

## Appendix 1

# City Water Profiles and Summary Findings

Appendix 1 provides information gathered from the field in 2002. Water utilities information is mostly end of 2001 data. These facts were gathered as parts of studies conducted under Promoting Effective Water Management Policies and Practices, an ADB regional technical assistance undertaking (RETA 6031). The Water in Asian Cities study and consultation, which came under this regional technical assistance, surveyed Bangkok, Chengdu, Colombo, Delhi, Dhaka, Ho Chi Minh City, Hong Kong, Jakarta, Karachi, Kathmandu, Kuala Lumpur, Manila, Osaka, Phnom Penh, Seoul, Shanghai, Tashkent, Ulaanbaatar, and Vientiane.

The first part of Appendix 1 gives city water profiles and includes comments from civil society (several sources) and the author on the water supply situation in these cities. The second part contains the summary findings of the Water in Asian Cities study and consultation, which was conducted by ADB.

## Part 1 City Water Profiles

### BANGKOK (THAILAND)

#### Water Resources

In the past most of the water supply for Bangkok came from groundwater, but due to overextraction, aquifer levels fell, causing widespread land subsidence, which in turn resulted in severe flooding. Presently, less than 0.4% of the approximately 4 million m<sup>3</sup> of public water used per day is supplied from groundwater. Development of new surface sources with water treatment and distribution has in general kept pace with the growing population of Bangkok. Indeed, the service area of the Metropolitan Waterworks Authority (MWA) has grown from 710 square kilometers in 1991 to 1,280 square kilometers in 2001.

#### Policies and Regulations

The Government of Thailand and MWA are committed to supplying 24-hour potable piped water to every home in Bangkok. In consonance with the

decision to “privatize” MWA in 2003, a regulatory commission has been proposed. MWA has in the past demonstrated good governance and a strong financial position. In 2001, it had an annual turnover of about \$281 million and a net income after all expenses (including debt servicing) of about \$62 million. MWA has been certified under ISO 9002 standards, which indicates that its tap water is safe to drink throughout its service area.

#### Private Sector Participation

The Government of Thailand has decided against consultant advice to follow the examples of Jakarta and Manila, which have dual concession contracts splitting distribution into two geographic areas. Instead, it has decided to offer shares of MWA as a company to the public through the stock exchange, but with the Government holding a majority of those shares.

#### Tariffs

The average tariff for domestic use of water in 2001 was about \$0.23/m<sup>3</sup>. Noticeably, there is little penalty in the tariff for high consumption. For example, the rate for 81–90 m<sup>3</sup> of consumption is only 47% higher than the basic rate for 0–30 m<sup>3</sup> of consumption per month. For nondomestic use, the average tariff is about \$0.32/m<sup>3</sup>. O&M costs were covered three times by revenue. The new connection fee for supply using a ½” diameter pipe is around \$116.

#### Service Levels

MWA had more than 1.44 million service connections in 2001, of which about 1.09 million were for domestic purposes. Based on five persons per domestic connection, the service coverage with piped water from MWA is 72% of the population. Others get their water from tubewells with handpumps and from private developers using groundwater. There are no standpipe supplies in Bangkok. Nearly all of the MWA service area gets 24-hour piped water. Average domestic consumption is around 35 m<sup>3</sup> per month. NRW throughout the MWA service area is about 37% of production. The number of MWA staff per 1,000 connections is a relatively efficient 3.6.

## Sanitation

MWA is not responsible for sanitation in Bangkok. This is handled by the Bangkok Municipal Administration, which has a major program of sewerage and sewage treatment developments under way in the city (see Civil Society Comments below).

## Civil Society Comments

*Prior to 1990, there was virtually no treatment of municipal wastewater in Thailand. The situation has now improved a little bit, and there is enough treatment capacity for 29% of the municipal population. This figure should increase to 65% when the current projects are completed. However, there are many wastewater treatment systems that either stopped operating or do not operate at full capacity because of a lack of operating budgets and technical knowledge. For industrial pollution, the following solutions could be considered.*

- *Enforce water pollution legislation effectively.*
- *Reduce tax for companies that operate nonpolluting systems.*
- *Stop corruption among civil servants and in the private sector.*
- *Establish a core agency to oversee policy implementation (there are 30 agencies in six ministries in charge of water pollution)*
- *Encourage the media to play a role in urging the Government to care more about the environment.*

## Author's Comments

MWA has addressed the two key issues of water utilities in Asia, namely governance and tariffs, and as a consequence it provides good service to the people in its service area. Improvements can be made in reducing NRW, which at 37% of production is still too high. The average household consumption of 35 m<sup>3</sup> per month is also quite high. Extending 24-hour piped water coverage to more people should be the main objective. MWA is nevertheless a very sound utility whose management staff might usefully be employed as consultants to other utilities, especially those in the South Asian region.

## CHENGDU (PEOPLE'S REPUBLIC OF CHINA)

### Water Resources

Chengdu, with a population of 11.2 million, is the fourth largest city in the PRC. It is, however, one of 300 cities in the country facing water scarcity that limits further development. Water pollution and degradation of forest cover in catchments are the two main problems. Two intakes on the main source, the Minjiang River, have been closed, and at two other intakes production has been reduced. This drop in production is partly because of water quality, and it is also because of temporarily overestimated demand. The situation is aggravated by the fact that 80% of Chengdu's rainfall comes between May and September. The Government is now investing heavily in watershed rehabilitation.

### Policies and Regulations

This year the State Council announced Foreign Investment Guidelines that encourage investment in the construction and operation of waterworks, wastewater treatment plants, and pollution control and monitoring. Chengdu is setting up a water bureau as an independent agency to administer and manage groundwater and surface water. Water supply and wastewater responsibilities are now with the Chengdu Municipal Public Bureau.

### Private Sector Participation

In Chengdu there are two main water producers. One is the Chengdu Municipal Water Supply Company (CMWSC) and the other is a joint venture of Generale des Eaux and Marubeni (CGE-M). CMWSC produces 980,000 m<sup>3</sup> per day. Since February 2002, CGE-M has produced 400,000 m<sup>3</sup> per day on a "take or pay" basis, under a BOT contract. Unfortunately, the present daily requirement of Chengdu is only about 1 million m<sup>3</sup> per day. As the supply is more than the demand, CMWSC had to close some waterworks, but the distribution company must buy the 400,000 m<sup>3</sup> per day from the private sector joint venture at the specified price. This situation has caused some concern. It came about partly because of overestimation of population growth and a lack of capital for new area development. It is also aggravated by the abundance of groundwater use by SSWPs. After completion of the BOT water quality improved, but the price of water increased, too, which reduced demand.

## Tariffs

The domestic tariff is equivalent to \$0.13/m<sup>3</sup>, and sewage charges add another \$0.02/m<sup>3</sup>. Nondomestic tariffs vary, but they range from about \$0.16/m<sup>3</sup> to \$0.24/m<sup>3</sup>. For price adjustment and determination, it is necessary to seek approval both from the Sichuan Province Price Bureau and the Chengdu Price Bureau. Collection efficiency is just under 100%. Poor households are identified in Chengdu, and they can get a 50% rebate on their water charges. If the water price cannot be increased in 2003, CMWSC will experience serious financial difficulties.

## Service Levels

There is 24-hour water service to 100% of the served population. In 2001, average water consumption was 134 l/c/d. NRW is estimated at 20%. In Chengdu, in addition to CMWSC, there are 69 SSWPs. The price of the water provided by these entrepreneurs varies from about \$0.60/m<sup>3</sup> to \$2.50/m<sup>3</sup>. These providers supply about 15% of the city. A monitoring report shows, however, that 70% of SSWPs fail to meet water quality standards.

## Sanitation

About 70% of wastewater generated in Chengdu is treated, and 90% of industrial wastewater is treated. Wastewater reclamation of about 300,000 m<sup>3</sup> per day is expected to be commissioned in June 2003.

## Author's Comments

The BOT contract in Chengdu is causing concern. Demand has been overestimated. The city is left not wanting any more water at the moment, but it is forced under the "take or pay" contract to buy 400,000 m<sup>3</sup> per day. This clearly shows that governments take a risk with "take or pay" BOTs.

## COLOMBO (SRI LANKA)

### Water Resources

The Kelani River is the main source of water for Colombo. There are three intakes, one on the river itself and two on tributaries. They are located about 50 kilometers from Colombo. Intake locations are subject to tidal influence. The increased sand mining activities have, since 1987, had a major effect

on river flows and tidal influence. A salinity barrier is now being constructed. The average combined output of the three treatment plants is 576,000 m<sup>3</sup> per day, but maximum capacity is 643,000 m<sup>3</sup> per day. A new water source, from the Kalu River (40 kilometers from the city), is now under development.

### Policies and Regulations

The National Policy on Water Supply and Sanitation was published in August 2002. It is based on implementation of the United Nations Millennium Development Goal of a 50% reduction in the number of people without access to safe and adequate drinking water by 2015. A regulatory commission to monitor water supply, power, and telecommunications is being established. The tariff policy includes recognizing water as an economic good while considering customers' ability to pay (5% of household income); pricing water to effect demand management and attract private sector investment; recovering the cost of services, including O&M, debt servicing, and an always increasing contribution to capital costs; and reducing cross subsidy from commercial and industrial consumers to domestic consumers.

### Private Sector Participation

The National Policy on Private Sector Participation in Water Supply and Sanitation was articulated in October 1999 and approved in 2001. The private sector is invited to enter into partnership with the Government to operate, maintain, and expand water supply systems. The partnerships can take many forms, including service contracts, management contracts, leases, BOTs, or concession contracts. Transparent, open, and competitive bidding will be required. Initial action is focused on secondary towns (under World Bank support). A capital investment fund and an operational investment fund are proposed to cushion the effect of higher tariffs. Utility staff are still somewhat reticent about PSP.

### Tariffs

The average tariff in 2001 was \$0.14/m<sup>3</sup> for domestic use of water and 0.36/m<sup>3</sup> for nondomestic use. O&M costs were covered 2.2 times by revenue. Connection fees are allowed to be paid along with the tariff in monthly installments. Collection efficiency is around 88%. It appears that a certain amount of revenue is lost through the imposition of fixed charges where meters are either not working or not read. (See case study in Appendix 2)

## Service Levels

About 66% of the population are served with direct piped connections and another 26% by standpipes. Standpipes are being phased out in favor of direct connections. Only about 60% of the people with piped water get 24-hour supply. Low pressure can add about \$2.50 per month to power bills, as people use electric pumps to move water to roof tanks and to serve upper corners of homes. Some people still use domestic shallow wells for at least part of their water supply. Average domestic consumption per six-person household is about 25 m<sup>3</sup> per month or 140 l/c/d. NRW in the part of Colombo covered by the Colombo Municipal Council is 55% of production. About eight utility staff are employed per 1,000 connections.

## Sanitation

There are about 33,000 sewer connections serving 33% of the population. The rest use septic tanks. Desludging septic tanks is usually only done when septic tanks or soakage pits get blocked and sewage overflows. There have been plans for some time to rehabilitate and expand the existing sewer system, which suffers from constant breakdowns, but finances have been the constraint. ADB has been requested to assist in financing this development. In 1992 Colombo received almost 500 millimeters of rainfall in 24 hours, causing severe flooding. Under Japan Bank for International Cooperation funding, the Greater Colombo Flood Control and Environmental Improvement Project has been successfully implemented at a total cost of about \$400 million.

## Civil Society Comments

*It is said that in Sri Lanka 40–50% of clean water goes to waste as a result of leakage. The National Water Supply and Drainage Board (NWSDB) is, however, in a position to maintain uninterrupted supply except during drought. Consumers misuse water in their daily activities, and drinking water is used for industrial purposes as well. People now use drinking water to wash their cars, which is a criminal waste. There should be a huge awareness program, starting at the school level, on water and water scarcity and effective water management. We need a proper master plan for water management. Desalinization of seawater could be considered.<sup>18</sup> It is also important to collect rainwater. This has*

<sup>18</sup> Civil society correctly identifies the need for a major awareness program, and the reference to the consideration of desalinization of seawater clearly shows that need, because the public is unaware that the costs of that alternative would be prohibitive.

*not been done effectively in the city, so far. Metering and charging for water, which only occurred in the last 20 years, have placed a burden on the very poor sectors of the urban population. NRW, which is estimated at over 50% of production in Colombo, adds an extra burden on the domestic consumer. NRW includes system leakage, illegal tapping, water meter deficiencies, and wastage at common outlets such as the 7,000 standpipes for low-income areas. Moving from standpipe water supply to metered individual connections to overcome the wastage problem has put a further burden on low-income groups. The Government would like to get rid of the problem by passing it on to the private sector. The theory is that government corporations are choked with excess employees, put in place by politicians, and that these employees do very little work and are a financial burden to the Water Board. They say the private sector could be more efficient, charge higher rates, and deliver better service, but that this will drive the poor to greater poverty. Can we have one section of the population flushing water down the sewers while another does not have enough to drink? Other ways of dealing with sewerage should be found. At least the quantity of water should be reduced, dual flush toilets should be introduced, and rainwater for use in toilets should be collected. At present, only about 20% of the 5.9 million people living in urban Sri Lanka receive a 24-hour water supply. In fact, only one third of all the piped schemes in the country have the capacity to provide water 24 hours a day. The quality of the water supplied also often falls below generally accepted standards. Inefficiencies in the water supply authorities have to be corrected to make the system commercially viable. Old pipes need to be replaced, and new sources of water need to be explored. The tariff structure should be adjusted to take account of social inequities. In some areas, where large quantities of water are required for industrial, agricultural, or other nonpotable uses, dual water supply systems could be considered.*

## Author's Comments

Sand mining in rivers is threatening water supply intakes, not just in Colombo but in many other parts of the country. It should be controlled. The regulatory commission should ensure autonomy of management and accountability of performance for water utilities. Greater Colombo has been eyed for some time by development agencies and contractors as the prime candidate to lead South Asia into PSP in water supplies. There are many very competent professionals in NWSDB whose potential has never been tapped. Some form of domestic PSP would be appropriate. Real autonomy, an injection from the domestic private sector in management

expertise, and separation from NWSDB are needed to allow Greater Colombo Water Supply and Sewerage to stand on its own feet as an independent entity that could fund its own capital investments.

## DELHI (INDIA)

### Water Resources

About 88% of Delhi's water comes from surface water and 12% from groundwater. There is still a shortfall of about 20% in supply meeting demand. A 102-kilometer lined channel is about to be constructed to bring new raw water supplies to Delhi. The Delhi Jal Board is making efforts to encourage public awareness of water conservation, promote and assist in rainwater harvesting, and reduce water losses and pilferage.

### Policies and Regulations

The Delhi Jal Board Act of 1998 clearly states that "the fees, rentals and deposits shall be so fixed to ensure recovery of all costs of operation, maintenance, repayment of debt and a return not less than 3% on net fixed assets...." In practice, the Delhi Jal Board manages to recover less than 40% of O&M expenditure (including interest). Sociopolitical considerations drive the tariff setting process. The last tariff revision was effected in 1997/98, but O&M expenses have increased at least 50% since then. There is no regulatory framework. Legislation for establishing a regulator is being considered.

### Tariffs

Domestic consumers are charged in one of three ways. Where metered, domestic consumers are charged on a volumetric basis with increasing block tariffs. A flat rate tariff (30 rupees per month) applies if the connection is metered and monthly consumption is less than 24 m<sup>3</sup>. The same flat rate applies to connections that are not metered. About 60% of consumers pay a flat rate tariff. In cases where meters are not working, the final water bill is calculated on estimated consumption, based on norms or past consumption. About 36% of consumers fall into this category. The low tariffs provide the consumer no incentive to use water prudently. *The tariff structure hurts the poor with a 30 rupees per month minimum charge, but it benefits the middle and upper classes with low tariffs for high consumption.* There is a high cross subsidy from commercial and industrial consumers, who pay respectively 6 and 11 times the rate of domestic consumers.

### Service Levels

Less than 1% of people receive 24-hour piped water. NRW is estimated at 53% of production volume. About half of the people receive piped water by direct connection, and the other half rely on standpipes or get tankered water. In the current scenario, it is the poor who have to bear the brunt of the unsatisfactory service levels. The water supply is irregular and difficult to access. The root cause is the poor financial health of the utility. There are about 1,015 tankers supplying water, and mostly they provide water for free. Likewise, there are 11,500 public taps in Delhi providing free water.

### Sanitation

Sewerage infrastructure constructed has received a strong thrust since 1995, with the completion of 14 of 16 sewage treatment plants built under the directive of the Supreme Court of India.

### Civil Society Comments

*There is overextraction of groundwater. Intermittent water supply has high coping costs. Lucrative tanker businesses have stepped in to supplement the service provided by the utility. There is a need to raise awareness about problems and solutions, implement rainwater harvesting, reduce water wastage in the home, and recycle treated water. Wastewater should be treated close to the source of generation. NGOs have united, and official agencies are warming to the idea of collaboration. *There is pressure to change building bylaws to integrate rainwater harvesting and wastewater recycling.* The dependence of Delhi on water from neighboring states has raised complex issues of intergovernmental relations. The gap between demand and supply is estimated at 20% of water demand. Domestic water availability is characterized by large distribution inequities. *Those relying on public taps or tankered water get 25–30 l/c/d, while those in high-income areas get 380–400 l/c/d.* The water tariff in Delhi is complex and cumbersome. Further inequities occur with tariffs, as the nondomestic tariffs are 12–15 times the equivalent domestic tariffs. High NRW and low tariffs impinge on the finances of the Delhi Water Board, which shows large excesses of expenditure over revenue.*

## Author's Comments

The water supply of Delhi illustrates many undesirable traits of South Asian water supplies. Tariff policy is ignored by elected officials. The service levels are low because of a lack of finances. The finances are low because of an unwillingness to charge the consumer. There is loss of water because of inadequate finances to fix leaks. Wastage results from a low tariff and inadequate metering. The meters cannot be replaced because of a lack of finances. There exists a vicious cycle that is continuously spiraling downhill. Corruption can feed off this situation, and those with vested interests are not considering change.

