



© Asian Development Bank 2004

All rights reserved

First published by Asian Development Bank (ADB) in January 2004, ISBN 971-561-523-6, Publication Stock No. 121203 as part of the "Water for All" publication series under the Water Awareness Program under RETA 6093: Promoting Effective Water Management Policies and Practices. This publication was prepared by staff of the Operations Evaluation Department of ADB. The findings, interpretations, and conclusions expressed in it do not necessarily represent the views of ADB or those of its member governments. ADB does not guarantee the accuracy of the data included in the publication and accepts no responsibility whatsoever for any consequences of their use.

Abbreviations

ADB	Asian Development Bank
DMC	developing member country
DSM	demand side management
IES	impact evaluation study
m ³	cubic meter
NGO	nongovernment organization
NRW	nonrevenue water
O&M	operation and maintenance
PRC	People's Republic of China
RSDD	Regional and Sustainable Development Department
TA	technical assistance
UN-HABITAT	United Nations Human Settlements Programme
WSC	water supply company
WSS	water supply and sanitation

Visit the ADB Operations Evaluation Department (OED) website www.adb.org/OED for more detailed information.
Full study http://www.adb.org/Documents/IES/Water/ies_reg_2002_17.pdf

Contents

4	ABBREVIATIONS
6	OVERVIEW
7	INTRODUCTION
7	Background
9	Purpose and Scope of Evaluation
11	Approach and Methodology
12	Stakeholder Workshops
12	Report Finalization
13	KEY IMPACTS OF CASE STUDY PROJECTS
13	Poverty Impacts
14	Institutional Performance and Cost Recovery
19	CONCLUSIONS AND RECOMMENDATIONS
19	Lessons Learned and Best Practices

Overview

This summary is part of the publications prepared for the 3rd World Water Forum sessions organized by ADB in Osaka on 18–19 March 2003. It extracts key messages from a recently completed impact evaluation study (IES) on Water Supply and Sanitation Projects in Selected Developing Member Countries. The full report is available online from ADB's evaluation page.

The IES assesses the impacts of ADB's lending and technical assistance (TA) for water supply and sanitation projects. It evaluates how improved water availability has affected different user groups, particularly the poor.

The IES has consisted of desk reviews of 50 loans and TAs and an in-depth review covering 6 loan projects in People's Republic of China, Malaysia, Philippines, and Sri Lanka. In addition, the impact of two non-ADB projects has been reviewed. Common objectives of all the projects were improved water services, improved living and community health (in part by reducing the incidence of water-related diseases), reduced poverty, and increased economic growth.

All six ADB projects subjected to the in depth review have substantially increased the availability and consumption of water by households. More than half the project beneficiaries have lived below the poverty line. Satisfaction with improved services varied among domestic and nondomestic water customers with piped connections. Households pay an average of 1–2% of their household income for water. The willingness of households connected to piped systems to pay for water is well established in areas where the service is reliable. However, none of the water utilities reviewed has yet achieved full cost recovery.

The most important lessons identified in the IES are as follows: aim at full cost recovery; include sanitation, hygiene, and health promotion; reduce nonrevenue water; practice demand-side management; consider distributing drinking water in bottles; involve beneficiaries at all stages of rural water supply projects; and streamline project management and administration.

An integrated and comprehensive set of actions has emerged from the IES. The action plan is consistent with the Water for Asian Cities Programme announced by the President at the World Summit on Sustainable Development, in Johannesburg in August 2002 and aims to further accelerate the implementation of the ADB Water Policy.

1



Introduction

Background

Policy and Assistance for Water Supply and Sanitation

Assistance in improving water supply and sanitation (WSS) in the developing member countries (DMCs) of the Asian Development Bank (ADB) has been an important part of its development agenda. The assistance has taken the form of financial and technical support for building the necessary infrastructure development, strengthening sector institutions, enhancing autonomy, and promoting cost recovery. Since its establishment in 1966, ADB has devoted some \$4.6 billion (close to 5% of its total lending) to the sector. ADB has also provided technical assistance (TA) totaling about \$84 million for project preparation and capacity building.

In recent years, the links between WSS projects and the social development objectives of reducing poverty and improving health have become increasingly evident. Poverty reduction has become the overarching goal in ADB's Long-Term Strategic Framework for the period 2001–2015. Robust, sustainable growth is essential for significant poverty reduction, and this growth requires building up physical and social infrastructure. Substantial investments are required in social services, including the provision of WSS services. ADB's new water policy¹ recognizes water as a socially vital economic good that needs careful management to sustain equitable economic growth and reduce poverty. ADB promotes a participatory approach to the conservation and protection of water resources and supports autonomy and accountability in service provision, private sector participation, and public-private partnerships. The policy emphasizes equitable access to water for the poor and the underserved.

¹ ADB. 2001. *Water for All: The Water Policy of the Asian Development Bank*. Manila.



