

Perceptions of JBIC – During the evaluation, as to be expected, many comments were received on the performances of JBIC. Most of these were complimentary. However, some concerns were raised. Only those concerns that were raised by several people are mentioned herein. It should be noted that since no time was available during this evaluation process to review the issues raised in terms of JBIC, the Centre is not in a position to conclude if they are simply perceptions or reality. Even if the issues raised next prove to be perceptual problems, JBIC should consider taking appropriate steps to countermand them, since many of these perceptions are widely held in Colombo.

1. JBIC is more protocol oriented, compared to other donors. As a result, on some issues, getting a decision from JBIC takes considerable time. Formal notes to JBIC are prepared by the Projector Director. It is then sent to the AGM, then to the GM, then to the Chairman, then to Secretary of the Ministry and finally to ERD, who then sends it to JBIC. In each of these steps, there is a possibility that some parts of the original messages could be modified due to different reasons. The reply of JBIC comes through the same chain of command to the Project Manager. This process generally takes 6-10 months. While this may be necessary for important issues, a closer relationship with JBIC will be desirable to solve not-so-major issues promptly and less formally, as often is the case with the World Bank and ADB-supported projects.

2. JBIC is more passive compared to the World Bank or ADB, and unlike other funding agencies, the comments received from JBIC on specific reports tend to be somewhat general. It appears that JBIC has less access to technical expertise for making comments on specific issues compared to the other major funding agencies.

3. JBIC is more format oriented. For example, the completion report for the towns east of Colombo water supply project is not dissimilar to the draft completion report of the towns south of Colombo. Both the report says that the contractors were good, but there were some problems. Neither of the

report says what were these “problems”. Thus, it is not known if these problems were similar or dissimilar, or how could such problems be solved in the future. No one at NWSDB has a copy of any response from JBIC on the completion report for the towns east of Colombo water supply project. Generally, the Consultant prepares these reports, and the Board then approves it. It is subsequently sent to JBIC. Some thought should be given on the possible use of these completion reports. For example, who will be the users of these reports, how will these be used, and for what specific purposes. If these reports are not going to be “paper exercises”, they must be more objective and critical, and there should be more flexibility in its preparation. Currently there is too much focus on the format of these reports, and not enough on their substances. Usability of these reports should be the main consideration.

4. Monitoring and evaluation of the projects – These are either passive or non-existent. Two NWSDB staff members mentioned that JBIC did send one monitoring mission for the towns east of Colombo water supply project. Since no monitoring report by JBIC was available at the NWSDB, or JBIC offices in Colombo and Tokyo, the Centre cannot confirm that such a mission was actually ever fielded. However, it is very unusual that for too such very large infrastructure projects, each spanning over six years, no monitoring mission appears to have been fielded, or any mid-term evaluation was conducted.

Furthermore, the Evaluation Team was informed that both the systems in the Board and Sri Lanka many times move somewhat slowly. If serious monitoring and evaluation of the projects are carried out by JBIC, and the feedbacks are received in clear terms, it will put some pressure on the national systems. This external pressure will be very helpful to make local the systems more reactive and efficient. Hence, since and regular monitoring and evaluation by JBIC, will not only beneficial the projects, but will also be used for the Board to modify the systems.

5. JBIC messages are not always clear or understandable. It is sometimes not easy to communicate with JBIC missions and consultants, mainly because of linguistic reasons. Thus, some of the messages are not understandable. In addition, some of the suggestions are implicit, and not explicit. Thus, interpreting them creates a major problem, and people are not sure if what they interpreted is what was meant by JBIC.

6. Absence of sewerage and wastewater treatment plants – While both the projects solved one major problem, that is the availability of clean water on a reliable basis, over the entire year, it is increasingly likely to contribute to another major problem. This is what will happen to the wastewaters generated from the households? Currently these wastewaters are discharged to gardens, communal lands or on to the roads. Since all the water for the two projects are external to the areas, environmentally-safe disposal of them will create an increasingly serious problem. As the economic pressures on the lands increase, there will be more and more land fragmentation. This will make disposal of wastewaters to home gardens increasingly a lesser alternative.