## DHAKA (BANGLADESH)

### Water Resources

Rivers surround Dhaka on all sides. Until very recently, Dhaka relied on continuous abstraction of groundwater through deep tubewells. But the groundwater levels have been falling at an alarming rate, so the Dhaka Water Supply and Sewerage Authority (DWASA), established in 1963, is embarking on surface water investments with a view to sustainable conjunctive use of groundwater and surface water. A 225,000 m<sup>3</sup> per day surface-water treatment plant has just been commissioned. Rainwater harvesting is also being promoted by DWASA. Despite legislation to control pollution, the discharge of toxic wastewater into the rivers of Dhaka continues unabated. Dhaka, and indeed the whole country, faced major floods in 1954, 1955, 1974, 1987, 1988, and 1998. After the 1988 flood (the largest), the Government decided to protect the city by constructing an embankment around its perimeter, improving the internal drainage system, and pumping out floodwater. These improvements have made a difference, but the eastern embankment is not yet complete.

### Policies and Regulations

The Draft National Water Policy is now under government review. It recommends giving priority to domestic and municipal use. There is also, since 1998, a National Policy for Safe Water Supply and Sanitation. This policy mentions the provision of water to the urban poor (the lowest-income areas) subject to payment, water being supplied at cost, promoting PSP, and reducing NRW. Tariffs cannot be revised without the prior approval of the Government. A workshop in 2001 led to a consensus on the need for a national regulatory body, but to date no action has been taken to bring this about.

## Private Sector Participation

Despite the policy (above), PSP has neither been undertaken nor planned in Dhaka. Part of the distribution, billing, and collection has been outsourced to the union, whose members may be rewarded based on revenue gained. This has been relatively successful but is limited to operations in high-income areas.

### Tariffs

There is a basic domestic charge for water of about \$0.08/m<sup>3</sup> for metered consumption. Use that is not metered is based on property tax. The effective domestic tariff for all connections is close to \$0.06/m<sup>3</sup>. The industrial tariff is about 3.3 times the domestic tariff, where metered. Domestic connection fees are about \$29 and payable in advance. Revenue from tariffs covers O&M costs and some rehabilitation but not debt servicing or service expansion. The existing tariff structure for DWASA consumers, with its low tariffs and unlimited use for most who pay based on property tax, means that metered charges are of little relevance, which gives many consumers little incentive to conserve water.

### Service Levels

The population of the service area of DWASA at the end of 2001 was about 7.1 million, of which 80% (5.9 million) have water supplied by DWASA. Some 77% of those people (4.5 million) have direct connections to their homes. The rest of the people (1.4 million) obtain water from street taps and water points established by NGOs to provide water to the lowest-income areas. There are 1,209 public taps and 126 water points in the city. As many as 1.5 million people do not have access to piped water and rely on wells, vendors, and illegal connections. Due to mechanical failure, electricity load shedding, and inadequate supply, the people do not get 24-hour service. Average per capita consumption is about 117 l/c/d. Water losses are estimated at 40% of production.

### Sanitation

Only 30% of residents have access to sewerage. Others use septic tanks. Many people, especially in the lowest-income areas, use latrines. Inadequate funds limit the expansion of the sewerage system.

## Civil Society Comments

*The expanding gap between water demand and supply at times leads to water crises and pilferage.*

Water supply has been constrained by severe pollution of all rivers around Dhaka and is also threatened by the expanding slum population in the metropolitan area. Water pricing is a critical issue, as per capita income has yet to pick up. People's participation can help, but DWASA must try to improve the delivery of services, including the drainage system. Overextraction of groundwater is also an issue. Water losses are high, due to inefficiencies and corruption. About 40% of the people live in illegal settlements. Because DWASA cannot normally provide piped water to such locations, the poor have to purchase water from intermediaries. The quality of the water deteriorates in the process. A water vision is needed for the city. There is a need to invest in more surface water sources. *Rainwater harvesting should be planned and implemented. NGOs can be involved in improving the access of the poor to water. Civil society action needs to be encouraged to improve the water supply. Consumer awareness of proper water use should be raised. We need to protect the water sources around the city, too. The growth rate of Dhaka is 7% per annum, which makes it one of the fastest-growing cities in the world. Water supply projects have largely been biased toward the provision of physical water facilities, with little attention paid to cost recovery and O&M related to existing waterworks. To improve the drainage system within the city, the rivers surrounding Dhaka should be dredged and navigation of the existing canals improved. There is a National Water Policy Statement that indicates that the Government is aware of the problems, but a strong political commitment is needed for effective and efficient water service to be provided to all residents. It is essential to set up strategies to introduce water saving devices, the use of alternative water sources such as rainwater, and treating and recycling wastewater. An independent regulatory body can set tariffs based on government policies and agreements, protect consumer rights, ensure that the private sector carries out its responsibilities, insist on standards of quality and service, and promote higher standards of efficiency and public relations. Benchmarking utility performance under the Water Utility Partnership, South Asia, will help.*

### Author's Comments

Dhaka has limited service coverage as well as an intermittent water supply. Revenue covers only O&M. A regulatory body is needed to oversee the implementation of government policy, especially in terms of tariffs. This, in turn, will allow investments in extending piped water coverage. A close watch needs to be kept on groundwater extraction and surface water pollution.

## HO CHI MINH CITY (VIET NAM)

### Water Resources

Ho Chi Minh City has about 5.3 million people. The water supply is managed by the Ho Chi Minh City Water Supply Company, a public enterprise owned by the Government. Two rivers supply most of the surface water. When the Sai Gon water treatment plant is commissioned in 2003, it is expected that the Dong Nai River will supply 800,000 m<sup>3</sup> per day and the Sai Gon River 310,000 m<sup>3</sup> per day. Groundwater (both shallow and deep aquifers) is also used for water supply. The present production capacity from groundwater managed by the Department of Industry is 520,000 m<sup>3</sup> per day. The groundwater tends to have relatively high salinity.

### Policies and Regulations

Parliament is considering the 14<sup>th</sup> draft of the Water Law. According to this draft, large important river basins will be managed by the River Basin Committee. The National Water Supply Strategy was accepted by the Ministry of Construction in 1993. This strategy targeted service levels and coverage.

### Private Sector Participation

A 300,000 m<sup>3</sup> per day water production facility was let under a BOT contract to Lyonnaise des Eaux. Another BOT contract for water production was let to Binh An, which will provide 100,000 m<sup>3</sup> per day. At the moment, production capacity exceeds distribution capacity. About 20% of the water in the city is provided by SSWPs, including resellers of utility water. These contractors concentrate on areas that lack water, such as new urban areas.

### Tariffs

Revenue from tariffs is supposed to cover all O&M expenditure, debt servicing, rehabilitation, and services expansion. In 2001, however, revenue covered only about 90% of O&M expenses. The domestic tariff, which ranges from about \$0.11/m<sup>3</sup> to \$0.27/m<sup>3</sup>, depending on consumption volume, does not encourage people to save water. The industrial tariff, at \$0.27/m<sup>3</sup>, is also low. But if the Ho Chi Minh City Water Supply Company increases the price, people may decide to use groundwater or get water from other companies. The water bill includes a 12% sewerage surcharge.

## Service Levels

Only about 44% of people have piped water connections to their homes. There are no public taps. The water supply is intermittent in 25% of the service area. While great effort has gone into water production, the distribution network, managed by the Ho Chi Minh City Water Supply Company, is very old and has high water losses. Funding is needed to improve this situation. Water consumption is 155–178 l/c/d from the Ho Chi Minh City Water Supply Company and 66–88 l/c/d from SSWPs. There were nearly 27,000 new connections in 2001, which represented an annual increase of about 8%. The cost of a connection for normal domestic use is about \$53, paid in advance. NRW is estimated to be 38% of production. The utility employs 3.5 staff per 1,000 connections.

## Sanitation

Only about 16% of the city has sewerage. There is an official total of 295,000 septic tanks, of which only 68% meet sanitary standards. Three export processing zones, 10 industrial zones, 800 industries, and 26,000 small factories discharge more than a million m<sup>3</sup> per day of wastewater. Most of this wastewater is discharged directly to the river and canal system, without treatment.

## Author's Comments

The “take or pay” BOTs, where production got well ahead of distribution, were not a good advertisement for PSP. Lack of piped water service coverage by the utility is a concern. The connection fee may be an impediment. Per capita consumption is high. The utility needs strong autonomous management supported by regulated groundwater use. This may allow tariffs to rise to effect long-term financial sustainability.

## HONG KONG (CHINA)

### Water Resources

Hong Kong receives 77% of its water from the East River in Guangdong Province in the PRC, 83 kilometers away, and 23% from the collection of rainwater through 120 kilometers of catchwater channels and 17 impounding reservoirs. A unique seawater supply system and a separate distribution system have also been constructed. The seawater supply is used solely for flushing. Seawater use is 630,000 m<sup>3</sup> per day, and freshwater use is 2,550,000 m<sup>3</sup> per day.

## Policies and Regulations

The water supplies are run by the Water Supplies Department (WSD) of the Government of the Hong Kong Special Administrative Region, which is self-regulating. The water supply policy is made known to the public in the Government Policy Address. For the last 3 years, policy objective booklets have been printed and distributed to the public. The water supply policy objectives are expressed in a vision, a mission statement, and a set of values. The vision is to excel in satisfying customer needs for quality water services. The mission statement explains the need to (i) provide a reliable and adequate supply of wholesome potable water and seawater to customers in the most effective way; (ii) adopt a customer-oriented approach to services; (iii) maintain and motivate an effective, efficient, and committed workforce to serve the community; (iv) remain conscious of responsibilities toward the environment; and (v) make the best use of resources and technology when striving for continuous improvement in services. The values include reliability, environmental awareness, dedication, improvement, teamwork, and customer satisfaction.

## Private Sector Participation

Although WSD contracts out several of its activities, including design, construction, and maintenance work, there is no specific plan for PSP.

## Tariffs

Water charges in Hong Kong are low, compared with other Asian cities. This is because water charges have been frozen since 1995. The total revenue in fiscal year 2001 was \$330 million, while the operating cost was \$794 million. The latter included \$311 million for purchasing raw water from the PRC. Capital expenditure was \$279 million. The Government subsidized the debt in full. The average domestic tariff is \$0.35/m<sup>3</sup>. The average nondomestic tariff is also \$0.35/m<sup>3</sup>.

## Service Levels

About 99.9% of Hong Kong's nearly 6.9 million people receive a 24-hour piped water supply with their own connection. WSD, however, still maintains 100 standpipes, through which free supply is given to the public. Some people take water from standpipes to supplement their supply from an individual connection, so as to reduce their water bill. Average daily consumption from these standpipes is about 700 m<sup>3</sup>. Normal domestic water consumption equates to 193 l/c/d. NRW is around 25% of production.



## Sanitation

The entire population has access to sewerage. There are neither latrines nor septic tanks in Hong Kong for domestic use. There are some septic tanks in parks, which are used by visitors to these areas. About \$220 million per year is spent on sanitation improvements by the Drainage Services Department. This department also spends around \$100 million each year on flood management.

## Civil Society Comments

*The major issue of Hong Kong's water supply is not one of quality but quantity, due to the high rates of immigration. Hong Kong should pursue ways of reducing water consumption through conservation and market measures. It can also explore recycling treated wastewater. There will be a need to work closely with neighboring governments to ensure both quality and quantity of water in the future. The price of water from the Dongjiang River has increased more than six times in the past 20 years, but the Guangdong provincial government is still asking for more. The problems are more political than technical, as the supplier also faces a water shortage problem. News of aging pipes bursting appears in local newspapers fairly regularly. Introducing no-dig technology may help in the major pipe rehabilitation program. Another issue is the frequency of the cleaning of high-rise storage tanks, which is the responsibility of building services personnel. This is often seen as the main cause of water contamination.*

## Author's Comments

One hesitates to criticize a system that provides 24-hour piped water supply to all homes. There may nevertheless come a time when demand management is invoked to reduce consumption, which is high. Demand management would reduce the amount of money paid by the Government of the Hong Kong Special Administrative Region to the PRC for raw water.

## JAKARTA (INDONESIA)

### Water Resources

There are 13 rivers that flow through Jakarta and end up in 10 estuaries. But due to deteriorating water quality, the rivers are no longer used as supply sources. Ten small lakes retain rainwater during the rainy season. Overextraction of groundwater, mostly by industries, has been lowering groundwater levels in central

Jakarta by 0.94 meters per year and by 2.6 meters per year in southern Jakarta. This has caused land subsidence and seawater intrusion. A survey in 1998 showed that 70% of the shallow wells in Jakarta are contaminated by fecal coliform. A 1992 law states that each house and building must construct a rainwater infiltration well. In locations where piped water is available, industries are now not allowed to use groundwater. Even though Jakarta has a surface water source 78 kilometers away, the quality of its raw water is not good. About 40% of the city rests on low-lying land and 50% is subject to perennial flooding. In 2002, 79% of the subdistricts (where 18% of the people live) were flooded.

### Policies and Regulations

The Jakarta Water Supply Regulatory Body reviews tariff proposals from the Jakarta Water Supply Enterprise and the two private operators. Once a proposal is reviewed, a recommendation is forwarded to the Jakarta Governor. The Governor decrees the tariff adjustment after consulting with and getting the approval of the Jakarta City Council. This system works on principles that include full cost recovery with a fair return on investment, affordability to consumers, demand management, simplicity, and transparency. The private sector concessionaires feel that the regulatory body needs to be more independent. Both concessionaires are facing financial difficulties as a result of the failure of the regulatory body to approve appropriate tariff increases.

### Private Sector Participation

Since 1998 two private water companies, PT Pam Lyonnaise Jaya and PT Thames Pam Jaya, have operated the Jakarta water supply under 25-year concession contracts. Annual investment over the last 4 years has averaged about \$24 million. NRW averaged 49% of production in 2001, compared with about 58% at the start of the concessions. Staff per 1,000 connections is now a respectable 5.3.

### Tariffs

There are various categories of consumers with different tariff levels. Lower-income households are charged an average domestic tariff of roughly \$0.04/m<sup>3</sup> when consumption is under 20 m<sup>3</sup> per month, which increases to around \$0.09/m<sup>3</sup> when consumption is over 20 m<sup>3</sup> per month. Higher-income households are charged about \$0.28/m<sup>3</sup> when they consume less than 20 m<sup>3</sup> per month and about \$0.39/m<sup>3</sup> when they

consume over 20 m<sup>3</sup> per month. Industrial tariffs, including those for hotels, are charged at a flat rate of about \$0.58/m<sup>3</sup>. Connection fees are also in accordance with standard of living, with lower-income households paying only about \$9 and higher-income households paying about \$38 for connections using 20 millimeter pipes. Total revenue from tariffs in 2001 equaled only 1.3 times O&M costs, which provided only \$14 million for capital expenditure.

### Service Levels

There were 566,000 household connections and 1,718 public taps in Jakarta at the end of 2001. It was estimated that about 92% of those served with piped water got a 24-hour supply. The overall coverage with piped water in Jakarta at the end of 2001 was 51%, compared with 43% at the start of the concessions. The remainder of the people rely on water vendors, supply at private operators' water points, and shallow and deep wells. Average per capita consumption of the piped supply is around 90 l/c/d.

### Sanitation

Only about 2% of Jakarta's wastewater passes through sewers, which mainly serve high-rise buildings and a few houses. The Jakarta Water Supply Enterprise (not the private water supply operators) is responsible for sewerage in Jakarta. Wastewater treatment capacity is only 11,700 m<sup>3</sup> per day. There is a 2001–2003 master plan for sewerage developed by the Jakarta government. This plan involves an investment of about \$3 million per annum. About 39% of Jakarta's residents have septic tanks and 20% use pit latrines. Many still rely on informal hanging latrines over waterways. The city's sanitation department operates 122 trucks for septic tank sludge removal.

### Civil Society Comments

*Potable water has not been produced in Jakarta for two reasons: raw water quality is poor and distribution pipes are old. Some say the water is so bad that they have to bathe their babies in mineral water. There is also a large percentage of water leakage (both technical and administrative). Demand exceeds supply because of limited water-treatment plant capacity, and the water rate is too high, compared with household income. There is no sewerage in Jakarta, so wastewater discharges to the river. Suggestions include raw water protection, a river cleaning program, and regulation of wastewater disposal. Monitoring 96 wells was*

*done in the city, and it was found that 64 of these wells did not meet the basic standard for drinking water. Sadly, the water companies can supply only 40% of the demand for water. Only 400 out of 4,000 manufacturers in Jakarta control their wastes. Civil society action and community training are needed to raise awareness about issues like garbage disposal. A person from Semarang once suggested subsidizing the connection fee instead of the tariff. The average cost of vended water in Semarang is 29 times the water tariff, but 45% of the people (mostly the urban poor) do not have piped water.*

### Author's Comments

The private operator concessions in Jakarta have not been too successful in investments and efficiency improvements. This may have been the result of tariff restrictions. The tariff structure operates on a good principle, which is to tap the range of affordability in the community, but even higher tariffs can be applied to the more affluent. Sanitation and the flooding problem certainly need attention.