Rationale for Evaluation

ADB's Regional and Sustainable Development Department (RSDD) and regional departments in operations proposed undertaking this impact evaluation study (IES) to help formulate investments in the sector and an agenda for policy dialogue with the DMCs. The proposal underscored the contribution that urban and rural WSS projects made to poverty reduction, both directly by providing safe water and indirectly by improving people's health and the environment. The rationale for the IES also emerged from recent operations evaluation reports that identified the following key issues affecting the sector:

- **Inadequate WSS coverage.** Despite the large investments supported by ADB and other external funding agencies, about 750 million people in rural areas and 100 million people in urban areas of Asia still lack access to safe drinking water. Similarly, hygienic sanitation is needed for 1.75 billion people in rural areas and 300 million people in urban areas. At the Johannesburg World Summit on Sustainable Development in August 2002, ADB and the United Nations Human Settlements Programme (UN-HABITAT) announced the joint Water for Asian Cities Programme, aimed at helping halve the number of people without access to safe drinking water or basic sanitation by 2015.²
- **High percentage of nonrevenue water (NRW).**³ Although NRW has been reduced in some water supply systems, high NRW levels in the order of 40%–50% still persist in many DMCs.
- **Poor financial performance of water companies.** Institutional and financial weaknesses of water companies hamper their operations and reduce their ability to sustain benefits from WSS projects.
- **Suboptimal allocation of water sources.** Lack of policy in relation to the allocation of water sources among various users is a common problem in many DMCs.

² The program will be supported by a \$10 million grant provided equally by each agency and \$500 million in loans from ADB for WSS over the next 5 years.

³ NRW is the difference between water produced at treatment plants and water billed. It includes both technical (leakages) and non-technical (illegal connections, meter errors, incomplete billings, etc.) losses. In this IES, NRW is used as a generic term to describe these losses.

- **Pollution of surface water and shallow groundwater sources.** Between 1995 and 2025, water pollution loads are expected to increase in Asia by up to 16 times for suspended solids, 17 times for total dissolved solids, and 18 times for biological pollution.

The purpose of the IES is to identify lessons from the implementation of WSS projects supported by ADB and other external funding agencies that could assist in the formulation of sector investments and capacity building activities in the future.⁴ In particular, the IES aims to

- Estimate the level of improvement in water availability for different user groups;
- Assess the economic and social impact of improved water availability on different user groups, particularly the poor;
- Assess sector policies relating to tariff structure and levels, supply alternatives, and institutional arrangements, including participation by beneficiaries and the private sector; and
- Compile a set of recommendations based on best practices and solutions to common problems.

Purpose and Scope of Evaluation



The projects varied considerably in the type and scale of facilities constructed, representing a cross-section.

Based on reviews of various ADB documents, six WSS projects were used as case studies for the IES (Table 1). These projects are located in both urban and rural areas in four DMCs: People's Republic of China (PRC), Malaysia, Philippines, and Sri Lanka. The status of the WSS sector varies in the four DMCs.⁵ Concurrent with its relatively high economic growth during the last 20 years, the PRC has experienced rapid population growth in its cities, from 190 million in 1980 to 378 million in 2000. In that year, an estimated 94% of the PRC's urban population and 66% of its rural population had access to safe water, while the corresponding proportions with access to sanitation were 68% and 24%, respectively. In Malaysia, 96% of the urban population and 66% of the rural population had access to safe water in 1990. By 1999, the coverage had increased to 98% of the urban population and 90% of the rural population. While more than 90% of the urban population in the Philippines had access to safe water and to sanitation facilities in 2001, the corresponding figures for rural areas were about 80% and 70%, respectively. In Sri Lanka, 91% of the urban population and 80% of the rural population had access to safe water in 2000, while the percentages with access to sanitation were 91% and 83%, respectively.

The projects selected for the case studies focused on water supply, with sanitation either not included or playing a secondary role. The projects varied considerably in the type and scale of facilities constructed, representing a cross-section of

- **User groups and institutional settings:** Large urban systems run by national water utilities or provincial water companies, small rural systems run by

⁴ The study team comprised K.E. Seetharam, Evaluation Specialist and Study Manager; Richard McGowan, Water Supply and Sanitation Specialist; Peter Mawson, Financial and Institutional Specialist; and social survey specialists from People's Republic of China, Malaysia, Philippines, and Sri Lanka, each supported by a group of enumerators.

⁵ ADB. 2002. *Water Indicators per Developing Member Country*. Available: http://www.adb.org/Water/Indicators/water_info_prc.pdf.

Table 1: Case Study Projects

Loan/ TA No.	Project Title	Approved Amount (\$'000)	Type	Approval Funding	Date	Completion Date	Other Reports
People's Republic of China							
1313	Dalian Water Supply	160,000	Loan	OCR	20-Sep-94	Apr-99	PCR
2773	Water Supply Tariff Study	169	ADTA	ADB	24-Mar-97	Jun-99	TCR
3250	Water Supply Tariff Study II	950	ADTA	ADB	03-Sep-99	Active	
Malaysia							
652	Kedah Water Supply Project	24,500	Loan	OCR	15-Nov-83	Oct-91	PCR, PPAR
Philippines							
812	Island Provinces Rural Water Supply Sector	24,000	Loan	OCR	04-Dec-86	Dec-92	PCR, PPAR
1052	Second Islands Provinces Rural Water Supply	24,000	Loan	ADF	20-Nov-90	Feb-96	PCR, PPAR
Sri Lanka							
817	Water Supply Sector	30,000	Loan	ADF	11-Dec-86	Jun-95	PCR
1235	Second Water Supply and Sanitation	40,000	Loan	ADF	17-Jun-93	Mar-99	PCR
1486	Financial Accounting and Reporting Assistance to the National Water Supply and Drainage Board	100	ADTA	ADB	27-Feb-91	Mar-94 ^a	^b
1900	Management Strengthening of the National Water Supply and Drainage Board	550	ADTA	Norway	17-Jun-93	Jul-97	^c

ADB = Asian Development Bank, ADF = Asian Development Fund, ADTA = advisory technical assistance, OCR = ordinary capital resources, PCR = project completion report, PPAR = project performance audit report, TCR = technical assistance completion report.