Since households do not consume any water, all the water used will ultimately be discharged as wastewaters. In addition to creating environmental and health hazardous, pools of wastewaters outside the house, which are already common occurrences, could prove a good breeding grounds for disease vectors like mosquitoes. It is somewhat unlikely that a functional sewage system can cover all the existing households that have water connections, and the new ones that will receive them in the future, before another 10 years or more. During this intervening period, until a sewage system becomes operational, major attention needs to be given as to how best to manage the wastewaters produced.

CHAPTER VI.  
CONCLUSIONS AND RECOMMENDATIONS

Based on the assessment carried out by the Third World Centre for Water Management, following major conclusions can be drawn on the towns east and the towns south of Colombo water supply projects.

1. *Technically and financially, both the two projects can be classified to be in the "excellent" category.* There were a few problems during the implementation phase, but these were very minor. This is very unusual for such major projects. The projects were not only completed within the budgets, but also the areas to be covered were later expanded because of the savings from the initial budget. For any large infrastructure development project, it is somewhat unusual to complete them within the stipulated budget, especially when the budgets were estimated some 10 years before completion. The fact that the projects were expanded because of the budgetary savings is again a highly unusual occurrence. One would be hard pressed to find similar successful examples from other parts of the developing world.

2. The social acceptance of the two projects is very high, and with time, such acceptance will probably become even higher, as more and more families come to depend on water from the projects, and also get used to the taste of piped water.

If these two projects were not constructed, the water situation in the townships by now would unquestionably have become very serious, both in terms of availability during dry periods, and in terms of quality throughout the year. When the projects were planned, the population growth in the project areas was estimated at 2-2.5 percent per year. Depending on the townships concerned, actual population growth rates are now in the 4-5 percent range which is nearly double of what was forecasted. Thus, "without project" conditions in the areas would have been simply unimaginable by now in terms of water availability.

3. NWSDB is now a very different institution, compared to what it was when the projects were planned. By most indicators, *it has become significantly more efficient during the past decade.* However, it will have to improve much more if the expectations from it for the future are to be fulfilled. The world is changing very fast, as are social and economic expectations of the people, and water development and management paradigms. NWSDB must change as well to reflect these new and evolving conditions.

The Board should review new management alternatives that are being used successfully in certain developing countries, which are now at the forefront of water supply management revolutions, like Brazil, Chile or Morocco. These alternatives are likely to be of more use under the Sri Lankan conditions to further improve the existing efficiencies of water management practices, compared to using examples from the developed world.

4. Non-revenue water is an important issue at present. Reduction in the current level of this component will be most beneficial to the country, the Board and the people. The percentage of non-revenue water should be reduced to about 15 percent within the next 10 years or so. It will not be easy task, but it is doable.

5. Capacity building within the Board, and communication with the public and policy-makers, should receive accelerated attention from the Board and the donors. These two areas need to be enhanced very significantly.

6. JBIC should take a more pro-active approach to monitor and evaluate these types of large infrastructure development projects. The past monitoring practices for the two projects need to be reviewed objectively and critically. It would be desirable to consider more frequent monitoring, especially as both of these projects were under-monitored.

Recommendations – On the basis of the current assessment, following recommendations can be made.

1. *Dissemination of the report* – Most evaluation reports are neither disseminated extensively nor used properly. They often sit on the shelf, serving a somewhat limited purpose.

If it thus recommend that 100-150 copies of the final evaluation report be printed, and distributed widely to selected staff members of NWSDB, JBIC, the Consultants and the Contractors. For example, all senior members of NWSDB should receive a copy of the report, including all DGMs, AGMs and Project Managers. The issues raised in this report do not exclusively fall in the domain of any one individual DGM or AGM: they often cover nearly all DGMs and AGMs. Thus, it would be essential that they all receive a copy of the present evaluation so that they are aware of both positive developments and areas where further improvements will be necessary.

2. *Brain-storming session for policy-makers and a workshop for operational staff* – Many issues are raised in this report, which should be discussed by senior members of NWSDB, JBIC, and other related Sri Lankan agencies like RDA, USIP, CEA, and senior officials of the appropriate ministries. Since several issues identified are cross-cutting, it is essential that the senior members of appropriate departments and institutions sit together, discuss them, and then take combined decisions to solve them as expeditiously and efficiently as possible.