## KARACHI (PAKISTAN)

### Water Resources

Karachi has a very low amount of rainfall, averaging only 200 millimeters per year. Most of its water (92%) comes from the Indus River, and an application to double its allocation is under way. The water requires only filtration and chlorination. A build-operate-own-transfer contract for recycling effluent from one sewage treatment plant for industrial use has been awarded. Water wastage through leakage in the distribution mains is of concern, but this cannot be measured, and there are no funds to repair and rehabilitate old mains. Annual capital investment in water supply is about \$15 million.

### Policies and Regulations

A draft water policy (September 2002) has been prepared by the Karachi Water and Sewerage Board (KWSB). The tariff is regulated by the provincial government, taking into account the social and political factors rather than cost recovery. Domestic consumers are not metered. Tariffs are based on plot size and the number of storeys of houses and apartments. The general public is not consulted in policy development.

## Private Sector Participation

Following an abortive attempt to “privatize” water supply and sewerage in the 1990s, there has been no other PSP, except for an O&M contract for a sewage treatment plant. There are, however, many water vendors using tankers, donkey carts, and manually transported leather bags, which serve an estimated 20% of the population. The average price for such water is from \$0.76/m<sup>3</sup> to \$1.00/m<sup>3</sup>.

## Tariffs

Revenue from tariffs barely covers O&M costs. **The collection efficiency is only 54%.** The average tariff for domestic consumers equates to \$0.16/m<sup>3</sup> and \$0.27/m<sup>3</sup> for commercial and industrial consumers. KWSB uses tankers to supply about 30% of the unauthorized settlements with free water.

## Service Levels

Only 50% of the people have piped supplies with their own connections, while about 2% use public taps. At the retail level, water is distributed on alternating days for only 2–4 hours. **Average per capita consumption is estimated by KWSB at 164 l/c/d.**

## Sanitation

About 50% of the people are connected to the city’s sewers. Sewage treatment is available for about 28% of the sewage created. Annual investments related to sanitation are on the order of \$3 million.

## Author’s Comments

**The very poor service levels reflect government policies that regard water as a social good but ignore the heavy subsidies needed to provide an adequate and equitable water supply.**

## KATHMANDU (NEPAL)

### Water Resources

Water sources for Kathmandu’s 1.5 million people include groundwater, surface water, and spring water. The groundwater abstraction rate is about double the rate of recharge, and groundwater levels are sinking by up to 2.5 meters per year. The Bagmati River is the main source of surface water. There are quite a few springs situated at the bases of mountains and several

stone spouts that have been used since ancient times for providing water. The water demand is about twice the supply in the dry season. The watersheds within Kathmandu Valley are being degraded, due to high demand for forest products and a lack of effective management. A major new source, the Melamchi River, which will more than double supply, is being developed. This is a transbasin supply that will come into Kathmandu Valley via a 26-kilometer tunnel. Groundwater licensing and a Kathmandu Valley water authority are being introduced as part of a package of reforms.

## Policies and Regulations

Nepal has the National Water Supply and Sanitation Policy and the Kathmandu Valley Water Supply and Sanitation Strategy. The policy includes full cost recovery for urban water supplies, integrating sanitation with water supply, and sustainable conjunctive use of surface water and groundwater. A regulatory commission is being prepared as a precursor to the introduction of PSP in water supply management in Kathmandu Valley. The need for an independent regulator to ensure, among other things, the autonomy of the water utility is evident from the fact that the Government has changed the general manager of the Nepal Water Supply Corporation about a dozen times in 19 years. **The NGO Forum for Water Supply and Sanitation in Kathmandu Valley has been successful in raising public awareness of water supply and the reforms taking place.**

## Private Sector Participation

A condition for development agency support to the \$464 million Melamchi Water Supply Project was PSP in managing water supplies in Kathmandu Valley. Over a period of 4 years, with World Bank and consultant support, attempts were made to prequalify contractors for a lease contract of 10 years. Due to the prequalification criteria being too strict, and the terms of the lease (investments were required), there was inadequate competition. World Bank eventually withdrew, and ADB is now helping prepare a 5-year management contract. The attitude of the public toward PSP is mixed. Most people think that there would be a big increase in the tariff and the poor would find it difficult to pay for services. Others think that water supply services would improve with PSP.

## Tariffs

The average domestic tariff is around \$0.08/m<sup>3</sup>. The average nondomestic tariff is also around \$0.08/m<sup>3</sup>. **Most nondomestic water users (hotels and factories) take groundwater for free.** Total revenue from tariffs is a little short of meeting O&M costs. **Due to intermittent water supply, most water meters have been disconnected.**

## Service Levels

The five urban centers of Kathmandu have a combined population of 1.1 million. It is estimated that 52% of households have individual connections to the piped supply, and another 30% get water from public taps. The remaining 18% of households get water from wells, stone spouts, springs, and streams. Perhaps 2% of the people get a 24-hour supply during the rainy season. Virtually no one gets 24-hour piped water during the dry season, when most people receive piped water for one hour every second day. **Despite severe intermittent supply, more than 5,000 new connections continue to be made each year.** People relying on standpipes often have to rise from bed in the middle of the night to wait for water, but they get the water for free. Per capita consumption is estimated at 56 l/c/d. The cost of intermittent water supply, apart from storage and pump capital costs, is reflected in power bills, which are 20 times higher than water bills. In most other Asian countries, power bills are only three or four times higher than water bills. NRW is estimated at about 40% of production.

## Sanitation

About 22% of households are connected to the sewerage system. The others rely on septic tanks (70%), and a few rely on latrines. Private operators are involved in desludging septic tanks. There are four wastewater treatment plants, with a combined capacity of about 40,000 m<sup>3</sup> per day, but three of the four are not working. The untreated discharge of waste has badly polluted water bodies and affected the religious use of holy waters.

## Civil Society Comments

*Responses to water scarcity have been ongoing for 25 years. The current daily water demand is estimated at 177,000 m<sup>3</sup> per day, but supply varies from*

*88,000 m<sup>3</sup> per day during the dry season to 132,000 m<sup>3</sup> per day at other times. Water scarcity is indeed Kathmandu's perennial crisis. Residents deem themselves lucky if they get water for a couple of hours every 2 or 3 days. Women have to wake up in the middle of the night to wait for water in the pipes. The efforts of state agencies have been guided by the incentives for continued augmentation of supply. A \$464 million transbasin scheme supported by six funding agencies is being developed, but this could take at least another 7 years. Water markets have emerged. Water sellers using private tankers are active, and sales of bottled water are high. An 8 m<sup>3</sup> tanker supply costs around \$12. A liter of bottled water costs about \$0.25. Activists, consumer forums, journalists, and academics have pointed to management flaws and questioned the need to develop new supplies by demonstrating that with improved management, existing supplies could meet needs. For example, at least 40% of production is lost. Only 75% of the connections have meters, and only half of these are working. The present tariff is too low to cover operating costs. The resulting subsidies allow the Government to interfere. **The increasing block tariff system does not help the poor, because 48% of the poor are not even connected to the system, and those on a shared connection get penalized for high consumption.** To ensure that the concerns of the poor are adequately addressed by sector reforms, which include PSP, the NGO Forum for Water Supply and Sanitation in Kathmandu Valley closely participates in the sector reform process. This group collects and disseminates information relating to sector reforms to various stakeholders, including communities, municipalities, civil society groups, NGOs, and individuals. **Documents are being translated from English into Nepali, and a poverty map is being prepared that will identify poor community blocks or clusters in Kathmandu Valley. This will allow the future private operator or the Government to make a plan for increasing service or providing subsidies in an easy manner.***

## Author's Comments

**The main lesson to be learned is that competition and keeping the contract simple are needed for PSP. The advent of the NGO Forum for Water Supply and Sanitation in Kathmandu Valley has been very useful in raising public awareness. Political stability and commitment will be required to see the reform program implemented (see case study in Appendix 2).**

## KUALA LUMPUR (MALAYSIA)

### Water Resources

It is a state responsibility to develop and manage the water supply. In line with this, the state of Selangor is responsible for the water supply of Selangor. In 1999, the Selangor Water Management Board was formed to regulate water resources management. There is emphasis on conserving water, preserving catchments, and controlling water pollution. Kuala Lumpur relies entirely on surface water for its water supplies. It is planned to transfer water from the neighboring state of Palang to Kuala Lumpur via a tunnel that is 5 meters in diameter and 45 kilometers long. This will provide 2,260,000 m<sup>3</sup> per day of water.

### Policies and Regulations

With the corporatization of the Selangor Water Supply Department into the Selangor Water Management Corporation Ltd. (SWMC), in March 2002, a senior government official was appointed regulator. All major policies are announced through the media, and the public is invited to comment. Increases in water tariffs are discussed in public forums. *There is a special day each month for the public to visit the regulator and the water company to communicate directly with staff involved in water service provision.*

### Private Sector Participation

Three private companies have concession agreements valid for 20–25 years for providing treated water to SWMC, which distributes the water to consumers. Two of the private companies are listed on the stock exchange. There are now plans to merge these companies with SWMC to create joint-venture companies that would be responsible for water supply from source to consumer. The private companies made annual profits (in 2001) from their water businesses that ranged from \$10 million to \$47 million. However, the water distribution company (SWMC) has faced annual deficits of around \$100 million. In 2001, it paid \$48.6 million under BOT contracts for treated water sent to Kuala Lumpur. There are no water vendors in Kuala Lumpur.

### Tariffs

A tariff increase was instituted in 2001—the first tariff increase in 10 years. Tariff policy and the tariff structure are designed to provide sustainable development, efficient use, and conservation of water resources. Tariff revenue is generally sufficient to cover

only O&M. Government subsidies amount to \$270 million annually and fund all capital works. Ability and willingness to pay the tariff are calculated, and the tariff (currently \$0.30/m<sup>3</sup>) is based on a 2.5% of mean household income standard. The connection fee is nominally priced at \$13 for domestic consumers. All consumers are metered, and collection efficiency is above 95%. The average domestic tariff is \$0.19/m<sup>3</sup> for normal use, up to 35 m<sup>3</sup> per month, and nondomestic consumers pay \$0.51/m<sup>3</sup>.

### Service Levels

One hundred percent of the people receive 24-hour piped water through individual connections. There are no public taps in the city. *Per capita consumption is around 132 l/c/d.* There is a client charter that spells out what consumers can expect in terms of service. NRW is estimated at 43% of production.

### Sanitation

About 80% of the city's residents have access to waterborne piped sewerage. The rest have septic tanks.

### Civil Society Comments

*Water quality at the tap is not good. Pipes should be replaced. Privatization is an issue, because it affects the poor and their water security. There is a need to reduce NRW, focus on reducing water demand, and look at alternative sources with a view to optimizing water use. When managing water resources, land, economic, and social aspects should be considered. Frameworks and regulations are needed.*

### Author's Comments

*While service levels are impressive, the relatively low tariff encourages high consumption, which has led to the need for the interstate transfer of more water. One has to ask how long the Government can continue to highly subsidize a sector that still has work to do to show that it is efficiently managed. The decision to bundle responsibility for operations from source to consumer is admirable.*

## MANILA (PHILIPPINES)

### Water Resources

About 98% of the official water supply comes from surface water sources. The mean annual rainfall in the main Angat watershed is around 3,000 millimeters. The Umiray–Angat Transbasin Project was completed in March 2001. It increased the total amount of water available to the Metropolitan Waterworks and Sewerage System (MWSS) by 50%, to about 50 cubic meters per second (cms). The multipurpose water source at Angat is also used for hydropower generation and irrigation. MWSS has exceeded its firm allocation of 22 cms. The National Water Resources Board has conditionally agreed to transfer from irrigation to drinking water an additional 15 cms of the Angat yield. This is subject to regular negotiation with the National Irrigation Administration. There are various scenarios under consideration for meeting Manila's future water demands, and some reforestation of one of the smaller catchments is ongoing.

### Policies and Regulations

The basis for economic regulation is the concession agreements between MWSS and Manila's two private operators. Tariffs may be adjusted (i) for inflation, (ii) to offset the financial consequences of unforeseen events out of the control of the operators (extraordinary price adjustments), and (iii) to counter the effects of certain forecasts or assumptions, such as demand growth, per capita consumption, operating efficiencies, or technology improvements, which severely hamper the finances of the operators (rate rebasing). In addition to tariff regulation, MWSS undertakes operations regulation (operator performance) and customer service regulation. *There is no official government policy that is used as the basis for the contracts or regulation. Essentially it is regulation by contract.*

### Private Sector Participation

In August 1997, the operations of MWSS were turned over to two private entities through concession contracts. The service area was divided into two zones, one east and one west. Manila Water Company Inc. (MWCI), which is responsible for the east zone, is a consortium led by Ayala Corporation, together with Bechtel, United Utilities, Mitsubishi Corporation, and BPI Capital Corporation. Maynilad Water Services Inc. (MWSI), a consortium led by Benpres Holdings with Ondeo Services, operates in the west zone. This is the largest "privatization" of water in the world (see the case studies in Appendix 2).

### Tariffs

In 2001, the average domestic tariff was \$0.12/m<sup>3</sup>, and the average nondomestic tariff was \$0.16/m<sup>3</sup>. The revenue from these tariffs only covered 82% of O&M expenditure. Annual capital expenditure was only \$16.8 million. Tariffs in the two concession areas are in fact very different, one being about 65% more than the other, because of debt service liabilities. Throughout 2001 and 2002, the concessionaires sought tariff increases. In October 2002, average tariffs were adjusted. MWCI now charges 17 pesos/m<sup>3</sup> (winning bid in 1997 was just over 2.3 pesos/m<sup>3</sup>), and MWSI was authorized to charge 26.7 pesos/m<sup>3</sup> (its winning bid in 1997 was nearly 5 pesos/m<sup>3</sup>). MWSS, prior to PSP, charged roughly 8.78 pesos/m<sup>3</sup>. On 10 December 2002, MWSI announced that it was pulling out of its concession contract. This action was taken when MWSS (the regulatory body) failed to agree to MWSI's request for a 31 pesos/m<sup>3</sup> tariff and a moratorium on concession fee payments for the next 5 years. An arbitrator will determine damages to either party.

### Service Levels

It is estimated that only 58% of the 12.4 million people in the service area of MWSS receive piped water. Most of the rest of the people either rely on wells or purchase water from SSWPs. About 88% of those served with piped water by the concessionaires receive a 24-hour supply. Average NRW is around 62% of production. Staff per 1,000 connections averages 4.1 for the two concessionaires. Both operators have launched special programs to serve the urban poor, but only 75,000 new domestic connections were made by the end of 2001.

### Sanitation

Only 7% of the people in the service area have access to sewerage. Most rely on septic tanks, with effluent being discharged to storm drains. The existing system is very old and requires rehabilitation. In 2000, MWSI reported cleaning 648 septic tanks, and MWCI cleaned 964. The concessionaires have only just begun to invest in sanitation facilities.

### Civil Society Comments

*Aside from not having safe drinking water, most of the poor, particularly those living in slums or relocation areas, do not have access to clean water. Being poor, these people spend more time ensuring that water is available. Water pollution is another serious problem. Inadequate drainage and sewerage systems*

contribute to the problem, and it is made worse by rapid industrialization and urbanization. Wastes are generated that pollute bodies of water and eventually cause flooding. It is time to replace old pipes, treat wastewater, and make a commitment to distributing water to all households. In these ways, illegal connections and distribution can be eliminated. The Government and the business sector, in consultation with the people, should design a sound water resources management policy that responds to the immediate needs of all residents. There should be a decentralized structure so that small communities can benefit. There should be a continuing public awareness and education campaign promoting the conservation of water.

### Author's Comments

The twin benefits of “privatization”—greater investment and efficiency improvements—if measured by piped service coverage and NRW, do not seem to have been realized in Manila. Part of the reason for this could be the delays in effecting tariff increases. In practice, high-ranking government officials, not the MWSS (the regulator), made the decisions that caused those delays. The lack of a clearly articulated government policy has affected the plight of the urban poor in not getting connected to piped water.

## OSAKA (JAPAN)

### Water Resources

The Yodo River, including Lake Biwa (the largest lake in Japan), is Osaka's only source of water. Three intakes and three water treatment plants are used to tap this source. Large amounts of groundwater have been used for industrial purposes in the past, but this created heavy ground subsidence, causing flooding at high tide. Groundwater use has now been controlled. There is concern about preserving the quality of water in the Yodo River, and the Yodo River Water Pollution Control Committee has been formed.

### Policies and Regulations

The Osaka Municipal Waterworks Bureau is responsible for the water supply of Osaka. Under the Local Public Enterprise Law, it operates with a special account for each business. Administrative costs, however, can be borne by the general account of the city. Under the Waterworks Law, water users must be supplied with information concerning water quality inspections, implementation schemes, water rates, management

conditions, etc. Water tariff decisions are guided by a need to be impartial and reasonable in the light of appropriate cost under efficient management.

### Private Sector Participation

The Revised Waterworks Law (April 2002) now allows water treatment services, including management and operations, to be entrusted to a third party, which means that deregulation for the entry of the private sector in Japan has just started. Nothing specific has yet been planned for Osaka, although the city allows the private sector to provide some services as a means of securing efficiency.