^a Financial completion.

^b No TCR.

^c The ADTA was attached to Loan 1235-SRI. The TCR was part of the PCR for the loan.

community water user groups, and multiple family or single family point source systems;

- **Technology, level of service, and complexity:** Large pumped pipe systems in cities, small- and medium-scale gravity piped systems in small towns, and hand pumps in rural communities; and
- **Operational and financial modalities:** Facilities developed with little customer participation and low cost recovery, facilities built with some customer participation and partial cost recovery, and large municipal water utilities.

In addition, two non-ADB projects in India implemented by nongovernment organizations (NGOs) as examples of sustainable provision of WSS services⁶ and four relevant TAs in the PRC and Sri Lanka (Table 2) were reviewed. The IES has also drawn on the findings of more than 50 project performance audit reports and two earlier IESs on WSS projects in ADB's DMCs.

⁶ The \$60 million Sri Sathya Sai Drinking Water Supply Project in Andhra Pradesh, implemented between 1993 and 1995; and the \$4.2 million Community Sanitation Services Project in Pune, implemented between 1999 and 2001.

Table 2: Number of Questionnaires Completed in the Surveys

Category	PRC	Malaysia	Philippines	Sri Lanka ^a	India ^b	Total
Households	197	75	138	402 ^a	105	917
Commercial and Industrial Users	18	25	6	6	1	56
Water Suppliers	2	1	7	4	1	15
Total	217	101	151	412	107	988

PRC = People's Republic of China.

^a Includes 100 questionnaires completed for a World Bank-financed subproject of the Community Water Supply and Sanitation Project.

^b Survey funded by UN-HABITAT and implemented by the Human Settlements Management Institute, New Delhi.

Approach and Methodology

Based on the key issues identified earlier, an evaluation design matrix with more than 20 quantitative and qualitative indicators was developed. The paucity of baseline information, especially in relation to social and economic impacts, made it difficult to assess without and before project scenarios. Targeted surveys, discussions with stakeholder groups, and expert opinions were used to obtain the best combination of quantitative and qualitative information on the various indicators as the basis for deriving significant conclusions.

The IES activities consisted of five main tasks:

- Preparatory work, including developing three survey questionnaires
- Field visits to the selected DMCs
- Completion of the survey questionnaires
- Follow-up field visits to the selected DMCs, including stakeholder workshops; and
- Preparation of the final report.

Based on the evaluation design matrix, the consultants prepared one survey questionnaire targeting domestic water users, a second questionnaire for commercial and industrial water users, and a third questionnaire for water. The first questionnaire included questions on sanitation, health, and hygiene practices. The second covered water conservation practices and use of alternative sources of water. The water supplier questionnaire focused on institutional capacity, operation and maintenance (O&M), cost recovery, and financial sustainability. Local consultants were recruited to carry out the surveys. The three questionnaires were field tested in PRC, Philippines, and Sri Lanka, and modified as necessary. Overall, almost 1,000 questionnaires were completed.

The IES team visited the case study countries in two phases to meet with resident mission staff, representatives from executing agencies and other concerned agencies, and private stakeholders. The team also held meetings with major sector players such as the World Bank, bilateral funding agencies, and local and international NGOs. The visits also included inspection of completed project facilities.

Data analysis provided the basis for the country reports. This was followed by an evaluation of a range of impacts (institutional, financial, economic, social and



The first questionnaire included questions on sanitation, health, and hygiene practices.

gender, poverty, health, and environmental), which enabled the IES team to develop a set of lessons learned and best practices.

Stakeholder Workshops

The country stakeholder workshops held during the second phase of the country visits provided useful insights into issues surrounding WSS projects. These workshops can be summarized as follows:

- **PRC.** The Beijing workshop had 15 participants from PRC agencies (the Ministry of Construction, the China Water Association, and the Dalian Water Supply Group), the World Bank, the United Nations Development Programme, the Japan Bank for International Cooperation, the Canadian International Development Agency, and ADB's PRC Resident Mission. The participants discussed a wide range of issues, (e.g., tariff reform, environmental degradation, subsidies for the poor, importance of social stability, population pressure, and growing demand for improved WSS services).
- **Malaysia.** More than 40 participants from government agencies involved in public works and health and the private sector (water treatment plant operators, etc.), as well as beneficiary representatives, attended the workshop in Sungai Petani. Most expressed satisfaction with their WSS facilities, except for some water quality concerns. Other important topics were the deterioration of water sources, the high connection costs, and the successful efforts to raise public awareness about water, health, and hygiene.
- **Philippines.** More than 50 participants, including a broad mix of water customers and service providers, attended the workshop in Bacolod. Discussions focused on institutional O&M responsibilities, variable water quality and service levels, willingness to pay and affordability, and substantial needs for the rehabilitation and expansion of facilities. Water users and suppliers felt that the urgent need to rehabilitate and expand facilities could not be met without external assistance.
- **Sri Lanka.** This workshop in Colombo had more than 60 participants. Many were community members from ADB-financed subprojects, but institutional representatives from the Water Board, other external funding agencies, NGOs, and a World Bank-financed WSS subproject also attended. A primary concern raised in the discussions was the politicization of water project implementation, meaning political interference in subproject selection, tariffs, and extension of pipelines into hitherto unserved areas that reduced service to existing customers.