Hence, it would be desirable to convene an one-day brain storming session of senior staff members of the relevant institutions to discuss the issues raised here, and then take joint decision as to how best the problems could be solved expeditiously. Otherwise, the Board would at best be aware of the problems, but no specific solutions may be found in the foreseeable future.



It is proposed that such a brief-storming session be organised outside Colombo (perhaps Kandy), so that the senior people are not distracted by day-to-day operational activities. The issues are complex, serious and often of long-standing. Thus, for the session to be successful, it is essential that the senior staff members give their total attention to the problems and their potential solutions.

In addition to the brainstorming session of the senior policy-makers, it is proposed that a 2-day workshop be organised for mid-level staff members of the Board to discuss and review all aspects of this evaluation report. While it is not likely to get all the appropriate senior staff members for more than 1-day, it should be possible to organise a successful 2-day meeting for the operational staff members. In this 2-day workshop, the discussions will be on more detailed and on specific issues, compared to the discussions of the policy-makers in the brainstorming session. The participants to both the meetings should receive a copy of the evaluation report well before the meetings so that they have an opportunity to read it carefully, prior to the discussions.

It would be desirable that both the meetings be organised as soon as the report is finalised, so that the momentum generated by the evaluation is not lost. Accordingly, it is recommended that both the event could be scheduled for May, perhaps within the same week. In addition, for the two events to be successful, it is essential that proper preparation be made to them. If this recommendation is accepted, preparation for the two events be initiated as early as possible.

3. *Further work* – In the chapter on “Lessons Learnt”, and under the section 5 of “Focus of soft issues”, many issues have been identified which requires additional work by NWSDB, JBIC and other related institutions. Consideration should be given to initiate work on the soft issues identified, since in the final analysis, they are likely to have both direct and indirect impacts on the sustainability of the two projects.

4. There is considerable interest in JBIC as to ensure how the public can participate more effectively in large infrastructure development projects. While this is an important consideration, and the issue is very much a popular idea with most international institutions at present, there are some fundamental questions that need to be asked and answered. Among these questions are the following:

- Is the public participation means to an end (more efficient water management), or is it an end by itself. If it is an end by itself, as is implicit in the thinking of many institutions, which objective takes priority when there is a conflict between the two ends (efficient water management and public participation), and based on what rationale?

- What types of public participation can be realistically considered for large water development projects? Have these types of participation been attempted in other countries? If so, where, and what have been the positive and negative impacts of such participatory processes? A series of objective and in-depth case studies needs to be carried out so that some definitive conclusions can be drawn.
- Which types of public participate in such processes and in what numbers? Considering the general apathy of public as a whole, how can all or most of the public be encouraged to participate? How can it be ensured that people with vested agenda do not manipulate the process to their own advantage in the guise of public participation?
- Public participation mostly generates different responses and priorities, some of which may be diametrically opposite to each other. How can these diametrically opposite views be reconciled in order to reach timely and cost-effective solutions? If so, how? If not, what should be done with these diverse views? How will these sectors of the public react whose participation is sought but their views cannot be considered for whatever reasons?
- What roles can the public can play in the development of national or regional policies on water-related issues? How effective are these roles, and what are their impacts on efficient water management?
- Is there any potential for using Badowita type of public participation in large water development projects? If so, how, and if not, why not? However, before such a study can be undertaken, an authoritative study of Badowita has to be undertaken first, since at present it simply does not exist.

For a variety of reasons, these studies are likely to be more of an immediate interest to JBIC rather than NWSDB. Accordingly, JBIC may wish to develop terms of references for a specific series of studies. Probably the most useful study will be to carry out a series of case studies of the benefits, costs and impacts of public participation in large water development projects. If such a study is to be carried out, it is absolutely imperative that this be conducted by objective and knowledgeable experts, with no hidden agendas and dogmas. Otherwise, such a study will be of no practical use.