### Tariffs

In Osaka, a progressive rate system is adopted by customer class along with the water rate system. The system has the effect of restricting demand and promoting the reasonable use of water. The average domestic tariff is about \$0.94/m<sup>3</sup>, and the average nondomestic tariff is about \$1.90/m<sup>3</sup>. Total annual revenue from tariffs in 2001/2002 was around \$644 million, whereas O&M costs were \$698 million and capital expenditure was \$313 million. Municipal bonds supplied most of the financing.

### Service Levels

Every household in Osaka (population: 2.6 million) is connected to a 24-hour supply of piped water. Average domestic consumption is 256 l/c/d. NRW is estimated to be just 7% of production volume.

### Sanitation

Almost every household (99.9%) has piped sewerage. There are 12 sewage treatment plants treating 2,844,000 m<sup>3</sup> per day of sewage. About \$600 million per year is spent on sanitation, drainage, and flood management.

### Civil Society Comments

*Japanese people purchase expensive bottled water (\$2.50 per two-liter bottle) because they are concerned about the influence of microtoxic chemicals on the human body. These concerns are heightened in summer, when Lake Biwa has toxic plankton that make the water smell and taste foul. Some people feel that the water rate is too high because too much money is spent on purification plants. These individuals believe that it would be better to clean up the rivers and lakes.*

## Author's Comments

Osaka seems to provide its citizens with excellent water supply service and is in general independent from the central Government. A reasonable balance of water price and consumption seems to have been achieved.

## PHNOM PENH (CAMBODIA)

### Water Resources

The main water utility operator in Phnom Penh, the Phnom Penh Water Supply Authority (PPWSA), sources its water from the Mekong, Tonle Sap, and Bassac rivers. Total production capacity from its three intakes and treatment plants is 180,000 m<sup>3</sup> per day. Cambodia is one of the member countries (together with Lao People's Democratic Republic, Thailand, and Viet Nam) of the Mekong River Commission, established in 1995.

### Policies and Regulations

The Government has yet to finalize and fully institutionalize the Draft Urban Water Supply Policy and Guidelines, but the political framework for water supply centers on financial autonomy of public utilities, cost recovery, PSP, protecting the poor, and providing regulatory mechanisms. Tariffs will cover all costs and ensure efficient bill collection. A block tariff will be set at less than the unit cost for small water user groups and will be set higher than the average cost for large volume water consumers. The regulatory body proposed would have five to seven members, who would be appointed by royal decree for a fixed term of 5 years. This body's main functions would be to promote efficiency, prepare the mechanisms for tariff revision and tariff control, ensure compliance with quality standards, and issue licenses to operators.

### Private Sector Participation

PPWSA is the only official operator in Phnom Penh. It was given the general status of public enterprise in 1996 and has since that time operated with autonomous administration and financing. Some private water networks supply water to households. They pump water directly from the river and supply raw water, mostly without treatment. The price of water supplied by the networks is higher than that supplied by PPWSA, but network connection fees are much less. Despite this fact, after PPWSA introduced the policy of installment payments for house connections, many

low-income residents in the vicinity of the rivers have been encouraged to choose PPWSA's higher quality-treated water. Some people resell PPWSA water to households without connections. PPWSA runs quite efficiently on 5.4 staff per 1,000 connections.

### Tariffs

Water charges are based on the type of user and the volume consumed. The average domestic tariff is \$0.22/m<sup>3</sup>, and the average nondomestic tariff is \$0.29/m<sup>3</sup>. Tariff revenue covers 2.2 times O&M expenses. All connections are metered. Capital expenditure is about \$15 million per year, sourced mostly from loans from international development agencies, but also partly from tariffs.

### Service Levels

At the end of 2001, there were 62,970 domestic service connections in a city service area with 532,130 people. That meant 83% of the population in the inner city was served with piped water. Since the population of Phnom Penh is greater than 1 million, however, service coverage for the whole city is a little under 50%. *All those served by PPWSA have a 24-hour supply. Annual growth in new connections is close to 11%. Average household consumption is about 23 m<sup>3</sup> per month, or about 110 l/c/d. NRW is estimated at 26% of production.*

### Sanitation

The majority of households have access to flush toilets connected to sewerage or septic tanks. There is no treatment of sewage after collection. All sewers discharge directly into either the river or low-lying water areas. The Wastewater Cleaning Authority of Phnom Penh is responsible for transportation and disposal of industrial wastewater, and sludge from septic tanks and water treatment plants. They charge \$50–76 per 5 m<sup>3</sup> load. Flood protection facilities in the city consist of outer and inner ring dykes, 10 pumping stations, the sewer network, and drainage channels. Most of these facilities were constructed many years ago and are now in urgent need of rehabilitation.

### Civil Society Comments

*According to PPWSA, it serves 99% of the population in the four urban districts of Phnom Penh, which implies that 56.5% of the city's one million people have access to PPWSA water. This was achieved with support from the international community and development*



agencies. *Even though PPWSA's efforts are successful, it is still not responsive to consumer demands in the suburbs, especially those of the poor communities. The Government approved a water policy in August 2000 to encourage PSP in all areas of the service provision contract. PSP, however, will challenge the water sector of the Government, because there is a lack of laws and regulations pertaining to this. It is also thought that investors may be deterred by too much bureaucracy and even corruption in government. There is a need to set a clear policy that establishes water price and allows connection fees to be paid in several installments. There is also a need to have special policies for poor communities. Even where there are illegal settlements, a water point can be provided to contribute to community development that is supported by NGOs. The water supply is just enough for the people in the city. Those people living elsewhere still use wells that lack sanitation and can cause disease. The cost of PPWSA water is beyond their means, which is why they choose to use well water. The people living in the suburbs and illegal settlements of Phnom Penh complain that they want to use clean water but have no ability to pay.*

### Author's Comments

*PPWSA, under inspired and disciplined leadership, is one of the better run utilities in the Asian region. Attention needs to be given to expanding the service area and service coverage density without sacrificing the quality of service (24-hour supply) or unnecessarily increasing the price of water. This example shows that poor people can and will pay for good water service.*

## SEOUL (KOREA)

### Water Resources

Some 97% of the water supplied to the 10.3 million people in Seoul comes from the Han River via the Paldang reservoir (some 25 kilometers from the city). Two raw water charges are levied. A water use fee of \$0.15/m<sup>3</sup> and a maintenance charge of \$0.10/m<sup>3</sup>. Recently, there have been problems associated with continuous degradation in the water quality of the Han River, due to livestock farms and urbanization. *Seoul is about to move to advanced water treatment systems, using ozone and granular activated carbon, to improve water quality.* The other 3% of the water supplied comes from groundwater. There are some laws that require water reuse facilities in bathhouses and rainwater collection facilities that catch runoff from large roofs, like those of gymnasiums.

### Policies and Regulations

Water rights rest with the Korea Water Resource Corporation. The Seoul metropolitan government deals with the waterworks, the water production, supply and distribution, water quality monitoring, water tariff decisions, and water levies. The water tariff must be approved by the Ministry of Budget and Economy and passed by the local assembly. Instead of a regulatory body, the Board of Audit and Inspection checks the managerial results. The spread of *the Internet played a significant role in enhancing the transparency of the city administration. In particular, introducing an on-line civil petition system and asking public servants for information have helped.*

### Private Sector Participation

Recently, many people have said that it is time for the Seoul metropolitan government to introduce "privatization" or private committed management in the waterworks sector to enhance management efficiency and public credence. Seoul's waterworks are self-regulating. PSP began in the sewage sector in 1999, and this has been successful. The Ministry of Environment is pushing local governments to implement PSP to reduce personnel and streamline organizational structures. Seoul worries about PSP because workers might strike.

### Tariffs

In 2001, the total revenue from tariffs was \$538 million, and O&M expenditure was \$308 million. Capital expenditure was \$650 million. This meant a government subsidy of \$420 million was required. The average domestic tariff is now \$0.46/m<sup>3</sup>, and the average nondomestic tariff is \$0.55/m<sup>3</sup>.

### Service Levels

It is estimated that 99.98% of the residents of Seoul enjoy 24-hour access to piped water in their homes. *Average domestic consumption is 205 l/c/d.* Since the people distrust the quality of tap water, they boil it or filter it, and about 20% of the people buy and drink bottled water.

### Sanitation

Some 98.5% of Seoul has sewerage. Mountainous areas, where sewerage is not appropriate, are not connected to this system. Roughly 5.5 million m<sup>3</sup> per day of sewage are treated in four large sewage

treatment plants. There is an active program of sewer renovation. Seoul has spent \$1.1 billion on sewers and sewage treatment in the last 5 years.

### Civil Society Comments

*A poll showed that less than 3% of the people in Seoul drink tap water, because they are suspicious of water quality. It is necessary not only to protect the water source but to see that the treated water does not get contaminated in the distribution system. Advanced water treatments, like ozone treatment and the use of granulated activated carbon, may be necessary, but there is a need to learn from the lessons of the earlier installations of 18 advanced water treatment plants that are inefficient, because of rushed implementation. The city needs to regulate the cleaning of water storage tanks on roofs. The Seoul metropolitan government should work with bodies such as the Water Research Institute of Seoul and the International Water Association to improve its services.*

### Author's Comments

The service is excellent, but a precious resource is wasted when consumption is higher than necessary. This translates into higher costs. A better balance of water price and water conservation could be considered. Reducing pollution at the source rather than pursuing advanced water treatment might help lower costs.

## SHANGHAI (PEOPLE'S REPUBLIC OF CHINA)

### Water Resources

The urban area of Shanghai contains about 10.5 million people. Two major rivers bounding the city provide most of the water. But pollution of these sources causes some concern. The Government encourages wastewater reuse among industries, and at the moment about 80% of industrial wastewater is supposed to be reused. Groundwater has been overexploited in the past, which has caused minor subsidence in the city. This is presently controlled through artificial recharge.

### Policies and Regulations

In the PRC, there are the National Tariff and Management Guidelines and the Regulation on Urban Water Supply. To reflect the special conditions in Shanghai, there is the Shanghai Water Management

Regulation. The Shanghai Water Bureau is responsible for establishing, approving, and inspecting all policies, regulations, plans, and permits. Eight financially independent enterprises have been established to take care of all operations, including investments, construction, and O&M. Tariff policy is based on the principles of cost recovery, reasonable profit, compliance with quality, water saving, and fair cost allocation.

### Private Sector Participation

There are 158 water supply companies in Shanghai. Pudong-Vivendi is the only large company in which the private sector is involved. Vivendi has a 50% stake in this entity. This is the first time in the PRC that the private sector has been involved in both the production and distribution of water. The cost of raw water and O&M is different from company to company. In 2001, 121 companies (including all the large ones) were profitable. The 37 companies that were not profitable were all in townships.

### Tariffs

In the last 4 years, revenue from water tariffs covered O&M costs but not investment costs (around \$112 million in 2001), which were covered by government grants. The domestic water tariff is charged at a flat rate, equivalent to \$0.12/m<sup>3</sup>. The wastewater tariff is about \$0.08/m<sup>3</sup>. Tariffs are collected in three ways. The first way involves meter reading by the utility staff. Bills, which are paid at banks, are then sent to customers. The second way relies on a remote water meter reading system, and bills, which are also paid at banks, are again sent to customers. The third way involves the use of prepaid cards that open control valves and enable customers to buy certain amounts of water.

### Service Levels

In Shanghai, 24-hour service is provided to 100% of the population through piped supply to the home. The last public tap was eliminated in 1999. Water consumption is around 251 l/c/d. The average leakage rate is about 17%.

### Sanitation

About 68% of the wastewater generated in Shanghai is collected in the sewerage system. The city is, however, subject to flooding, especially when a storm and high tide coincide.

## Civil Society Comments

*A polluted raw water source, old pipes, and secondary use contribute to poor water quality. Advanced water treatment, including the use of ozone and granulated activated carbon, is suggested as one of the solutions. Operating costs exceed income, so the Shanghai Water Supply Company must raise tariffs, if it is to improve water quality. Optimizing O&M in water treatment plants would also help. A new intake at the Yangtze River estuary should be considered. Sewerage should be brought under one agency. Legislation and regulations for wastewater need to be developed and then enforced. It would be better to amalgamate smaller water operators with larger operators. For access to new water sources, Shanghai may need to provide development assistance to regions outside its borders.*

## Author's Comments

High service levels reflect disciplined development and management. The grant contribution by government to investments is now changing. The national Government is now encouraging water utilities to fund both water supply and wastewater investments directly from increased tariffs.

## TASHKENT (UZBEKISTAN)

### Water Resources

Tashkent has two sources of water: a surface source brought to the city by the Bozsu Canal and a groundwater source in the Chirch Valley. Groundwater rights are given by the Ministry of Geology and surface water rights by the Ministry of Agriculture and Water Resources. Priority over other uses is given to domestic water supply. There are adequate supplies for the long term.

### Policies and Regulations

Water management is guided by the 1993 On Water and Water Use Law. Regulation is done through various decrees from the Cabinet of Ministries. One such decree, approved in May 1996, is a regulation that provides for installing water and gas meters in homes and social and cultural institutions. Resolutions from the Mayor of Tashkent have also been approved. Tariffs are guided by the city administration and the State Unitary Enterprise (Suvsoz) and are very dependent on the price of relevant goods (such as chlorine) purchased from abroad. The Anti-Monopoly Committee, under the city administration, regulates tariffs.

Local news agencies pay great attention to the transparency of tariff policy.

### Private Sector Participation

Tashkent's water supply system operates without PSP. All water is produced and distributed by Suvsoz. Operation is through 11 independent district water departments, each coming under Suvsoz. Following a decree from the Cabinet Ministers in March 2002, Suvsoz will look nevertheless at the possibility of joint ventures with the private sector.

### Tariffs

Suvsoz is a self-financing enterprise and a natural monopoly at the same time. There is a flat unified water tariff in the city equivalent to about \$0.02/m<sup>3</sup> and a sewerage tariff equivalent to about \$0.01/m<sup>3</sup>. Bulk consumers pay around \$0.05/m<sup>3</sup> for water and \$0.02/m<sup>3</sup> for sewerage. According to regulations, the tariff will cover the cost of operations, including major repairs and amortization. It appears that in 2001 revenue covered both O&M expenses and capital expenses. Financial assistance is sought to replace materials and equipment that are still in service long past their useful lives.

### Service Levels

Tashkent's population is roughly 2.1 million. All, except for 66,700 people using public taps and 5,400 people using wells and transported water, receive a 24-hour supply of piped water in their homes. In 2001, the irrigation of household plots and the lack of water meters resulted in a domestic water consumption of 328 l/c/d. Official quotas for consumption are supposed to range from 50 l/c/d for street taps to 330 l/c/d for higher-income households. NRW has been estimated at 27% of production volume.

### Sanitation

The total capacity of urban sewage treatment plants is greater than 1.9 million m<sup>3</sup> per day. The centralized sewerage system serves 85% of the population of Tashkent. The balance use septic tanks.

### Author's Comments

Low tariffs and high consumption are evident, but the service is very good and there are not yet any water resources constraints. Some attention could be given to getting the 66,700 people using public taps directly connected to the system.

## ULAANBAATAR (MONGOLIA)

### Water Resources

Ulaanbaatar uses groundwater exclusively, because nearby rivers freeze up in winter. There are 169 wells in four separate well fields, providing a total of about 189,000 m<sup>3</sup> per day. Production wells are 18–54 meters deep.

### Policies and Regulations

There are plans for creating economic regulation, but no steps have been taken. Instead, government policy spells out some objectives. These objectives include regularizing consumption, reducing water wastage, improving financial capability, installing water meters, and fixing tariffs for long-term sustainable development.

### Private Sector Participation

In Ulaanbaatar, the private sector (through some 30 companies) is involved in the rehabilitation of buildings and the maintenance of pipelines. It also distributes water through kiosks in the *Ger* (informal and tented) settlement areas. The Utility of Water and Wastewater Treatment Company, which is a fully state-owned enterprise, manages the distribution of piped water. There are 10 bottled water companies operating in the city. Some have their own wells and some treat water from the public system.

### Tariffs

The average domestic piped water tariff is \$0.19/m<sup>3</sup>, and the average nondomestic piped water tariff is \$0.30/m<sup>3</sup>. Total annual revenue from tariffs in 2001 was nearly \$7 million, whereas O&M costs were almost \$5.8 million. But annual capital expenditure in 2001 was just over \$2.8 million, which means that there is some subsidy from the Government.

### Service Levels

*Ger* area residents, who are 48% of the Ulaanbaatar's 743,000 population, are supplied with 1,600 m<sup>3</sup> per day of water through 43 tankers and 283 kiosks. The water consumption of *Ger* area

residents is only 5.3 l/c/d. Apartment buildings pay for water based on 150 l/c/d, but actual water use according to the meters is 300–500 l/c/d. NRW is estimated at 35% of production. The Utility of Water and Wastewater Treatment Company does not have direct contact with customers. It goes through apartment managers, who buy and resell its water. Those on piped water get a 24-hour supply.

### Sanitation

Sewerage serves 48% of the population. The remainder have latrines (*Ger* areas) and septic tanks. Small industries have septic tanks. Flooding is one of the more significant socioeconomic problems for the people of Ulaanbaatar. A special enterprise owned by the municipality was created in 2001 to maintain the drainage system. A master plan for capital works improvements has been prepared. Funding is sought.