A primary concern raised in the country stakeholder workshops was interference in subproject selection, tariffs, and extension of pipelines into hitherto unserved areas that reduced service to existing customers.

Report Finalization

This report is based on the findings from the surveys, responses from NGO and government representatives, and inputs from ADB experts and stakeholders, including poor beneficiaries. The draft was sent to pertinent ADB departments and to governments, and the comments received have been incorporated.

The main findings were presented at the Regional Consultation for the Water in Cities, held at ADB headquarters in Manila in October 2002, attended mainly by representatives of the civil society.

2



KEY IMPACTS OF CASE STUDY PROJECTS

Poverty Impacts

Survey household income data for each country indicated the proportion of poor households.⁷ More poor households now have in-house connections or an improved water supply than prior to project implementation. In the Philippines, the new water supply systems in small towns and rural communities have had a positive impact on the quantity and quality of water available to all households, including the poor. In Sri Lanka, poor families are taking advantage of household connections and public standpipes are gradually being phased out in most project towns. In Malaysia, where rural coverage has increased as a result of the project and where 50% of surveyed rural households are below the poverty line, poor families have benefited. As no baseline data were available, the IES could not estimate in monetary terms by how much the projects have affected poor households.

⁷ Poor households are defined as those living below the poverty line as defined for each country by the responsible government agency. The survey data are most complete for Malaysia and the Philippines. As the samples were relatively small, the results are only indicative.

The primary impacts of these projects for poorer households were likely to be the savings in time (but these vary considerably among locations), the cost of water (in the Philippines, respondents reported prices of P100 per cubic meter [m³] or more before the projects compared with P13 per m³ in the most expensive of the water districts included in the survey after the projects), and the incremental benefit of increased water consumption. Secondary impacts were on health and on small-scale economic activities, made possible partly by the time savings and the more readily available water. These changes are well illustrated by the Philippine surveys (Box 1). Subprojects have expanded employment options and incomes have increased. The quality of life has improved. A similar message is obtained from respondents' comments in Dalian, where the project has more than doubled the quantity of water available to households.

Institutional Performance and Cost Recovery

Implementation and Physical Performance

Except for Dalian in the PRC, completion of all the reviewed projects was delayed. The average delay was almost 20 months, compared with an average expected implementation period of 56 months. In the case of the project in Malaysia, the delay was 40 months. This may be contrasted with the expeditious implementation of the Sri Sathya Sai Drinking Water Supply Project in India, which was implemented over a period of 18 months and constructed water supply systems for more than 1.25 million people in 731 villages.

Box 1: Voices from the Philippines

"It is much better now that the water is right on our doorstep, not like before when we had to buy water at P2 for 20 liters. Before when taking a bath we had to budget how much we will consume per bath per person. Now we don't need to worry about that."

"Now we can take care of our livestock and plants."

"I am happy, not like before when I had to wash clothes in the river. Now I can clean my house and use the toilet when I want. No need to carry water from the far away source."

"Time is saved and additional work can be done to earn income."

"Now I can take a bath every day and am away from diseases. The hand pump is free, while the water from the water district costs more, and comes irregularly."

"Life is easy, especially household chores, now that getting good quality water is easy. Our health and hygiene have improved. My children can take a bath any time they want."



Secondary impacts were on health and on small-scale economic activities.

The project facilities in Kedah are currently operating at about 85% of capacity. New projects are being planned and implemented to meet expanding demand. The subprojects surveyed in the Philippines and Sri Lanka were also producing at or close to capacity levels, and subproject managers all said that expansion was needed. The Dalian water supply system is currently operating at 65%–70% of capacity and the Zhangjiakou system at 60%–65%, due to the impact of water conservation measures and tariff reforms.

All water supply companies (WSCs) reported having programs for reducing NRW. The reductions have been most significant in Malaysia and Sri Lanka (Box 2).

Box 2: Project Experience with Nonrevenue Water

After completion of the Kedah Water Supply Project, an increase in NRW to 62% was experienced. The project completion report noted that this was probably due to higher pressure in old distribution lines, and that the original target to reduce NRW to 25% by 1990 was unrealistic. By 2000, the average NRW level in Kedah was reduced to 46%, and during the first seven months of 2002 to 32%. The major improvement was achieved through careful monitoring of metering and attention to leaks.

In Sri Lanka, the Second Water Supply and Sanitation Project sought to reduce NRW. This was partly achieved by improving metering and changing from standpipes to household connections, although standpipes, from which no revenue is collected, still remain in some places, and thus NRW is still high. Surveys for two schemes showed that in Weligama, NRW fell from 40% to 28%, and in Diyatalawa from 38% to 29%. Overall, NRW is estimated to have fallen from about 40% before the Project to 31% in 2000.

In the PRC, the Dalian and Zhangjiakou WSCs report a NRW level of 25% and 20%, respectively. The current level in Dalian is reportedly similar to that before project implementation, which did not include any NRW targets, but the WSC aims at a reduction to 19%.

NRW is not monitored in the small rural water systems in the Philippines. Among the systems surveyed, the issue was only acknowledged as significant in Sagay City, where it was caused by leaks in the distribution pipeline. NRW was reduced from 45% to 34%, but is still of concern to system managers.