### **JBIC View**

This evaluation was conducted by the Third World Centre for Water Management in Mexico. Internationally renowned professionals, Dr. Asit K. Biswas and Dr. Hilida Cecilia Tortajada-Quiroz, the President and the Vice President of the Centre, successfully led the evaluation mission in which Dr. Ramani Jayatilaka, Department of Sociology, University of Colombo, was also involved to conduct social research using 600 samples of urban residents in Colombo.

This evaluation should be noted both inside and outside of JBIC as being a benchmark measuring the socioeconomic impact of water supply on the residents in a wide variety of social strata in a mega city and shedding light on what would be required for future policy development and efficient water management. The issues of which we should be aware have been clearly stipulated in "economic sustainability" (Chapter III) and "capacity building and communication" (Chapter IV) though JBIC has found that there are some data and descriptions that need further elaboration.

Part of the results of this evaluation has been already disseminated at the Third World Water Forum (March 2003), and feedback workshops both in Tokyo (June 2003) and Colombo (July 2003), which greatly interested not only experts and stakeholders in the water sector but the general public as well. However, there are a few points in relation to the report that JBIC would like to draw attention to:

#### Various perspectives with respect to the performance of NWSDB

JBIC has heard from JOCV (Japan Overseas Cooperation Volunteer) that some residents have different perspectives regarding the performance of NWSDB. The views of these residents do not necessarily agree with what the Centre has observed and evaluated. On one hand what the Centre has observed as an evaluator is correct; NWSDB has achieved remarkable progress in various regards. On the other hand, however, it should be noted that there are different perspectives at the field level.

#### Corruption in meter-reading

In the report, the Centre mentioned the corruption of meter-readers, citing as evidence the impression that some households felt that there was some corruption in the meter-reading process. As the Centre itself states: "We cannot establish definitively the correctness or otherwise of this perception", JBIC also does not perceive the "impression" as the consensus of all households in the area.

#### Training

The Centre has mentioned issues related to training for staff members of NWSDB. Readers should note the fact that most of JBIC-financed projects have a technical assistance component with which both JBIC and the executing agencies pursue institutional capacity building. Also, JICA (Japan International Cooperation Agency) has been continuously supporting NWSDB by dispatching JICA expert(s) to give advice since 1989.

In closing, we, the Development Assistance Operations Evaluation Office of JBIC, would like to say we are honored to have worked with the Centre and to have seen this fruitful and constructive evaluation report become available to all those who are interested, whatever their background is and wherever they are from.

CHAPTER VII  
BIBLIOGRAPHY

Biswas, Asit K., "Impact Evaluation of Greater Colombo Water Supply Project: Developing a New Framework for Water Supply Project," Report Submitted to Japan Bank for International Cooperation, Third World Centre for Water Management, Mexico, October 2002, 25 p.

Biswas, A.K, 1997, "Water Development and the Environment", Water Resources Development, Vol. 13, No. 2, pp. 141-167.

Biswas, A.K., "Socio-economic considerations in Water Resources Planning", Water Resources Bulletin, Journal of the American Water Resources Association, Illinois, Vol. 9, No. 4, August 1973, 746-754.

Biswas, A.K. and R.W. Durie, "Sociological Aspects of Water Development", Water Resources Bulletin, Journal of the American Water Resources Association, Illinois, Vol. 7, No. 6, December 1971, 1137-1143.

Boyagane, S.B., D.R.S. Jayasinghe, S.R. Saputhanthri, M/J/M/ Peiris, K.R.Ranasinghe, P.K. Perera & A.A.D. Shantha Kumara, "Training in Japan under Greater Colombo Water Supply System Extension Project Coverage of Southern Urban Areas (OECD) from 11 to 24 June 1998," 22 May 1998, 2 p.

Cernea, M., 1991, Involuntary Resettlement: Social Research, Policy and Planning, In Putting People First, Sociological Variables in Rural Development, M. Cernea (Ed.), 2<sup>nd</sup> edition, pp. 188-216, World Bank, Oxford University Press, New York.

CES, 2003, "Badowitz Sri Lanka: An Assessment of an Urban Resettlement Project", Centre for Environmental Studies, Peradeniya University, Sri Lanka, 203 p.