### Civil Society Comments

*The city has about 640,000 people and almost half live in the Ger area, where water is sold at kiosks that are supplied by tankers. Water shortages occur due to a lack of tankers, the freezing of outlet pipes, and the absence of kiosk attendants. Residents of apartments have a much more convenient supply. The distribution of water is very unequal, as Ger area residents get 5 l/c/d and apartment residents get more than 300 l/c/d. In terms of water quality, it is hard to say that residents are supplied with good water. Improper pipe jointing (old with new) is one reason for water contamination. There is proven survey evidence of health hazards due to uncontrolled pollution of the river Tuul. It is suggested that aeration of waters in rivers by creating artificial turbulence with rocks could help. In recent years many buildings have been constructed, but there seems to be no planning. Individual water metering should be introduced. Promoting consumer awareness and changing attitudes toward water use would be more effective than policy reform.*

### Author's Comments

It is time for the *Ger* area people to get a piped water supply at affordable prices. There is great inequity in water supply service in Ulaanbaatar.

## VIENTIANE (LAO PEOPLE'S DEMOCRATIC REPUBLIC)

### Water Resources

The Mekong River is the source of water supply for Vientiane. Water quality is reasonable, except during the rainy season, when higher turbidity requires the use of more chemicals. The Government has, however, begun to set up watershed management teams. The Government's policy is to minimize water loss or waste; preserve, care for, and protect water resources; and ensure the efficient and effective use of water.

### Policies and Regulations

The Government has defined its policy on the management and development of the water supply sector, and this includes the devolution of responsibility for water supplies to local governments. The entity responsible for water supply and sanitation in Vientiane is called Nam Papa Lao. The Prime Minister has established a water supply regulatory board to assume decision-making functions and give advice on future directions. An appropriate regulatory framework is being established to allow for the possibility of PSP in the water supply system.

### Private Sector Participation

Up to now, PSP has not occurred in the water supply sector in the Lao People's Democratic Republic. It is feared that PSP may lead to higher tariffs. The Nam Papa Lao staff per 1,000 connections is 10.5.

### Tariffs

The tariff policy is to work toward full cost recovery, considering the constraints of affordability and willingness to pay. The current tariff structure is designed to help reduce poverty, and as a consequence total revenue from tariffs does not quite cover O&M costs. The balance and capital investment are subsidized by the Government. The average domestic tariff is around \$0.02/m<sup>3</sup>, and the average nondomestic tariff is around \$0.06/m<sup>3</sup>. Collection efficiency is about 94% annually. Capital expenditure is about \$2 million per year.

### Service Levels

Piped water supply coverage in Vientiane is about 65% (36,121 domestic connections at the end of 2001), and about 50% of those served receive a 24-hour supply. NRW is about 28% of production.

There are no public taps in Vientiane. Those not served by the piped supply mostly use shallow wells, but some use deep wells, and a few take water directly from the river. Bottled water is readily available, and about 40% of the people buy it. Per capita consumption from the piped supply is estimated at 197 l/c/d. There are no water vendors in Vientiane.

### Sanitation

No urban centers in the Lao People's Democratic Republic have a comprehensive sewerage system. The small-bore sewerage system recently installed in a small part of Vientiane is not functioning properly, because the treatment facilities are blocked by solid waste. Most households have flush latrines connected to septic tanks. Some effluent is diverted into storm-water drains. There are some attempts by private contractors to desludge septic tanks, but these attempts are uncommon.

### Civil Society Comments

*Water quality in the Mekong River varies with seasonal rainfall, and river water becomes especially turbid (2,000 milligrams of suspended solids per liter of water) during the rainy season. Dependence on one water resource is not suitable to supply safe water on a stable basis to a major city. It is therefore recommended that raw water from the Nam Ngum River be used. There is enough water presently to supply most of Vientiane, but from time to time the water pressure is low, which has led people to install pumps and storage tanks. This situation results from the very understandable tendency in developing systems to overstretch distribution capacity by making too many connections and extending the systems over long distances and to higher topographical levels than the natural head losses will sustain. The number of buildings is increasing faster than the water supply system. In some cases water is wasted, especially in large buildings where it is free, such as those used by state organizations, universities, the military, the police, etc. The cost of water production is 727 kip/m<sup>3</sup>, but water is sold at only 550 kip/m<sup>3</sup>. Bottled water factories produce water that is below specified health standards. There are 147 drinking water factories in the Lao People's Democratic Republic, but only 43 are licensed. In Vientiane there are many businesses digging wells in areas where the network does not reach.*

## Author's Comments

It is sad to see Nam Papa Lao deteriorating in terms of its financial sustainability. High water consumption would indicate that the tariff for most of the population is too low. Compare the domestic water tariff in Phnom Penh (\$0.22/m<sup>3</sup>) with that of Vientiane (\$0.02/m<sup>3</sup>).

## Part 2 Summary Findings of the Water in Asian Cities Study

Table A1.1 gives a comparison of key performance data for the water utilities studied. It is interesting to note that, apart from the staff per 1,000 connections category, the performance of the PSP concessions in Jakarta and Manila fall below many of the public utilities.

Some of the more interesting findings from the study are summarized below.

### Private Sector Participation

Chengdu, Jakarta, Kuala Lumpur, and Manila have PSP in water supply, but the main reasons for PSP (efficiency, investments, and autonomy) have not been manifested to date. Phnom Penh is an example of a city where there is a very good public utility.

### Policy Matters

Governments are only too happy to prepare policies for development agencies but are often not held accountable for implementing them. The people rarely see or know about these policies. Transparency is needed.

### Regulation

Regulators in Jakarta and Manila are only contract administrators. Although actions have been taken in Colombo, Kathmandu, and Kuala Lumpur, apart from tariff regulation in Chengdu and Shanghai there are no independent regulators in place among the study cities.

### Tariffs

The PRC has National Tariff and Management Guidelines that are enforced. Phnom Penh has strong tariffs, too. But most elsewhere there continues to be political interference in tariff setting. Domestic tariffs in Delhi, Tashkent, and Vientiane equate to less than \$0.03/m<sup>3</sup> for a monthly consumption of 20 m<sup>3</sup>.

## Pollution

There is more and more pollution of the sources used for drinking water. There is also heavy pollution of rivers downstream of cities.

## Subsidies

It is hard to argue with water supplies that provide 100% piped water coverage 24 hours a day to homes. But Hong Kong had the largest annual operating subsidy (\$743 million) and Seoul the largest debt (\$583 million).

## Service Levels

Intermittent water supply is the norm in South Asia, and to a large extent low coverage with piped water is prevalent in Southeast Asia. Intermittent water supply coping costs for pumping, storage, and treatment range from \$50 to \$150 per year per household. The urban poor who are not served and use vended water pay five times more than those connected to piped water, but they use only one fifth the volume.

## Awareness

Perhaps the most important finding is that there is limited awareness among civil society (in this case represented by journalists, NGOs, and academics) regarding the problems and solutions facing the sector. This is illustrated in the civil society comments throughout this appendix. While some comments are clearly appropriate, others through ignorance of the subject are just as clearly inappropriate. Much more awareness among all stakeholders is needed. Governments will not reform themselves without due pressure from civil society.

## Small-Scale Water Providers

These entrepreneurs have been ignored for too long. In cities like Jakarta and Manila, they account for more revenue turnover in water sales than the formal utilities. It is time to carefully evaluate what these providers mean to the water sector, especially in terms of service to the urban poor.

## Non-Revenue Water

This lost water (due to leakage and illegal use) ranges from 30% to 60% of production in most cities studied. The worst are under private sector operators. Osaka (7%), Shanghai (16%), Chengdu (18%), and Phnom Penn (23%) are the best.

Table A1.1 Comparison of Utility Performance Data (2001)

| City                   | Piped Water Coverage (%) | 24-Hour Supply Continuity (% of Area) | NRW (%) | Staff per 1,000 Connections | O&M Cost versus Revenue (2001) | Annual Capital Expenditure (\$ million) |
|------------------------|--------------------------|---------------------------------------|---------|-----------------------------|--------------------------------|---|
| <b>PSP Concessions</b> |                          |                                       |         |                             |                                |   |
| Jakarta                | 51                       | 92                                    | 51      | 5                           | 0.80                           | 29                                      |
| Manila                 | 58                       | 88                                    | 62      | 4                           | 1.01                           | 17                                      |
| <b>Public Sector</b>   |                          |                                       |         |                             |                                |   |
| Chengdu                | 85                       | 100                                   | 18      | 34                          | 0.50                           | 9                                       |
| Colombo                | 93                       | 60                                    | 55      | 8                           | 0.49                           | 1                                       |
| Delhi                  | 55                       | 1                                     | 53      | 20                          | 2.45                           | 107                                     |
| Dhaka                  | 80                       | 0                                     | 40      | 12                          | 0.89                           | 28                                      |
| Ho Chi Minh City       | 84                       | 75                                    | 38      | 3                           | 1.13                           | n.a.                                    |
| Karachi                | 83                       | 0                                     | 30      | 6                           | 1.00                           | 9                                       |
| Kathmandu              | 83                       | 0                                     | 37      | 15                          | 1.04                           | 2                                       |
| Kuala Lumpur           | 100                      | 100                                   | 43      | 1                           | 1.34                           | 30                                      |
| Phnom Penh             | 84                       | 100                                   | 23      | 5                           | 0.46                           | 15                                      |
| Shanghai               | 100                      | 100                                   | 17      | 6                           | 1.08                           | 113                                     |
| Tashkent               | 100                      | 100                                   | 27      | 6                           | 0.47                           | 2                                       |
| Ulaanbaatar            | 49                       | 48                                    | 36      | n.a.                        | 0.83                           | 3                                       |
| Vientiane              | 56                       | 50                                    | 28      | 10                          | 1.10                           | 2                                       |
| Hong Kong              | 100                      | 100                                   | 25      | 2                           | 2.41                           | 279                                     |
| Osaka                  | 100                      | 100                                   | 7       | 2                           | 1.08                           | 313                                     |
| Seoul                  | 100                      | 100                                   | 25      | 1                           | 0.57                           | 215                                     |
| n.a. = not assessed    |                          |                                       |         |                             |                                |   |

## Appendix 2

# Case Studies

These six case studies have been contributed by experts closely associated with the water utilities examined. The views provided allow readers to see the perspectives of these utilities as presented by individuals from within these organizations. The Malé utility offers an example of a successful public-private partnership and the implementation of very high tariffs. The Phnom Penh utility example shows what strong leadership and political commitment can accomplish, despite an impoverished population. It is a good example of a public utility. The Manila case study provides different perspectives on the private concession contracts that have now been under way for more than 5 years. The Kathmandu case study illustrates many problems of South Asian water supplies and why reforms are needed. The Greater Colombo example shows that it is possible to fund capital improvements directly out of tariffs. Finally, the study focusing on the Dalian water utility shows that tariff reform is the basis for future development.

### Malé Water and Sewerage Company (Maldives)

[Contributed by Mohamed Didi, General Manager, Malé Water and Sewerage Company Pvt. Ltd.]

#### General History

Malé is the capital of the Maldives, and with about 80,000 people plus another 10,000 floating population it has one third of the Maldives' population crowded into an area of 2.5 square kilometers. The underground aquifer in Malé, once the major source of water for all purposes, has been depleted of freshwater, which has been displaced by brackish or saltwater. Such groundwater can no longer be used safely for drinking or cooking, nor can collection of rainwater from roofs meet the normal demand for water. Desalination of seawater is the only feasible solution.

A series of studies by international consultants, funded by the Danish Government, presented various options for supplying drinking water. In the end, the Government decided that as of 1 January 1996 the existing Maldives Water and Sanitation Authority would

be abolished and converted into a regulatory body operating as a part of the Ministry of Health. The Government also decided to participate in a new private limited company, Malé Water and Sewerage Company Pvt. Ltd. (MWSC), with foreign share capital contribution, to produce and distribute desalinated water on the capital island of Malé, on a commercial basis, with viability and sustainability as two objectives.

#### Privatization Process

The first analyses and recommendations of Denmark's consultants (Carl Bros. International) were presented in 1992. Then, in April 1993, the Government decided:

- To establish a joint venture company for the provision of water supply and sewerage services in Malé.
- That this company should operate on commercial terms, with customers paying for water and sewerage services.
- That water production should be based on the reverse osmosis technique of desalination.
- To establish a new distribution system for freshwater, serving all households on Malé.
- To gradually close down public taps as people connect to the piped water supply.
- That the joint venture partner should be able to supply a competent management team to start up the new company, to manage it in the first years, and to train Maldivian staff.
- That, on the above basis, an international tender should go out inviting bids from specialist organizations.

The tender went out in July 1993, and three firms were invited to submit their bids. These were Thames Water International (UK), Biwater International (UK), and NTR Holdings/HOH Water Technology (Denmark). Clarifications, further detailing of financial proposals, and related negotiations were conducted until the bids were in their final form in April 1994. Evaluation of bids was based on the World Bank's procedure for tender evaluation, with particular emphasis on the following: investment level, cost per m<sup>3</sup> of water supplied, management proposals, and financing proposals.



The amount of risk sharing by the joint venture partner was reflected in:

- the funds which each of the three bidders were willing to risk by investing them as equity in the joint venture company,
- the degree to which the joint venture partner expected guarantees on demand and revenue from the Government of the Maldives, and
- the level of exclusivity to supply goods and services to the company.

In March 1995, the Government signed a joint venture agreement with NTR/HOH. The authorized share capital was Rf320 million (about \$25 million), of which 70% was subscribed by the Government, 18% by the Danish Industrialization Fund for Developing Countries, and 12% by NTR/HOH. The board of directors comprises five persons, of which three are from the Government, one is from the Danish Industrialization Fund for Developing Countries, and one is from NTR/HOH. The Government granted MWSC a monopoly concession for all public water supply and sewerage services on Malé for 20 years. **One factor in particular contributed to the success of the privatization, and that was the fact that NTR/HOH took on full responsibility for the construction and management of all the project's main components, including the desalinization plant and the distribution system, from formation of the company, through construction, to daily operation for a period of 5 years. This enabled the operations to be well coordinated in all phases of the work, with short lines of decision and command and a built-in ability to adapt quickly and effectively to changes in the operational environment.**

### Malé Water and Sewerage Company

The principal objectives of MWSC are to develop, manage, and maintain an efficient and cost-effective public water supply and sewerage service on the capital island of Malé. The total organization started out with about 40 staff and has by today, in step with increased demand and added responsibilities, reached 125. Of these, four positions, including the one of finance manager, are held by expatriates from Sri Lanka and India. There are six layers to the organization structure: (1) unskilled staff (laborers), (2) semiskilled staff (assistant operators and drivers), (3) skilled staff (operators and technicians), (4) officers, (5) assistant managers, and (6) managers. An ever-increasing productivity per staff has been maintained. Job descriptions have been prepared for each individual staff. In the process leading to the salary structure of the individual

layers of the organization, it was made a point to ensure that salaries stood out favorably with comparable positions in other organizations in the Maldives. The human resources development plan includes training needs analysis, overseas fellowship courses, in-house on-the-job training, use of external training facilities in Malé, and use of external training facilities in neighboring countries. MWSC reached the breakeven point in April 1997, and by June 1999 it recovered all losses from the start-up period. In April 2000 MWSC began to operate under Maldivian management, and during the same year it started paying out dividends to its shareholders. New projects on the horizon for MWSC include a facility for the production and bottling of table water and soft drinks, not just for the local market but for export. The bottling plant is expected to be operational in 2003. A more long-term project involves the construction of a wastewater treatment plant. Recently, MWSC was awarded a concession to develop the water and wastewater services for the island of Hulhumalé. This is an artificial reclaimed island near the international airport, and when fully developed it will have 100,000 people in an area of about 6 square kilometers.

### Utility Performance Parameters

Based on year 2001 figures, MWSC performance indicators included:

- Service coverage—100%.
- Water availability—24 hours per day to all customers.
- NRW—3% of production.
- Accounts receivable—one month of sales.
- Staff per 1,000 connections—8.7.
- Operating ratio (expenses versus revenue)—0.48.
- Dividend payment to shareholders—\$2.66 million.
- **Average domestic tariff (based on actual consumption and revenues)—\$5.08/m<sup>3</sup>.**

### Tariff Schedule

- Domestic Consumers: 0–90 liters per day, \$2/m<sup>3</sup>; 91–270 liters per day, \$6/m<sup>3</sup>; and > 270 liters per day, \$8/m<sup>3</sup>.
- Institutional Consumers: \$6/m<sup>3</sup> (any quantity).
- Commercial Consumers: \$8/m<sup>3</sup> (any quantity).
- The tariff schedule has not been revised since the MWSC was established in 1996.

### Water Production

The water production facility is based on the seawater reverse osmosis process. Equipment has been installed in 500 m<sup>3</sup> per day modules, to keep pace with demand. Production capacity is now 3,500 m<sup>3</sup> per day. The facility is independent of the local electricity supply in that it provides its own electric generation system at a lower cost and with a more reliable supply.

### Service Levels

Coincidental with the registration of new water connections, there was a phased discontinuance of the public standposts, leaving just 15 public standposts in place to cater to the less fortunate part of the population. The Government pays for the water taken from the standposts. Service coverage with house connections is essentially 100%, and all have 24-hour supply. The development of water demand has been a key feature in the early years. Demand has grown from 6,500 customers using 395,500 m<sup>3</sup> of water in 1996 to 12,193 customers using 1,175,377 m<sup>3</sup> of water in 2001. Demand is seasonal to some extent, as it is influenced by rainfall precipitation. Per capita consumption increased from about 21 liters per day in 1996 to about 32 liters per day in 2001.