Financial Performance

ADB projects in the WSS sector generally emphasize full cost recovery to ensure the long-term viability of WSCs. The loan agreements of the projects reviewed contained covenants relating to cost recovery and financial performance. Except for the Dalian Water Supply Project in the PRC, compliance with the covenants was unsatisfactory.

In particular, the financial covenants for the Kedah Water Supply Project in Malaysia were not complied with. The project is operated as part of the statewide water supply system, and tariffs and other policies are set centrally for the whole state. Water tariffs in Kedah were last adjusted in 1993. Data for 1996 and 1999 show that operating costs were about 96% of revenues, suggesting that full cost recovery (including depreciation and debt servicing) had not been achieved, and that water supply services continued to be subsidized from the state budget.

In the Philippines, where small water supply systems in rural communities were built, the intent was that O&M costs and a provision for depreciation would be recovered for each scheme. In many cases this has not happened, and in some of the smaller schemes no fees are collected, but users contribute to costs when repairs are needed. Many of these schemes depend on external sources of funds, such as local governments or politicians, when rehabilitation or system expansion is needed. The Sagay City water district, however, is a good example of sound management and an improving financial situation. The current tariff was established in 1997, and since then the district has been able to repay an inherited debt of P600,000. For the most recent financial year, the operating ratio was 0.88. The system supplies water for 18 hours a day and is increasing its coverage to reach 80% of households by 2003.

The water utilities that are most likely to achieve full cost recovery in the near future are the two WSCs reviewed in the PRC. The Zhangjiakou WSC, which benefited from one of the TAs for water supply tariff studies, has a schedule of tariff increases until 2006 that is intended to leave it debt free and recovering all



ADB projects in the WSS sector generally emphasize full cost recovery to ensure the long-term viability of WSC's.

Box 3: Dalian's Experience with Demand-Side Management

Dalian is a dry area with limited water resources. Even with the new project, end users and officials of the local government and WSC realized the importance of taking additional measures to ensure continuing access to water. Thus, the preparatory TA report for the Dalian Water Supply Project recommended that specific water saving measures should be adopted parallel to project implementation, namely: public awareness campaign for water savings; increased water recycling rate and the reuse of treated wastewater; adoption of some official management measures to promote the rate of recycling and reuse of treated wastewater; and drastically raising water tariff together with penalty payment for exceeding the specified quotas.

The promising water conservation program that resulted incorporates technical, financial, public awareness, and regulatory measures. Specific technical measures include recycling gray water, carrying out water audits, substituting seawater for freshwater for some processes, and using flow restrictors and low-flow toilets. To complement this, subsidies have been introduced for DSM technologies and hardware, and water audits and punitive tariff rates are applied to consumption exceeding specified water quotas for both domestic and nondomestic consumers. Public awareness programs for schools, commerce, and industry are implemented and awards are given for successful DSM programs.

From the regulatory side, recycling measures are mandated for certain classes of consumers and DSM standards are widely disseminated among nondomestic customers. The impact of this program is seen in the high level of awareness of water issues among consumers, the widespread use of recycled water for parks and gardens, and the impact of the water tariff on consumption by individual consumers and overall sales.

costs. In 2001, the WSC had positive net income before interest and tax payments and an operating ratio of 0.86. The Dalian WSC is in compliance with ADB's loan covenants, and in 2001 had an operating ratio of 0.90 and a small positive net income before interest and tax payments. However, the WSC does not yet cover all debt servicing costs from its own resources, because tariffs have not increased as rapidly as expected (although a large increase took place in August 2001 that is not yet fully reflected in the financial results) and water sales have fluctuated, being lower in 2001 than in 1999.

In Sri Lanka the availability of financial information at the subproject level is limited. In the towns included in the IES surveys, revenues exceed expenditures on O&M, but the degree of full cost recovery achieved was uncertain. The second project was intended to provide a 24-hour supply, but the extent of O&M implemented has been insufficient to maintain this level of provision. Only 6 of the 27 towns included in an ADB-financed study⁸ have a reliable 24-hour supply. The National Water Supply and Drainage Board spends insufficient amounts on O&M.



Water conservation or demand-side management programs are becoming increasingly common in many parts of the world, especially in areas where water is scarce or where the cost of developing new sources of supply is high.

Water Conservation

Water conservation (or DSM) programs are becoming increasingly common in many parts of the world, especially in areas where water is scarce or where the cost of developing new sources of supply is high. Like reducing NRW, DSM reduces the amount of water that has to be produced and distributed, the requirements for wastewater treatment, and the energy required to distribute water throughout the system.

Water conservation has been addressed only in the PRC among the projects reviewed (Box 3). In addition to technical measures, tariffs have been used for demand management. In north China, where populations are large and water is scarce, water producers and consumers are under pressure to conserve water. The Zhangjiakou and Dalian WSCs have successfully used tariff increases to help promote water

⁸ Coffey MPW Pty. Ltd. 2002. *Review of 27 ADB-Assisted Water Supply Schemes: 1986–2000*. Report prepared under TA 3587-SRI: *Secondary Towns Water Supply and Sanitation Project*.



Households are more willing to pay to connect to a water system if they do not have to bear all costs up-front.

conservation. The increases have been large—up to 190% over a 4-year period—and their acceptability and impact have been aided by a shared sense of the need to control consumption. However, WSCs have little incentive to save water if water resources are abundant and exceed current demand, as in the case in Kedah.