Fernando, P., 2002, "Greater Colombo Water Supply: A Financial Perspective," NWSDB, Colombo, 8 p. (mimeo).

General Treasury, 1997, "Guidelines on Government Tender Procedure. Part I, Procurements financed by Public Funds, including Donor Funds", Revised Edition, August 1997, Sri Lanka, 2-D 046358 10,000 (10/97), 115 p.

Jayatilaka, R., "Socio-Economic Impacts of Towns East and Towns South of Colombo Water Supply Projects", Report Submitted to Third World Centre for Water Management, Mexico, February 2003, 55 p.

Jayarathne, K.A., "Inception Report. Social Study for Post Evaluation of Greater Colombo Flood Control and Environment Improvement Project (GCFC&EIP)", Colombo, 23 August 2000, 20 p.

JBIC, no date, "Post evaluation. Towns East of Colombo Water Supply Project", Japan Bank for International Cooperation, Colombo Office, 25 p.

JBIC, "Greater Colombo Water Sector: Evaluation of Sustainable Development (Draft)", Japan, September 2002, 4 p.

JBIC, 2002, "Ex-post Evaluation Report for ODA Loan Projects, Summary", Project Development Department, Japan Bank for International Cooperation, Japan, 152 p.

Hosaka, M., and O. Tomoko, 2001, "Third Party Evaluation Report, Waterfront Environment Improvement Project in Greater Colombo Block, Sri Lanka. Relocation of Residents and Improvement of Residential Environment", Welfare Social Development Research Institute, Nihon Fukushi University, Japan, 77 p.

Lamabadusooriya, T.P., S.G. Jayawardena, A.W. Gunasekara, M. Abeysekera, G.B.N. Wimalasooriya, R.A.S. Rabel, M.R. Keerthiwansa & A.R. Pieris, "Report of Foreign Visit by Officials of the National Water Supply & Drainage Board. Overseas Training under Greater Colombo Extension Project (OEFC) from 5 September to 3 October 1998," 5 p.

Loan Agreement No. SL-P37, "Loan Agreement for Greater Colombo Water Supply System Extension Project. Coverage of the Southern Urban Areas between the Overseas Economic Cooperation Fund, Japan, and the Government of the Democratic Socialist Republic of Sri Lanka," August 12, 1993, 4 p. plus schedules 1-3.

Loan Agreement No. SL-P19, "Loan Agreement for Towns East of Colombo Water Supply Project between the Overseas Economic Cooperation Fund, Japan, and the Government of the Democratic Socialist Republic of Sri Lanka," March 28, 1990, 6 p. plus 3 schedules.

Manpower Development & Training Division, "Performance Report", National Water Supply & Drainage Board during the years 2000 and 2001, 2 p.

Manpower Development & Training Division, "Annual In-House Training Plan 2002", National Water Supply & Drainage Board, 2002, 7 p.

Manpower Development & Training Division, "Training Programme 2002, Training of NWSDB Employees at other Institutions", National Water Supply & Drainage Board, 2002, 7 p.

Ministry of Environment and Natural Resources, no date, "National Involuntary Resettlement Policy", Ministry of Land, Central Environmental Authority, Sri Lanka (panflet).

Ministry of Housing and Plantation Infrastructure, 2001, "Policy Framework and Operational Strategy for Urban Upgrading in Sri Lanka, Governing Principles", Approved by Cabinet on October 15, 2001, 7 p.

Ministry of Policy Development and Implementation, Draft Urban Sector Policy Framework, Request for Public Views and Comments, Sri Lanka, 14 p.

Mitsubishi Research Institute, 2002, "Towns East of Colombo Water Supply Project", Sri Lanka, 16 p.

NWSDB, "Approval of Water Tariff Revision," National Water Supply & Drainage Board, Colombo, 29 April 2002, 3 p.

NWSDB, 2002, "National Policy on Water Supply and Sanitation", National Water Supply & Drainage Board, Ministry of Housing and Plantation Infrastructure, Democratic Socialist Republic of Sri Lanka, Annex II, 8 p.

NWSDB, 2002, "Water Tariff for 2002", National Water Supply and Drainage Board, Colombo, 10 p. (mimeo).