### Vision

We have a vision that MWSC will gradually develop into an organization taking on responsibility for all drinking water and wastewater operations in the Maldives, starting in the short term with the islands of Villingili and Hulhumalé. The company will be the hub of other fully owned organizations, such as MWSC North, MWSC Central, and MWSC South. A separate company would handle bottled water. The total future organization will continue as a private limited operation based on viability and sustainability.

### Lessons Learned

- The “privatization” process (developing a public-private partnership) has been a success.
- It is possible to use high tariffs to effect full cost recovery, if alternative sources are unavailable (average household expenditure on water equates to around 7% of household income).
- Demand is affected by the tariff, household income, and the absence of alternative sources.
- Intermittent water supply is not related to the volume of water available, but rather hydraulic efficiency, high tariffs, disciplined metering, and billing and collection.

## Phnom Penh Water Supply Authority (Cambodia)

[Contributed by Ek Sonn Chan, Director, Phnom Penh Water Supply Authority]

### Introduction

Phnom Penh Water Supply Authority (PPWSA) became an autonomous body in 1986. However, this did not change anything in PPWSA until 1993. After the Paris Peace Agreement, the Government of Cambodia, with the assistance of different development agencies, started the change in PPWSA that led to its becoming a fully autonomous body. Today, PPWSA is a fully independent, commercially oriented, self-sufficient body.

### Organization

In 1993, PPWSA was still operating under heavy subsidy from the Cambodian Government. The total annual income generated at that time was only 0.7 billion riels, against an operating cost of 1.4 billion riels. There were more than 500 staff working for PPWSA, and the average monthly salary of the staff was 50,000 riels (approximately \$20). The staff were underqualified, underpaid, had low motivation, and worked with low efficiency. Nepotism was widely practiced, and morale and discipline among the workers were low. The higher management was working for self-interest rather than the interest of PPWSA. They were abusing the property of PPWSA for their own interest.

### Existing Water Supply System

PPWSA was supplying to the city 63,000 m<sup>3</sup> of water a day. The distribution network consisted of about 280 kilometers of pipes, ranging in diameter from 60 to 800 millimeters. This distribution network covered 40% of the city area and served only 20% of the total city population. Thirty percent of the pipes in the network had been laid more than 100 years ago, with the newest of the pipes being more than 40 years old. The deterioration of pipes and lack of maintenance gave rise to high physical losses in the system. The number of connections was 26,881, out of which only 13% were with water meters. This gave rise to inaccurate and improper billing. And the actual volume of water sold was only 28% of production, out of which the collection ratio was only 50%. In 1993 alone, the number of illegal connections discovered was about 300. Staff of PPWSA installed most of these illegal connections for their own benefit. Formal applications for water connections were difficult and most of the time impossible to complete.

The going market price for an illegal connection was around \$1,000. With all the above, it was no surprise that NRW in 1993 was more than 70%. The water tariff at that time was also less than desired. The water rates for household and commercial use were 300 riels/m<sup>3</sup> and 550 riels/m<sup>3</sup>, respectively. With these rates, PPWSA was supplying water below its operating cost.

### Remedial Actions and Results

#### Changing of Culture

To counter all the negative elements and inefficiencies, PPWSA began a "changing of culture" based on educating, motivating, and disciplining its staff and the public.

The first step taken within PPWSA was the restructuring of the whole organization. Higher management was given more direct responsibility. Members of the more dynamic younger generation who possessed better qualifications were promoted to higher levels and given more responsibilities. Inefficient "old timers" in high positions kept their positions, but moved into more dormant roles. This younger generation of managers was given much training in the various skills required to run PPWSA effectively. Incentives such as higher salaries (10 times more than before) and bonuses for good performance were introduced, together with penalties for bad intentions. Managers were also taught to be responsible, and the spirit of teamwork was stressed. The work responsibility of the staff was more streamlined and the number of employees was reduced to less than 400. The second priority was to ensure higher revenue generation. To achieve this, PPWSA took a five-pronged approach.

First, PPWSA started to install water meters for all its connections. In 1996, 85% of 32,404 connections were metered. Today, each of the 82,000 connections is metered. With the improvement in the water quality, PPWSA even introduced the more accurate Class C meters to replace the less accurate Class B meters.

Second, PPWSA set up an inspection team to stop the illegal connections. The public was advised to stop using and pursuing illegal connections. Incentives were given to anyone who could provide information on illegal connections. A heavy penalty was slapped on those found to be using illegal connections. Any staff of PPWSA found to be associated with illegal connections were removed immediately. As a result, the number of illegal connections dropped from one in a day to less than five in a year, if any.

*Third, PPWSA revised and improved its consumer files.* A consumer survey was carried out to identify the actual number of connections. It was found in 1993 that there were 12,980 documented connections not receiving water from PPWSA, while 13,901 others were receiving water but were not documented. The consumer files were corrected and updated. In 1995, PPWSA started to implement an automatic billing system granted by the Government of France. This computerized system was completed in 1996 and helped tremendously in bill collection.

*Fourth, PPWSA embarked on a program to educate the public, especially the high-ranking families, other government agencies, and even the top management of PPWSA, on the importance of paying their water bills.* This was not an easy task. However, with a lot of hard work, the strong support of the Prime Minister, and the concept of "leadership by example," PPWSA managed to convince many VIPs and high ranking officials to pay their bills. As a result, the rate of bill collection from the public improved from just 50% in 1993 to 99% now.

*Fifth, and probably the most difficult task of all, PPWSA increased the water tariff to cover its cost.* To avoid having a huge jump in the water tariff, PPWSA proposed to have a three-step increase in the water tariff over a period of 7 years. With the strong support of the development agencies and the commitment of the Government of Cambodia, particularly the Governor of Phnom Penh City and the Prime Minister, the first increase was achieved in 1997 and the second in 2001. However, PPWSA did not push for the third increase, as its revenue already fully recovered the cost, due to the higher collection ratio and the drop in NRW from 72% in 1993 to 22% as of today.

PPWSA also embarked on a program to rehabilitate its whole distribution network. A repair team was organized to stand by 24 hours a day to properly repair and maintain the distribution network. The public was encouraged to inform PPWSA of the leaks within the system. In 1996, with financing provided by ADB, World Bank, and the governments of France and Japan, PPWSA started to renew and rehabilitate its distribution network. By 2002, PPWSA managed to fully rehabilitate its distribution network. Treatment plants were also rehabilitated and constructed. Recently, with financing from ADB, a new 16-kilometer transmission line was installed across the city of Phnom Penh. A new distribution network of 600 kilometers was laid. It

covers 100% of the inner city of Phnom Penh and is expanding to suburban areas. This network covers approximately 70% of the whole of Phnom Penh City, and PPWSA is embarking on a program to cover 95% by the year 2005. With the laying of new pipes, the pressure within the distribution network was increased to 2.5 bars from just 0.3 bars in 1993.

### Social Responsibilities

Through the years, PPWSA has also actively assisted the Government of Cambodia as it implements its policy to alleviate poverty. Poor communities in Phnom Penh are mostly located in places that are difficult to access and that have poor sanitation facilities. Most residents spend too much time and use too many resources just to have sufficient water for their daily consumption. To lessen the burden of poor families related to buying water at a high rate from water resellers, PPWSA made it a policy to supply clean and safe water directly to these poor families. By the year 2002, PPWSA had made a total of 3,046 connections among the 31 poor communities within the city of Phnom Penh. This figure reflects an almost 100% supply to all the poor families living in the service area in Phnom Penh.

### Conclusion

There are many factors contributing to the improvement in the operations of PPWSA. *Political stability, strong government support, and external assistance from different development agencies (ADB, World Bank, the Government of France and the Government of Japan) have contributed much to the expansion of PPWSA. However, the most important factor comes from within PPWSA. Today, PPWSA takes pride in its team of people, who are hardworking, responsible, and self-motivated.* This team of people has indeed worked hard, with a common goal of overcoming the difficulties of the past, and it shall be ready to face the challenges of tomorrow.

### Lessons Learned

The success of this public water enterprise is to a large extent the result of a champion of the cause in the person of the Director, Ek Sonn Chan. Strong leadership, governance, and political commitment on tariffs are the essential ingredients for success. A comparison of the before and after operational performance of PPWSA is given in Table A2.1.

**Table A2.1 Phnom Penh Water Supply Authority—Operations (1993 and 2002)**

|   | 1993                 | 2002              |
|---|----------------------|-------------------|
| <b>Human Resources</b>                              |                      |                   |
| • Staff per 1,000 Connections                       | 20                   | 5.3               |
| • Total Staff                                       | More than 500        | 391               |
| <i>By Qualification</i>                             |                      |                   |
| - Managers (Ph.D.)                                  | 0                    | 1                 |
| - Managers (master's degree)                        | 0                    | 11                |
| - Engineers   | 16                   | 27                |
| - Technicians and Skilled workers                   | 19                   | 116               |
| - Accountants (superior)                            | 3                    | 7                 |
| - Accountants (medium)                              | 4                    | 10                |
| <b>Production Capacity</b> (m <sup>3</sup> per day) | 63,000               | 120,000           |
| <b>Distribution</b>                                 |                      |                   |
| • Leaks per Kilometer of Pipe per Year              | Very poor conditions | 1.6               |
| <b>NRW</b> (Percentage of production)               | 72%                  | 22%               |
| <b>Commercial</b>                                   |                      |                   |
| <i>Customers (by type)</i>                          | 26,881               | 82,000            |
| - Domestic  | 78.10%               | 85%               |
| - Commercial  | 21.10%               | 14%               |
| - Administration                                    | 0.80%                | 1%                |
| • Billing Ratio                                     | 28%                  | 78%               |
| • Collection Ratio                                  | 50%                  | 99.64%            |
| <b>Financial Indicators</b>                         |                      |                   |
| • Accounts Receivable                               |                      | 63 days           |
| • Return on Assets                                  |                      | 5.26%             |
| • Debt Servicing Ratio                              |                      | 1.69%             |
| • Operating Ratio                                   |                      | 31%               |
| • Self-Financing Ratio                              |                      | 18.4%             |
| • Total Revenue                                     | 0.7 billion riels    | 34 billion riels  |
| • Total Operating Expenses                          | 1.4 billion riels    | 9.4 billion riels |
| \$1 = 3,895 riels (31 December 2001)                |                      |                   |

## Manila Water Supply (Philippines)

### PART A MANILA WATER COMPANY

[Contributed by V.C. Rivera, Group Director, Regulatory and Planning, Manila Water Company]

At the time of the privatization in 1997, Metropolitan Waterworks and Sewerage System (MWSS) directly supplied potable water to nearly 60% of the 10.6 million inhabitants within its service area. This was done through a total network of 770,000 house water connections. Less than 9% were connected to a sewerage system. Most of the MWSS service area was served by septic tanks. However, its operation steadily deteriorated due to years of underinvestment in facilities and the failure to address NRW, which stood at over 60% in the mid-1990s.

The Government took bold steps. It passed the National Water Crisis Law in 1995 and quickly drafted implementing guidelines that provided for private sector participation in MWSS operation and management.

The MWSS privatization was considered by the International Finance Corporation (IFC) to be the biggest water privatization in 1997 and was expected to result in the following benefits:

- Huge capital investments and operational efficiencies that will expand service coverage (water and sewerage and sanitation).
- The Government was to be relieved of the financial burden needed to improve MWSS facilities.
- A 24-hour water supply was to be ensured.
- NRW was to be reduced to an acceptable level.

In consultation with the IFC, MWSS decided to adopt a concession model as the mode of entry of the private sector. Furthermore, to ensure competitive benchmarking, MWSS divided its franchise area into two zones (East Zone and West Zone). This entailed auctioning two 25-year concessions through competitive bidding and giving the winning bidders the responsibility of handling water treatment, distribution, tariff collection, facility improvement, and overall management. The contractual arrangements between MWSS and its concessionaires were formalized under concession agreements.

After a 25-year concession period, the private sector is expected to have earned from its investments, cleaned up the system, put all MWSS financial obliga-

tions in order, and laid down an efficient water supply system for the metropolis. But the concession agreements did not mean that the Government would automatically adopt a hands-off policy. MWSS retained its ownership of the water facilities, including the agency's real estate properties, and maintains a regulatory function over water rates.

The concessionaires are required to pay concession fees amounting to about 30 billion pesos (estimated at 1.2 billion dollars in 1997) over the 25-year concession period. This amount represents debt service payments for the existing foreign debt obligations of MWSS. The concession fee can also be viewed as a rental or lease for the use of MWSS facilities.

#### **Prequalification of bidders, the bidding process, and results**

In the early stages of the privatization, at least 50 local and foreign companies expressed an interest in participating in the privatization plan of the Government. Later on, however, the Government decided to impose a strict set of criteria to narrow down the list. These included but were not limited to the following:

- that the interested bidding party or consortium should be composed of a "local sponsor" and an "international operator," and
- that the "international operator" should show proven experience and expertise in the provision of water supply and sanitation services.

Based on the above criteria, the MWSS narrowed down the initial list of about 50 prospective participants to 7, and eventually to 4 consortia qualified to bid. The list of "international operators" included Campagnie Generale des Eaux (later Vivendi), Lyonnaise des Eaux (later Ondeo), Anglian Water International (UK), and North West Water (UK), while the "local sponsors" included the country's leading conglomerates: Ayala Corporation, Benpres Holdings Corporation, Metro Pacific Corporation, and Aboitiz Holdings Corporation.

MWSS adopted a competitive bidding procedure during which the bidders were asked to propose rate bids for the two concession areas (East Zone and West Zone). The bids were coefficients representing discounts against the existing average tariff of MWSS (estimated at 8.78 pesos per m<sup>3</sup> in January 1997). MWSS further imposed a condition, which said that no single bidder could win both concessions and, therefore, there would be one winner for the West Zone and another for the East Zone (the winning bids are shown in Table A2.2).

**Table A2.2 Winning Tariff Bids for Concessions**

| <b>Winning Consortia</b>  | <b>(a) Discounts</b> | <b>(b) Existing Tariffs<br/>(pesos/m<sup>3</sup>)</b> | <b>(a) x (b) Bid Tariffs<br/>(pesos/m<sup>3</sup>)</b> |
|---|----------------------|---|--|
| <b>West Zone Operator</b><br>Maynilad Water Services, Inc.<br>Local Sponsor: Benpres Holdings Corp.<br>International Operator: Lyonnaise des Eaux | 0.566                | 8.78  | 4.97   |
| <b>East Zone Operator</b><br>Manila Water Company, Inc.<br>Local Sponsor: Ayala Corporation<br>International Operator: North West Water           | 0.264                | 8.78  | 2.32   |

The concession agreement between MWSS and its concessionaires (Maynilad Water Services, Inc. and Manila Water Company, Inc.) had the following key provisions:

- creation of a regulatory office;
- key service obligations;
- other obligations of the concessionaires;
- rate setting procedure; and
- dispute resolution.

The role of the MWSS regulatory office is:

- to implement a system that will protect the customers' interests;
- to conduct tariff rate determinations; and
- to monitor the concessionaires' performance relative to their service obligations.

The annual operating budget of the regulatory office and MWSS amounts to 200 million pesos (about 4 million dollars) and is obtained from the concession fee payments of the concessionaires. The budget is adjusted for inflation every year.

Key service obligations of the concessionaires are:

1. **Provision of water supply.** The concessionaires are required to provide uninterrupted 24-hour supply at an acceptable (16 psi) pressure to customers. It is also required that sufficient connections are made so that the concessionaires will meet the

service coverage targets (i.e., percentage of population residing in a municipality or city [with access to piped water]) set in the contract.

2. **Provision of sewerage and sanitation services.** Since less than 10% of the households in Metro Manila are connected to a sewerage network, the contract also requires the concessionaires to provide sewerage services to their customers who are currently connected to the water supply network. This will take time and significant capital investment, so in the meantime the concessionaires are also obligated to provide sanitation services, including the cleaning of septic tanks and desludging, to the majority of households who have septic tank systems.
3. **Provision of better customer service.** The concessionaires are expected to provide prompt responses to customer complaints and inform customers of water and sewerage charges.

#### **Rate setting procedure**

The contract has specified three mechanisms to adjust tariff rates from time to time.

- Consumer Price Index Adjustment, used every year (referred to as the "C" factor)
- Extraordinary Price Adjustment, used to counter "unforeseen events" ("E" factor)
- Rate Re-basing Adjustment, used every 5 years ("R" factor)

Any tariff adjustment determined by the Regulatory Office that is expected to exceed the 12% RORB<sup>19</sup> required under the law will be treated as an expiration payment in favor of the concessionaire at the end of the 25-year concession period. This mechanism ensures that the concessionaires get their "guaranteed rate of return."

### **Post-private performance: the case of the Manila Water Company**

#### **Overview**

The Manila Water Company took over operation of MWSS in August 1997. The company faced enormous problems and challenges. These included the following:

- higher operating costs and concession fee obligations as a result of the depreciation of the peso;
- unreliable network with very high NRW, estimated at 63% for the East Zone;
- lower water supply, due to El Niño weather phenomenon and poor water quality;
- significant regulatory risks; and
- reluctance of banks to provide financing due to the Asian financial crisis and significant regulatory risks.

#### **Provisions of water supply**

During the period 1997 to 2000, Manila Water Company increased billed volume by 70%, from 440 million liters per day (MLD) to over 700 MLD, expanded its service area receiving 24-hour water supply from an estimated 15–20% to over 60%, and broadened its served customers to 88% from 65% of the population. The company achieved this performance through:

- enhancement of customer focus by redeploying manpower and dividing the East Zone into manageable business areas and territories or blocks;
- fiscal discipline and cost-effectiveness;
- reorientation of employees on the value of quality service, business focus, and accountability for performance; and
- reduction of NRW from a high of 63% to 58%.