Willingness to Pay

The surveys checked whether domestic and nondomestic customers saw the tariffs charged by WSCs as affordable and within the range of what they were willing to pay for water. Households connected to a piped system were paying, on average, 1%–2% of their income for water an amount that was affordable for most of them. In the Philippines, households in rural communities with simple supply systems are paying much less for water.

The willingness of households already connected to piped systems to pay for water is well established in each of the project areas reviewed, but for those in villages still using hand pumps and standpipes, as in some of the Philippine subprojects, fewer than half would be willing to pay to be connected to a piped supply. These people are cautious about incurring the costs that would be involved. By contrast, in the PRC, where domestic tariff rates have increased by 126% in Zhangjiakou and 92% in Dalian since the beginning of 1998, increases appear to have been well accepted by the population and affordability does not appear to be an issue, although in Zhangjiakou, a cash rebate equivalent to consumption of up to 5 m³/month is paid twice yearly to certified poor households. In Sri Lanka, tariff rates are currently low for small consumers. Even poor households are now willing and able to pay for in-house connections.

Households are more willing to pay to connect to a water system if they do not have to bear all costs up-front. In large towns and cities in the PRC and Malaysia, the issue of connection costs hardly arises because the connection comes with the house or apartment and alternative water sources are not available. Connection costs posed problems in rural areas. In the Philippines, the number of surveyed

households currently without in-house connections that were willing to pay for a connection increased by about a third if installment payments were an option.

Nondomestic consumption is an important component of total consumption in most projects with the exception of the small-scale supply systems in the Philippines and some rural subprojects in Sri Lanka. Nondomestic consumers invariably pay higher rates than domestic consumers. They subsidize domestic consumers in most water supply schemes.

Increased tariff rates in the projects reviewed have generally exerted downward pressure on nondomestic consumption. In the PRC, nondomestic consumption has clearly fallen in response to raised prices. In Dalian and Zhangjiakou, where nondomestic tariff rates have risen by 110% to 150% in Dalian and by 180% to 190% in Zhangjiakou since the beginning of 1998, industrial consumers surveyed have, on average, reduced consumption by 30%, implying a high price elasticity. Consumption by one large industrial user in Zhangjiakou has fallen by 45%.

Other Impacts

The other main impacts from the projects that were reviewed include

- All of them have substantially increased the consumption of water by households. In the PRC, the Philippines, and Sri Lanka, many more households have access to an improved water supply than prior to project implementation, and some now have connections in their homes. The smaller impact in Malaysia has been attributable to starting from a higher base.
- Satisfaction with improved water services varied considerably among both domestic and nondomestic water customers. The reasons for their satisfaction also varied considerably among survey respondents.
- As sanitation received less attention than water supply in the projects reviewed, their impacts in this regard have been mixed and limited. In contrast, the NGO subprojects in Pune, India are outstanding examples of providing sustainable sanitation services through community mobilization, a distinct factor for their success.
- A common goal of the projects has been to improve communities' health and living conditions by reducing the incidence of water-related diseases. Important characteristics of improved water services are quantity, accessibility, reliability, and quality. The quantity, accessibility, and reliability were satisfactory to most users in the projects reviewed. While water quality was generally not an issue in the PRC and Sri Lanka, some beneficiaries in Malaysia and the Philippines perceived problems with quality, especially during the wet season.
- The recent approach of involving prospective beneficiaries in planning, implementation, operation, maintenance, and cofinancing of small town and rural projects was largely not yet followed in the design of the projects reviewed. Similarly, the important roles and responsibilities of women in providing water, sanitation, and health support services for their families were not yet widely recognized. Not surprisingly, therefore, the level of customer involvement in planning and implementing these projects was much lower than in ongoing projects or those now being designed.

3



CONCLUSIONS AND RECOMMENDATIONS

Lessons Learned and Best Practices

Numerous lessons learned and best practices were compiled during this IES. The following paragraphs discuss the most important of them.

Supporting Cost Recovery and Financial Sustainability

New WSS projects usually include requirements to raise tariffs and generate revenues to recover costs and meet defined financial targets. Components aimed at helping WSCs meet these targets are included less often. Rationalizing or raising tariffs may often require difficult institutional changes and the reasons for increasing tariffs may need to be fully explained to water consumers and producers as well as to politicians. Support for implementing these processes, as in the two-tariff study TAs in the PRC, would increase the likelihood of WSCs meeting financial targets and achieving long-term sustainability.

Ensuring Effective Sanitation, Hygiene, and Health Promotion Programs

ADB needs to give serious attention of implementing effective sanitation, hygiene, and health promotion programs in its WSS projects. The traditional emphasis on simply providing adequate quantities of good quality water is not enough to

achieve the full benefits of improved individual and community health. Carefully crafted sanitation, hygiene, and health promotion programs, such as the Society for the Promotion of Area Resource Center's projects in India, are needed for project beneficiaries to become much more aware of the critical links between water, sanitation, hygiene behavior, and health.

Reducing Nonrevenue Water



Every ADB-financed WSS project with subprojects serving more than 5,000 people should require the development and implementation of a program of specific and feasible activities (technical, financial, managerial, and social) to reduce NRW. Simply saying that this should be done is not enough. Project preparation documents should specify a program of feasible and cost-effective tasks, tailored to the situation at hand, that have a high likelihood of reducing NRW to "reasonable" levels of about 25%–30%, or lower if the situation permits. Leak detection is only one of many options that should be considered. The caretaker approach,⁹ currently under development by ADB, is a useful tool to apply coupled with benchmarking the performance of water utilities.