NWSDB, 2002, "National Water Supply and Drainage Board: Overview 2002", Draft, National Water Supply and Drainage Board, Colombo, 20 p.

NWSDB, 2001-2002, "Non Renewable Water Percentages, Production and Consumption Data", National Water Supply and Drainage Board, 25 p.

NWSDB, 2001, "National Water Supply and Drainage Board: Overview 2001," National Water Supply and Drainage Board, Colombo, 17 p.

NWSDB, 2002, "Policy Statement for Water Supply and Sanitation", NWSDB, 2002, "National Policy on Water Supply and Sanitation", National Water Supply & Drainage Board, Ministry of Housing and Plantation Infrastructure, Democratic Socialist Republic of Sri Lanka, Annex II, 8 p.

NWSDB, "Tariff Policy on Drinking Water", National Water Supply and Drainage Board, Colombo, 21 June 2000, 8 p.

NWSDB, 1998, "Project Completion Report. Towns East of Colombo Water Supply Project OECF Loan No. SL-P19", National Water Supply & Drainage Board, Ministry of Housing and Plantation Infrastructure, Democratic Socialist Republic of Sri Lanka, 28 p., plus 4 annexes.

Peiris, M.J.M., Training on Finance & Administration in Japan from 11 to 25 June 1998, Greater Colombo Extension Project (OECF), Report on Foreign Visit by Officials of the National Water Supply & Drainage Board, Colombo, September 1998, 3 p.

Ranasinghe, K.R., Training on Public Finance and Administration in Water Supply from 11 to 23 June 1998, Report on Foreign Visit by Officials of the National Water Supply & Drainage Board, Colombo, July 1998, 8 p.

Resources Development Consultant, LTD, "Report of the Socio-economic and Technical Feasibility Studies. Third Sri Lanka Water Supply Project for Towns East of Colombo Battaramulla - Talangama Pannipitiya & Kaduwela", Report prepared for the National Water Supply & Drainage Board, Sri Lanka, October 1985, 98 p.

SEVANATHA, 2000, "Operation, Maintenance and Sustainability of Urban Services in Low Income Settlements in Colombo", Sri Lanka.

Scudder, T., 1997, "Social Impacts of Large Dam Projects in Large Dams, Learning from the Past, Looking at the Future", Workshop Proceedings, IUCN – The World Conservation Union and The World Bank Group, Editor: Tony Dorcsey, Co-Editors: Achim Steiner, Michael Acreman, Brett Orlando, Gland Switzerland, Washington, D.C.

Sen, A., 1999, *Development as Freedom*, Oxford University Press, New Delhi, 382 p.

Silva, A.H.C., D.A.K. Samaranayake, U.C. Pathiranage, P.A.U.D. Chandrasekara, K.D.P.F. Siriwardena, C.J. Siriwardena & J.A. Hettiarachchi, "Report on Foreign Visit by Officials of the National Water Supply & Drainage Board. Overseas Visit for Greater Colombo Extension Project (OECEP) from 4 April to 3 May, 1998", September 1998, 3 p.

Sri Lanka Standards Institutions, "Sampling and Analysis of Water Samples, Water Supply Project of JBIC for Towns East and South of Colombo", Sri Lanka, 6 January, 2003, 10 p.

Sri Lanka Standards Institutions, "Sampling and Analysis of Water Samples, Water Supply Project of JBIC for Towns East and South of Colombo", Sri Lanka, 13 January, 2003, 10 p.

Terms of Reference for "Study on Sustainability of Badowita as an Urban Settlement," 2002, 11 p.

Uphoff, N., 1991, *Fitting Projects to People*, in *Putting People First, Sociological Variables in Rural Development*, M. Cernea (Ed.), 2<sup>nd</sup> edition, World Bank, Oxford University Press, New York.

USIP/JBIC, 2001, "Pilot Programme", Pilot Settlement No. 01, Ministry of UDH&C, Sri Lanka.

Zwarteveen, M.Z., 1999, "Trends in Participatory Water Management, A Review of the Literature", Prepared for IWACO, The Netherlands, 97 p.