#### **Provision of sewerage and sanitation services**

Manila Water Company has laid the foundation for significant improvements in sewerage and sanitation services for the East Zone. The company has also installed low-cost package sewage treatment plants in several communities with several more planned over the next 3 years.

#### **Customer service**

Immediately after privatization, a call center was established and the branch office network was strengthened to systematize customer service and relationships. Relationships and interaction with communities were forged at the barangay level, the smallest political unit in the country, through projects for the urban poor. A significant portion of Metro Manila residents still depend on vended water, which is priced 15–20 times higher than Manila Water's rates.

"Tubig para sa Barangay" (water for the urban poor) is the company's program to enable poor communities to avail of legitimate water service connections at affordable rates. Since 1997, for example, projects that were completed by Manila Water in the East Zone have already benefited more than 35,000 households.

Through the program, the company minimized illegal connections and leaks and improved the quality of life for most people and fostered excellent community partnerships.

To improve overall operating efficiency, the territory management program was adopted. Under this setup, the service area was divided into smaller units or blocks and district metering zones, where territory managers are responsible for offering better service to customers. Customer service and operations functions have been synchronized for better customer focus and accountability.

#### **Productivity of workforce**

Manila Water absorbed 2,165 employees from MWSS in August 1997. The total headcount by 31 December 1997 was 1,641, which went down further to 1,577 by 31 December 1998. This reduction was achieved through a voluntary retirement program.

The company has 1,540 employees today, or a manpower productivity ratio of 3.7 employees per 1,000 connections. This key indicator used to be more than 8.5, prior to privatization. *The company relied on former*

<sup>19</sup> Rate of return base.



*MWSS employees, who still account for 95% of the company's workforce, to attain positive business results. Open communication with employees was established, including full transparency about the financial performance of the company.*

*As required under the concession agreement, an employee stock option plan has been offered to all regular employees absorbed upon privatization. This plan ensures ownership equal to 6% of the total outstanding stock of the company and would allow opportunity for capital gains, once the shares are listed on the local stock exchange.*

#### **Financial performance: 1997–2000**

*During its first 2 years Manila Water experienced net losses, which can be attributed to transition and start-up problems and reduced water supply due to El Niño. In 1999, with the water supply back to normal, the company recorded positive earnings (before interest, taxes, depreciation, and amortization) and financial viability. This was achieved through increased revenue and fiscal discipline.*

*The company got additional financing amounting to \$55 million from a consortium of banks. This has enabled the company to pursue its capital investment plans and further expand service coverage. Manila Water expects better financial results in the future (the Manila Water Company's 2001 performance can be seen in Table A2.3).*

#### **Key messages**

*The key lessons that can be learned from the privatization of MWSS and the experience of Manila Water are as follows:*

- *To ensure successful implementation of privatization, the Government must have clear objectives, firm political will, focused execution of its action plans and programs, and unwavering support from the private sector.*
- *The close link and unique relationship between MWSS and the "Regulatory Office" would require experienced regulators to manage, considering the regulators do not have complete independence.*
- *Concessionaires need a strong balance sheet and cash flows to address "regulatory lag" and survive liquidity problems resulting from external factors (for example, currency devaluation as a result of the Asian financial crisis).*
- *MWSS privatization showed success initially, but establishing a credible regulatory structure requires more time and effort. Changes in policy and contract will present new challenges and opportunities to all stakeholders, particularly MWSS and its concessionaires.*
- *To ensure the success and sustainability of the MWSS privatization, both MWSS and its concessionaires should strengthen existing partnerships to ensure that the latter remains efficient in the delivery of service to its customers, especially the urban poor.*

| <b>Table A2.3 Manila Water Company, Inc. Utility Performance (2001)</b>   |                            |
|---|----------------------------|
| <b>Water Production</b> (in thousands of m <sup>3</sup> )   | <b>629,625<sup>a</sup></b> |
| <b>Water Consumption Volume</b> (in thousands of cubic meters)  |                            |
| Residential and Semicommercial  | 173,801                    |
| Commercial  | 74,757                     |
| Industrial  | 17,737                     |
| <b>Total</b>  | <b>266,295<sup>a</sup></b> |
| <b>Water Connections by Customer Type</b> (31 December 2001)  |                            |
| Residential and Semicommercial  | 319,021                    |
| Commercial  | 26,792                     |
| Industrial  | 7,169                      |
| <b>Total</b>  | <b>352,982</b>             |
| <b>Revenue</b> (in millions of pesos )  |                            |
| Water Revenue   | 1,180                      |
| Sewer Revenue   | 78                         |
| Environmental Charges   | 118                        |
| Interconnection Revenue   | 142                        |
| Others  | 140                        |
| <b>Total</b>  | <b>1,658</b>               |
| <b>O&amp;M Expenditure</b> (in millions of pesos)   | <b>1,483</b>               |
| <b>Capital Expenditure</b> (in millions of pesos)   |                            |
| Manila Water Company Funded Capital Expenditure   | 335.05                     |
| Concession Assets   | 435.00                     |
| Others  | 148.00                     |
| <b>Total</b>  | <b>918.05</b>              |
| <b>Accounts Receivable</b> (balance as of 31 December)  |                            |
| Gross Accounts Receivable (millions of pesos)   | 408                        |
| Net Accounts Receivable (millions of pesos)   | 324                        |
| <b>Total Household Connections</b>  | <b>427,795</b>             |
| <i>(This includes the growth in households due to bulk metering [subdivisions, townhouses, condominiums, etc.] and Tubig Para Sa Barangay.)</i> |                            |
| <b>Sewer Connections</b>  | <b>25,467</b>              |
| <b>Population in the Service Area</b>   | <b>5 million</b>           |
| <b>24-Hour Water Availability</b>   | <b>83%</b>                 |
| 50 pesos = \$1 in 2001  |                            |
| <sup>a</sup> Equates to NRW of 57%.   |                            |

## PART B THE VIEW OF AN NGO COALITION

### Bantay Tubig's Views on Private Sector Participation in Manila Water Supply

(Bantay Tubig, 2002)<sup>20</sup>

*The promise is that through privatization service sectors will be able to tap financial markets in innovative ways. Service that might otherwise fail to get financing from the Government may get financing from bankers and investors. The private sector's technical prowess is also harnessed, and services are delivered efficiently and quickly. As for the rights of citizens to minimum services, privatization advocates would claim that private providers are bound to deliver, or else they lose their reputations, not to mention their performance bonds.*

*From the experience of private involvement in water and sanitation in Metro Manila, several things are clear:*

*First, at least one of the private concessionaires (Maynilad) has been unable to tap the financial markets as planned, and, consequently, it has failed to deliver on its service obligations.*

*Second, both concessionaires have succeeded in changing the contract. Through Amendment No. 1, effected in October 2001, both companies succeeded in changing the parameters of their original bids in terms of the allowable pace and rate of increases and service and expansion targets. Manila Water has succeeded in doubling its allowable profit by an upward adjustment in its tariff. Maynilad has been allowed to collect its debt payments at an accelerated pace, even if it has failed to reach its target number of connections. The improvement in the contract of Maynilad benefits Manila Water, and vice versa.*

*Third, the regulatory agency that is tasked with enforcing the concession contracts has been unable to stand its ground. Key regulators became advocates for the concessionaires.*

*Fourth, there are no effective mechanisms for the exercise of consumer power in this crucial public utility. Although consumers have the greatest incentive for*

*defending the gains of privatization, there is no mechanism for empowering and harnessing consumer voice under privatization. There is no consumer representation on the MWSS Board. There is no formal mechanism for making information accessible to the public and the media. Public hearings conducted by the MWSS Regulatory Office do not give weight to consumer input and grievances.*

*Bantay Tubig, a citizens' network for adequate, potable, and affordable water, calls for the following:*

- *a review of Amendment No. 1 that will reinstate incentives and penalties in relation to water companies' compliance to service obligations;*
- *a stop to the rate re-basing exercise that will raise water rates to 25–30 pesos/m<sup>3</sup> and a public accounting of the basis of these rate proposals;*
- *the establishment of an independent regulatory body that will enforce service obligations and contractual commitments on both private and public providers of water service; the current Regulatory Office is a creation of the contract between Government and the concessionaires, hence its imperiousness to public demands;*
- *the creation of institutional mechanisms for consumer representation; in the short term, clear procedures for public hearings must be established, and clear and enforceable terms of reference between community representatives and private providers must be put in place; and*
- *the national Government, through its pertinent line agencies and local governments, together with private concessionaires, to specify an agenda for water provision based on the principle that water is a basic human right and that all citizens must have access to adequate, potable, and affordable water.*

*Bantay Tubig is composed of the following organizations:*

*Akbayan Citizens' Action Party, Alliance of Progressive Labor, Focus, on the Global South, Freedom from Debt Coalition, Institute for Popular Democracy.*

<sup>20</sup> Source: the Internet.

## PART C ANALYSIS OF WATER SUPPLY IN MANILA (AUTHOR'S VIEW)

### No Policy and No Independent Regulatory Body

Many problems encountered might not have arisen if the Government had at the outset consulted with the stakeholders and produced a comprehensive policy statement covering all the critical issues of public and private operated water supplies, including tariffs, tariff structure, service levels, serving the poor, regulatory arrangements, performance criteria, staffing, public awareness and transparency, SSWPs, coverage, water resources development, etc. Likewise, if a regulatory body had been set up to monitor the implementation of that policy, a firm foundation would have been created on which to build a private sector contract. Regulation by contract was not the answer, as it made the regulator nothing more than a contract administrator. The autonomy gains that might have been there with an independent regulator have been lost, as it has essentially been government officials and not MWSS officials making the important decisions on tariffs. A transparent policy provides the basis for allowing variations to the contract, which are usually inevitable. **It is not too late to have a transparent policy.**

### Bidding on Low Tariff

It was unfair to saddle one half of the people of Manila with 90% of the past debt and the other with 10% of the past debt. It was also sending all the wrong signals to allow bidding to be based on the lowest tariff, because it did not encourage the conservation of water and further promoted inequities. Five years later, tariffs are set to become 5.4 and 7.3 times those bids, despite the fact that much of the justification for these tariffs has been based on an increase in the peso-to-dollar ratio just 2.1 times the original exchange rate. The tariff structure should be flexible but nevertheless governed by policy objectives. The tariff structure does not penalize high consumption, and it does not ensure that the poor receive subsidies, since many of the poor do not have an individual connection or receive water through shared connections at high block rates. The large numbers served by vendors also do not receive any subsidies.

### Coverage Target

The contracts were based on 98% coverage targets at the end of the 25-year concession, but these assumed 9.2 persons per connection, whereas year 2000 census statistics indicate 4.6 persons per household in Manila,

on average. **It is not a satisfactory outcome after a 25-year private sector concession contract to have the equivalent of only half the population enjoying water connections to their homes.** Considering the natural increase in population of Manila and the true coverage rates achieved by the concessionaires over the first 5 years, the situation appears to be getting worse, not better. This should be cause for great concern. Furthermore, much of the level of service offered to those who are now connected (shared connections with high tariffs and low usage) is inferior to that offered to those already connected. In reality there are great incentives for the concessionaires to sell water in bulk, especially to low-income households in unauthorized settlements. This not only means more income to the concessionaires, it means no NRW and 100% collection efficiency at no cost. There is unquestionably a link between low piped water coverage, investment levels and high levels of NRW. The link is the SSWPs. These entrepreneurs are not officially recognized, but their revenue turnover exceeds that of the concessionaires. The concessionaires were expected to invest \$7 billion over 25 years. After 5 years, they have invested less than \$100 million of their own money. The balance of the capital expenditures were funded out of tariffs, not investments.

### NRW Reduction and Demand Management

In 5 years, one concessionaire improved NRW from 63% to 57% of production, and the other allowed it to get worse, from 63% to 67%. These results show the difficulty of keeping promises of improved efficiency that accompany the trumpeting of PSP. The results are indeed disappointing. Apart from penalties associated with nonperformance, which so far seem to be ignored in Manila, there are few incentives for the concessionaires to reduce NRW. If we assume NRW is 50% leaks and 50% illegal use, then removing the leaks (and most are on service connections) would put undue attention on the illegal use. Bearing this in mind, and assuming that the concessionaires are getting good returns from illegal users (which could include many SSWPs) by selling water to them, why would the concessionaires want to change the status quo? Likewise, what incentives are there for the concessionaires to encourage water conservation in homes? After all, the more water they sell, the higher their profits will be.

Is more water needed in Manila? No, not in the foreseeable future. Higher tariffs will inevitably bring down the average household consumption for those with individual connections. Instead of using 30 m<sup>3</sup> per month, they will use 20 m<sup>3</sup> per month. Half the people in Manila already consume water at a rate close to 6 m<sup>3</sup> per

month. Reducing NRW from around 60% of production to 30% will also make a lot more water available. In fact, the combined effect of these two interventions would almost double the water available for consumption in Manila.

### **Inequities and the Urban Poor**

The average household with an individual connection uses 30 m<sup>3</sup> per month and pays 162 pesos per month in the East Zone. Whereas the average household receiving vended water, or a shared connection, receives about 6 m<sup>3</sup> per month and pays 600–900 pesos per month for that privilege. There are at least 5 million people in Manila in this situation after "privatization." That is not a great advertisement. The block tariff system would work fine, providing subsidies to the poor, if everyone could have an individual connection, but under the present scenario it is mostly a subsidy to the rich.

### **Public Awareness and Transparency**

People who are not connected to piped water have no idea when they can expect to be connected. Although the concession agreements are available to the public on request (which is excellent), only one of the concessionaires (Manila Water Company) produces an annual report. How the other can get away without producing an annual report (let alone make it available to the public) is extraordinary. Furthermore it is strange that the 5 year audit reports are produced by consultants for the concessionaires, not the regulator. While Bayan Tubig, a coalition of five NGOs, is trying to represent civil society, there is no mechanism for it to obtain the necessary financial resources to undertake investigations. Until now its attention has been on tariffs and the private sector contract, but it would be

more useful if it were to focus on the 5 million people who are not yet connected to piped water, many of whom fall below the poverty line, and if it urged the Government to come out with an official and transparent policy statement. Stakeholders need to know more about the problems and solutions, so that informed decisions can not only be made but be seen to be made.

### **Accountability of Concessionaires**

While one concessionaire (Manila Water Company) is doing much better than the other, neither performance is satisfactory. There are so many performance targets not even remotely met. For example, NRW was to come down from 63% to 30% by 2001. It still averages more than 60% in 2003. Targets related to access to piped water, investment, and 24-hour supply have not been met, and sewerage coverage has scarcely begun. In concert with this failed performance, the contracts have been amended so that the basis for the original bidding is no longer valid. In terms of accountability, a question must be asked: Why is the performance of the concessionaires not independently audited each year?

### **Conclusion**

If we measure the success of this example of "privatization" by the three main benefits expected—investments, efficiency, and autonomy—there is no doubt that it is failing. The announced withdrawal of one of the two concessionaires in December 2002 confirms this verdict. *It is time to place the undertaking on a firm foundation of policy and independent regulation, with greater awareness and transparency and the involvement of civil society.*

## Kathmandu Water Supply (Nepal)

[Contributed by Poshan Nath Nepal, former General Manager, Nepal Water Supply Corporation]

### History of Development

The twin cities of Kathmandu and Lalitpur are often referred to as Greater Kathmandu, or in short Kathmandu, the capital city of the Kingdom of Nepal. It is situated in a valley known as Kathmandu Valley at an altitude of about 1,400 meters above mean sea level. The history of development of public water supply in Kathmandu dates back to the late nineteenth century. The first public water supply system, with a capacity of 7.5 MLD, was implemented in 1893. Distribution by private connection was limited to high officials, government offices, and influential citizens. Public standposts were provided for ordinary people. Cast-iron pipes were used for the trunk mains and distribution network, and galvanized iron pipes were used for individual connections. In 1930 another scheme, with a 4 MLD capacity, was implemented. Surface sources in the hills north of Kathmandu were tapped in the above schemes. In 1959 an additional scheme, this one also with a capacity of 4 MLD, was implemented utilizing a surface source to augment the existing supply system. It was in 1965 that a major drinking water project, with a 20 MLD capacity, was implemented with Indian assistance. The system is known as the "Sundarijal System," as it utilizes water from the Bagmati River near Sundarijal, some 13 kilometers northeast of Kathmandu.

In 1988, water loss as a result of leakage and wastage, due to the poorly built and inadequately maintained distribution network, intermittent supply, and lack of awareness among consumers was estimated to be as high as 40%. Therefore, major maintenance and rehabilitation of the distribution system was necessary. In view of this, a rehabilitation project costing \$71 million, including \$60 million from International Development Association, was formulated and initiated in 1989. Due to various reasons, including noncompliance of covenants, a portion of the International Development Association loan, worth \$39 million, was cancelled in 1997. No rehabilitation with major improvement, therefore, could be accomplished. However, in 1994, a rehabilitation project for the Sundarijal System and the original system was implemented with Japanese grant assistance. This work augmented the systems with 30 MLD of water and improved the supply qualitatively with the provision of treatment plants at Mahankal and Bansbari.