Supplying Drinking Water

As drinking water requirements account to 2–3 liters per capita per day, they do not have to be met only through a piped water supply. Potable water from water treatment plants, as well as smaller quantities from shallow groundwater, may be better delivered when distributed in bottles, either by the WSC or through public-private partnership. Most tropical areas of DMCs are endowed with sufficient annual rainfall for shallow groundwater to be the most accessible and sustainable source of potable water. The key problem is the pollution of this groundwater because of inadequate sanitation practices. This problem cannot be overcome by extending piped water supply alone, which requires greater investment.

Considering Water Demand-Side Management

An effective DSM program is a simple and cost-effective alternative to supply expansion, particularly in water-scarce areas. DSM succeeds with political support and appropriate campaigns to promote customer awareness of the need for conservation, as observed in Dalian. Particularly in water-scarce areas, all ADB-financed medium- to large-scale WSS projects should include a DSM program of achievable and cost-effective actions, appropriate to the situation, to develop demand-side alternatives to supply-side expansion of system capacity. The program's activities should be prioritized according to their net impact in terms of the amount of water potentially saved and according to their cost-effectiveness

⁹ This approach is applicable to urban areas and proposes to assign staff of the WSC at the community level (perhaps for every 500 or 1,000 connections) with responsibility for operational matters within the community. This may include overseeing general operation of the network in the area, reading meters, identifying leaks in the distribution system, helping customers identify leaks inside the home, and undertaking other customer relations matters.

in decreasing cost per unit of water saved. Project preparatory TA documents should address the full range of tasks needed to design and implement a DSM program, including technical assessments and recommended actions, financial (e.g., water tariff structure) and economic assessments, customer conservation awareness campaigns, and political support requirements.

Enhancing Customers' Roles in Planning and Implementation

Stakeholders' roles in planning, implementing, and operating water supply systems have been limited in the projects reviewed in the IES. Perhaps the greatest obstacle to successful participatory development is convincing institutional players that it is indeed possible. Maximizing stakeholder involvement in project decision-making and implementation goes against the institutional culture in some DMCs. Success stories from Malaysia and the Philippines show that often, just one committed person can lead the way and achieve customer participation. Consistent with ADB policies that specify the importance of such participation, project designs should make a more concerted effort to realize this objective.

Streamlining Project Management and Administration

Most WSS projects experience significant delays in implementation. These delays result from an interplay among institutional, design, policy, and administrative factors that include institutional and capacity constraints commonly encountered in DMCs, overly complex project designs, proliferation of policy requirements of both external funding agencies and recipients, administrative procedures that are not always well understood, and cumbersome domestic procurement procedures and decision-making processes. Insufficient attention by ADB to project management and monitoring causes slow loan disbursements, adversely affecting project implementation and performance. In turn, this can lead to increased project overhead costs and customer dissatisfaction. ADB should consider how best to address this complex but important set of issues. Success stories from NGO-implemented projects in India point to innovative approaches, such as turnkey contracts, that ADB might consider as elements in a more streamlined approach to project management for expeditiously implementing WSS projects.

Perhaps the greatest obstacle to successful participatory development is convincing institutional players that it is indeed possible.



Action Plan

An integrated and comprehensive action plan has emerged from the IES. Three workshops were conducted for ADB staff to develop this action plan from those lessons and best practices that could be replicated and scaled up in future ADB projects. The action plan is consistent with the Water for Asian Cities Programme that builds on UN-HABITAT's experience in urban water governance and capacity building in other regions, as well as ADB's operational experience, and aims to accelerate the operationalization of ADB's Water Policy. Called W A T E R, it comprises five categories of actions:

- **Water (W):** Providing 100% coverage for drinking water, including distribution in bottles;
- **Alternative Source (A):** Protecting alternative sources of water through education and revival of traditional practices;
- **Tap Water (T):** Reducing NRW, promoting tariff reform, and encouraging DSM for sustainable 24-hour piped-water supply;
- **Environment (E):** Providing 100% coverage for environmentally safe sanitation; and
- **River Basins (R):** Integrating water resources management with participation of beneficiaries and management at the river basin level.

Provide Drinking Water for All in Asian Cities

Bottled drinking water is prevalent in many DMCs, especially in urban areas. Yet only a few WSCs in DMCs actually bottle their water for distribution. The experience of WSCs in the PRC and Indonesia confirms that bottling water is a financially viable business, because the selling price of bottled water from private companies is about 1,000 times that of the cost of water produced by WSCs.

With support from ADB and other external funding agencies, and under the auspices of the Water for Asian Cities Programme, WSCs in DMCs should be encouraged to distribute drinking water in bottles and sell drinking water from their water treatment plants in bulk to bottling companies.¹⁰ This action can be implemented between 2003 and 2008.

Initiate Health and Hygiene Awareness Education in Relation to Safe Drinking Water

Providing adequate amounts of clean, accessible, good quality water will not by itself necessarily ensure significant reductions in the incidence of water-related diseases, especially in young children, who are the most vulnerable group. The numerous anecdotal examples in this IES indicate that the intended health impacts of WSS projects are fully achieved only in the presence of wide awareness of the benefits of health and hygiene among the beneficiaries. To obtain the maximum benefit from WSS investments, broadly based health and hygiene education and

¹⁰ The water sold or bottled before it is distributed in pipes also helps the companies reduce the level of NRW and obtain additional revenues.

awareness programs are needed at the customer level to increase community understanding of the critical links between health, personal hygiene, and sanitation practices. In the absence of such awareness, the benefits are either not achieved or are at best underachieved. The simple chore of washing hands with soap, especially before meals and after using the toilet, can make a big difference in achieving the health impacts if people, especially children, practice it. The program developed by UN-HABITAT for water education in schools in Asian cities, following that for water education in African cities, is highly relevant in this context.

Executing agencies, departments of health, and departments of education in DMCs should implement this action with support from UN-HABITAT, ADB, and other external funding agencies under the auspices of the Water for Asian Cities Programme between 2003 and 2005.

Promote Cost-Effective Water Conservation

Water conservation (or DSM) programs are becoming increasingly common in many parts of the world, especially in water-scarce areas. Like reducing NRW, they have the advantages of reducing the amount of water that has to be produced and distributed, the requirements for wastewater treatment, and the energy required to distribute water throughout the system. Strategic use of water conservation can extend the value and life of infrastructure assets used for both water supply and wastewater treatment. The success of the water conservation program in Dalian, which incorporates technical, financial, public awareness,



The intended health impacts of WSS projects are fully achieved only in the presence of wide awareness of the benefits of health and hygiene among the beneficiaries.

and regulatory measures, is replicable in many cities in the PRC and other DMCs. The training programs for utilities under the Water for Asian Cities Programme could accelerate the pace of action in this regard.

ADB's regional departments and executing agencies should implement this action between 2003 and 2008 with support from ADB's RSDD and training by UN-HABITAT under the auspices of the Water for Asian Cities Programme.

Harvest Rain Water and Protect Boreholes and Dug Wells from Contamination

Water cannot be produced; it can only be harvested. Yet the most common source—rainwater—is not harvested in many urban and rural areas. Rainwater is generally pure and can be easily collected and stored without contamination. The related investments are modest and can be supported by community-oriented initiatives. Raw water from other sources, such as boreholes and dug wells, often suffers from contamination from nearby septic tanks, which are either located or constructed and operated without much precaution. This contamination is remediable once the source of pollution has been reconstructed or moved, which is cheaper than exploiting new sources of water. The best practice examples from the projects implemented by NGOs in many DMCs can be replicated.¹¹

NGOs should be encouraged to implement these initiatives with support from ADB and UN-HABITAT under the auspices of the Water for Asian Cities Programme during 2003–2006.



Water cannot be produced; it can only be harvested. Yet the most common source—rainwater—is not harvested in many urban and rural areas.

¹¹ At the Regional Consultation Workshop held in Manila in October 2002, an NGO based in India presented successful projects that harvest rainwater in a cost-effective manner.

Launch Initiatives for Financially Sustainable Water Supply Companies

Full cost recovery is essential for long-term sustainability. Both loan covenants and specific project components are required to achieve this objective and remove subsidies. It is important to optimize costs by providing adequate allocations for both O&M and reducing waste caused by excessive staffing and NRW levels. The success stories from Zhangjiakou, Sagay City, and Dalian are replicable elsewhere. Assistance such as the tariff study TAs in the PRC, should be considered for other DMCs.

ADB's regional departments should implement these measures during 2003–2006 with the guidance of ADB's RSDD.

Reduce Nonrevenue Water Using the Caretaker Approach

The Zhangjiakou and the Dalian WSCs managed to reduce NRW to 25%–30%. In many other DMCs, NRW levels are still above 30% and a major scope for improvement exists. NRW can be reduced through such measures as improving maintenance, upgrading metering, and reducing leaks. Revenues gained from the water saved should cover the costs of reducing NRW. As revenue is a function of volume sold and price, the water tariff is one of the factors affecting how much effort should be put into reducing NRW. Where tariffs are low, attempting to reduce NRW may not be worthwhile.

ADB's RSDD is developing the caretaker approach (footnote 9) to help WSCs reduce NRW. Regional departments and executing agencies should implement this approach during 2003–2008.

Encourage Community-Oriented Sanitation

While governments have targets for increasing sanitation coverage, actual achievements are still very low. As noted earlier, overlapping institutional responsibilities often exacerbate this problem. Sanitation and hygiene education components should be allocated a greater share of resources in future projects. The Society for the Promotion of Area Resource Center's model could be replicated in as many DMCs as possible.

ADB's regional departments and local governments should implement this action under the auspices of the Water for Asian Cities Programme during 2003–2010.

Promote Integrated Water Resources Management

As the demand for water grows, the pressure on limited water sources has intensified in many DMCs. Often, the more readily accessible water sources have already been used, and more distant or lower-quality water sources must be tapped. This increases the costs of water transmission and treatment. Competition for increasingly limited water raises complex legal, environmental, and ethical problems among water user groups. Especially in rural areas, where agriculture



Competition for increasingly limited water raises complex legal, environmental, and ethical problems among water user groups.

is the largest user of water, water rights controversies may supplant limited financial resources as the most important constraint to providing improved water supply services. An integrated approach to managing water resources as that developed in Sri Lanka can meet the increasing needs of all water users.

Disseminate Success Stories at the 3rd World Water Forum

ADB has disseminated the IES findings at the 3rd World Water Forum held in Japan in March 2003 and at related regional and international workshops. ADB should conduct seminars and should continue to do so prepare video footage and PowerPoint slides on success stories and lessons from the IES for a wide audience, including nontechnical people and schoolchildren.