### Current Status

#### Institutional Arrangement

The Kathmandu Water Supply System was being administered by "Pani Goswara" (the Water Office) until 1973. In July 1973, a semiautonomous board known as Water Supply and Sewerage Board was established under the Development Board Act—1958. This was the first effort made by the Government to manage the urban water system autonomously, on a cost-recovery basis. The board had the mandate to run the existing water supply facilities in major urban areas, including Kathmandu, and to implement the International Development Association-assisted Water Supply and Sewerage Project. This institutional arrangement continued until July 1984, when the Water Supply and Sewerage Corporation (WSSC) was established under the Corporation Act—1964, to make the institution more autonomous and permanent. As the Corporation Act, being a general act, does not make specific provisions for any corporation, a separate act, the Nepal Water Supply Corporation Act, was enacted in 1990, and WSSC was converted to the Nepal Water Supply Corporation (NWSC) under this act. This enabled NWSC to make specific decisions relating to its functioning. For example, this act has given NWSC the right to revise the water tariff.

#### Staffing and Organization

According to the Nepal Water Supply Corporation Act, the Secretary, Ministry of Physical Planning and Works, is the Chairman of the Board. The members are representatives from the Health, Physical Planning and Works, and Finance Ministries, the mayor of Kathmandu Metropolis, one more mayor from another municipality in the NWSC service area, a consumers' representative, a water supply specialist, and an environmental specialist. The General Manager, as member-secretary, administers the functions of NWSC. The Chief Executive Officer of NWSC is the general manager appointed by His Majesty's Government of Nepal (HMGN). Under the General Manager there are six divisions, each headed by a deputy general manager. The divisions are: Kathmandu Valley Water Supply Services, Outside the Valley Water Supply Services, Corporate Engineering, Support Service, Finance, and Internal Audit. The corporation has a staff strength of about 1,100 personnel of various categories and levels to manage the Kathmandu Water System.

### Population and Growth Rate

According to the 2001 census, the population of Kathmandu is about 1.01 million. Being a capital city, Kathmandu has also to serve a great number of floating populations, estimated at about 10% of its residents. Thus the population to be served by the Kathmandu Water System is almost 1.11 million. The Greater Kathmandu Water Supply Project report (Volume 1, 1991) estimated the population growth rate at 4.7% per annum for Kathmandu. The report has also estimated the internal migration rate at 2.67% per annum. According to a recent press report, the present urban growth rate is 5.4%. This is perhaps due to the higher internal migration rate, resulting from growing insecurity in rural areas of Nepal.

### Water Production and Per Capita Consumption

The production capacity of the various systems described above is about 117 MLD. No figures are available as to what is the actual daily production of the system. It is estimated that the dry period production is less than 100 MLD. This is far below the dry period demand estimated at 140 MLD. According to the Greater Kathmandu Water Supply Project report, demand (total supply requirement) for all consumers is estimated at 238 l/c/d.

### Income and Expenditure

According to NWSC sources, the total income of the Kathmandu Water Supply System for the fiscal year 2001/2002 was about \$3.79 million, while operating expenses, including salaries, fuel, maintenance, and electricity, but excluding depreciation and debt services, was about \$2.57 million for the same period. NWSC had an operating surplus of about \$1.22 million. Almost 20% of the surplus was set aside for the Gratuity Fund, and the remainder was invested for various capital works in the existing networks. Although the financial situation appears satisfactory, NWSC is financially weak when debt servicing and depreciation are taken into account. It has not paid any of its debt, and it has borrowed from the Government for the International Development Association-assisted projects mentioned above.

### Leakage

The Kathmandu Water Supply System consists of a very old and a very new distribution network. Pipes are not joined properly. Laying pipes at shallow depths has loosened joints. A large percentage of the population is not aware of the consequences of the loss of

water. Public standposts remain open most of the time. The above factors are responsible for a high percentage of leakage of water in the distribution system. According to the annual report of NWSC for 1999/2000, leakage due to both technical and financial reasons is 37%.

### Water Tariff

Connections are of two types—metered and unmetered. Kathmandu has adopted a progressive tariff structure for metered ½" connections, i.e., unit cost (cost of 1 m<sup>3</sup> of water) increases with the increase in consumption. Thus, for monthly consumption of 10 m<sup>3</sup> or less, unit cost is \$0.06, while it is \$0.15 if monthly consumption exceeds 10 m<sup>3</sup>. For connections of ¾" and above, the tariff is uniform and is about \$0.34/m<sup>3</sup>, irrespective of monthly consumption. For unmetered connections, however, a flat tariff of \$2.73, \$20.55, \$34.29, \$91.35, \$150.70, \$447.46, and \$894.91 is being charged monthly for connections of ½", ¾", 1", 1½", 2", 3", and 4", respectively. The tariff for all public standposts, which is about \$12 per month for each standpost, is being paid by HMGN. Households having both water and sewer connections are charged an additional 50% of their water bills.

### Metering

Consumers are being served through 111,000 private connections and 893 public standposts. Almost 90% of the private connections have been metered. Due to intermittent supply, deposition of iron and other foreign substances in the meter-filter, and insufficient water pressure, a large number of meters are nonfunctional.

### Problems

Major problems faced by NWSC are as follows: (1) As is clear from above, water demand is much higher than the supply. Therefore, there is a shortage of water throughout the year. During the dry season, the supply situation becomes much worse. (2) *Though NWSC is autonomous legally, in practice there is frequent interference from the Government. Since 1984, when the corporation was established, roughly a dozen general managers have been appointed. This frequent change in the top slot has not helped the management.* (3) NWSC is highly overstaffed. On an average, almost 14 persons are engaged to manage the operation of every 1,000 connections. (4) Due to reasons such as intermittent supply, inadequate treatment, faulty pipe joints, etc., water quality is not satisfactory. (5) Routine monitoring of major information on

the functioning of the system is almost nonexistent. Therefore, information and data very vital to the plans for reforms are not available. (6) Although NWSC has been able to meet its day-to-day financial requirements, its inability to contribute to areas like debt servicing, depreciation, return on investment, and future investment is a cause of concern.

### **Private Sector Participation**

Reforms today are no longer a matter of choice. In view of the problems cited above, and also in view of the fact that the recommendations for reforms by consultants in the past could not be implemented, HMGN has decided to hand over its management to the private sector. After necessary preparation, a letter of interest was invited in 1998. But due to differences of opinion between the stakeholders in the interpretation of the terms of the contract, the deal could not be concluded at that time. However, the effort is ongoing, and a fresh letter of interest may be invited again. Assistance from ADB has been requested.

### **Melamchi Project**

To meet the growing and long-term demand of Kathmandu, the Melamchi Water Supply Project has been formulated and is being implemented with financial assistance from ADB, Japan, Sweden, and Norway. The main feature of the project is the 26-kilometer-long tunnel, which will transfer initially 170 MLD of water from the Melamchi River (situated outside the valley) to Kathmandu Valley. The project is estimated to cost \$464 million at the present exchange rate.

### **Manohara Water Supply Project**

With Japanese grant assistance, a water supply project utilizing water from the Manohara River has just been initiated. This will provide a further 20 MLD of water to the Kathmandu System within the next 2 years.

### **Future Course of Action**

The future course of action on reform should address issues mainly in the following areas:

#### **Improvement of the Service Level**

As stated earlier, supply falls short of present demand by a large margin. Both surface water and groundwater sources within the valley have already been utilized. Speedy implementation of the Melamchi

Water Supply Project will improve the service level quantitatively. Rehabilitation of the existing system is expected to take place simultaneously with the Melamchi project's implementation. This will enable the system to produce a 24-hour supply, ensuring improvement in the service level qualitatively.

#### **Rainwater Harvesting**

It is to be remembered that the Melamchi project, with subsequent extension from the Larke and Yangri rivers, just east of Melamchi, will meet the future demand up to 2024. For further augmentation of the system, no surface water source has yet been identified. Therefore, creation of an alternative water source should be given adequate attention. *Kathmandu gets almost 1,500 millimeters of rainfall annually. This rainwater, if collected and stored properly, may serve as a potential water source for the future. This aspect of the utilization of rainwater should be studied.*

#### **Groundwater Licensing**

The public and private sectors are exploiting groundwater without any control and regulation from the concerned authorities. Every year a substantial lowering of the groundwater table is being reported. To check this worsening situation, and *to control overexploitation of groundwater, a mechanism for licensing and charging for the use of groundwater should be developed.*

#### **Wastewater Disposal**

Most of the densely populated areas have been provided with storm sewers. Due to a lack of provision of sanitary sewers, these have been converted to combined sewers. Mostly wastewater is being discharged into the river system of Kathmandu Valley without any treatment, as there are no treatment plants in many areas. *Existing treatment plants at Dhobighat and Kodku are nonfunctional, due to lack of maintenance.* Hence, the rivers in the valley have been virtually turned into open sewers. A recently completed treatment plant in the Pashupati area, serving about 50,000 people, is the only functional treatment plant in Kathmandu. Therefore, *a master plan for the disposal of wastewater should be formulated and implemented in stages.*

#### **Institutional Arrangement**

The present arrangement can no longer operate the system efficiently and in a cost-effective manner. This has been proved beyond doubt by the unsatis-



factory performance of NWSC, due mainly to the reasons cited earlier. In view of this, HMGN has agreed in principle to hand over the management of the NWSC to the private sector, and the process has already begun. This should be pursued until a satisfactory contract negotiation is concluded. *The reform strategy should be to forge a public-private partnership with the private sector taking up the responsibility of management and the public sector regulating and monitoring performance with clearly defined measurable indicators, since only that which can be measured can be monitored.* The modality of PSP could be a joint venture of local and foreign companies or local companies assisted by expatriate experts in critical areas, such as leak detection and control, financial and human resources management, and monitoring.

### **Regulatory Body**

To oversee the functioning of PSP, a regulatory body has been proposed. It will monitor and analyze PSP activities and make the results available to the private sector, so that appropriate improvements in their functions can be made on this basis.

### **Cost Recovery**

Before 1990, the financial situation was alarming. There were not enough funds even to pay salaries to staff. However, the situation is vastly improved. It has largely been accepted that drinking water service can no longer be subsidized. *A comparison of the tariff structures of 1982 and 2002 clearly shows that cost sharing by consumers is on the rise. People are paying more than \$1 for 1 m<sup>3</sup> of water delivered by private sector*

*tankers.* Against this background, and taking into account the inability of the Government to subsidize this sector, the water tariff should be reviewed and revised frequently and in such a way that it covers all related costs, like capital cost, operating cost, depreciation, some return on investment, and future investments. Alternatively, the tariff could be hiked automatically in the beginning of every fiscal year by an appropriate percentage. In doing so, willingness and capacity to pay, the present progressive tariff structure, and cross subsidy for the urban poor should be given due attention.

### **Human Resources Management**

Human resources development, including training programs of long and short duration, should be made a permanent feature of personnel management. Overstaffing has been the major problem of many public sector enterprises. An appropriate ratio of connections to number of staff should be maintained in order to make the organization slim and trim with the optimum number of staff.

### **Information Management**

A database should be prepared for items such as (1) water production, (2) leakage, (3) groundwater extraction and groundwater table, (4) staffing, (5) income and expenditure, and (6) consumer satisfaction, in order to monitor and analyze these periodically. Information obtained should be used for the improvement of the operation. Areas to be given more focused attention are leak detection and control and financial and personnel management.

## Colombo Water Supply— A Financial Perspective (Sri Lanka)

[Contributed by Premakumar Fernando, Deputy General Manager (Finance), National Water Supply & Drainage Board]

The views expressed in this case study are Premakumar Fernando's and do not necessarily represent the views of National Water Supply and Drainage Board (NWSDB) or the Government of Sri Lanka.

### Introduction

Sri Lanka, formerly Ceylon, is an island in the Indian Ocean off the southeastern coast of India. The total area of Sri Lanka is 65,610 square kilometers. The total population of Sri Lanka is 19.5 million, yielding an overall population density of 298 persons per square kilometer. Colombo is the commercial capital and the largest city.

Presently, about 850 water supply schemes are in operation on the island. NWSDB, a fully government-owned state enterprise, is the principal authority for the provision of safe drinking water in Sri Lanka. The board operates 269 major and minor water supply schemes, through which 24% of the population is served with piped water.

### Greater Colombo Water Supply

The Greater Colombo (GC) area is located in the southwest quarter of the Island of Sri Lanka. The total population of this area is approximately 3,412,000. NWSDB currently provides service to approximately 1,848,000 people within the service area. The existing water supply to the GC area depends mainly on a river intake at Ambatale, on the Kelani River, and the impounding reservoirs at Kalatuwawa and Labugama. The present supply of 585,000 m<sup>3</sup> per day is provided through the Ambatale Treatment Plant, and the two reservoirs provide the balance of 146,000 m<sup>3</sup> per day. This supply is distributed to areas north, south, and east of Colombo, all of which are steadily expanding, leading to a shortage of water in the city.

Studies by NWSDB have revealed that there will be a water shortage in Colombo in the immediate future, and the following actions are being taken by the Government of Sri Lanka to address the impending water shortage (see Table A2.4).

|  | <b>Estimated Cost</b><br>(\$ million) |
|--|---------------------------------------|
| Augmentation of Present Ambatale Treatment Plant<br>(to produce 45,460 m <sup>3</sup> per day) | 4.0                                   |
| Kaluganga Project 1st Phase<br>(to produce 60,000 m <sup>3</sup> per day)                      | 84.0                                  |
| Kelani Right Bank Project<br>(to produce 181,000 m <sup>3</sup> per day)                       | 33.0                                  |

These projects and a salinity barrier on the Kelani River, to allow saline-free abstraction, will be commissioned between 2002 and 2009. Based on the forecasted consumption pattern, the average daily demand for the GC water supply area is as shown below (see Table A2.5).

The present supply to the GC area from its three main sources is 585,000 m<sup>3</sup> per day. If the demand is 490,000 m<sup>3</sup>, why was there a shortage of water in 2002? The water shortage was due to very high water losses. NWSDB is billing only for 65% of its present production. The difference between the production and billed quantity is commonly known as NRW.

The 35% NRW component can be categorized as shown (in Table A2.6).

For administrative purposes, GC water distribution is divided into four major areas, Colombo City, Towns South of Colombo, Towns North of Colombo, and

|                                   | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|-----------------------------------|------|------|------|------|------|------|------|------|
| Daily Demand (000) m <sup>3</sup> | 490  | 506  | 521  | 536  | 574  | 596  | 613  | 632  |

**Table A2.6 Breakdown of Non-Revenue Water in Greater Colombo**

|  |     |
|--|-----|
| (1) Leakage                                  | 23% |
| (2) Non-billed Tenement Gardens (standpipes) | 4%  |
| (3) Illegal Connections                      | 4%  |
| (4) Administrative Losses                    | 4%  |

Towns East of Colombo. As of 30 June 2002, there are 332,000 connections in the total GC area. Of these, 85,000 are in the Colombo City area. Even though overall NRW for GC is 35%, the figure for Colombo City is a staggering 53%.

The breakdown of this figure is as follows (Table A2.7):

**Table A2.7 Breakdown of Non-Revenue Water in Colombo Municipality**

|                                   |     |
|-----------------------------------|-----|
| (1) Leakage                       | 25% |
| (2) Tenement Gardens (standpipes) | 15% |
| (3) Illegal Connections           | 8%  |
| (4) Administrative Losses         | 5%  |

Thirty thousand consumers in Colombo City get estimated bills. It is estimated that at least 20,000 meters are defective in this area. With very minimal efforts, water losses under (3) and (4) above could be brought down by 50%. Through encouragement of connections to tenement gardens (low-income areas) at a lower

connection fee, at least a 7% reduction could be achieved in NRW. Even without doing any investment on leakage, Colombo City's NRW can be reduced by 15% with an investment of approximately \$250,000 over a time span of 2 years.

#### Need for Water Loss Reduction

Out of the total production, only 77% is being used while the rest, i.e., 23%, is wasted due to leakage, etc. In terms of revenue, only 65% of the water generates revenue, while the rest (12%) is being supplied without revenue. Under these circumstances, reduction of leakage and wastage is indispensable for (i) reducing the need to develop more expensive water resources, (ii) reducing the cost of water, and (iii) expanding the potable water supply to serve more people. In order to address these issues and satisfy the required amount of water evenly and effectively, new thinking and strategies are necessary both in terms of demand management and control of waste.

#### Water Demand

The Greater Colombo Domestic Water Demand Forecast is provided (Table A2.8). One key area where we could improve is per capita domestic consumption. The present consumption average is 140 l/c/d. Through consumer awareness and through appropriate tariff structuring, this could easily be brought down to 100 l/c/d. In fact, in 1995, in many Colombo households, l/c/d was in the region of 200. Through tariff structuring, this figure is now around 140. If per capita consumption is restricted to 100, the present served population would require only 185,000 m<sup>3</sup> per day, compared to the present demand of 246,000 m<sup>3</sup> per day. The water available for others will be 60,000 m<sup>3</sup> per day. Stage 1 of the Kaluganga Project will bring 60,000 m<sup>3</sup> per day at a capital investment of \$84 million.

**Table A2.8 Greater Colombo Domestic Water Demand Forecast**

|   | 2002      | 2005      | 2010      | 2015      | 2020      |
|---|-----------|-----------|-----------|-----------|-----------|
| Population  | 3,412,100 | 3,632,925 | 3,853,750 | 4,076,025 | 4,298,300 |
| Served Population                                   | 1,848,399 | 2,087,384 | 2,378,566 | 2,621,915 | 2,843,302 |
| Population Served (%)                               | 54        | 58        | 62        | 64        | 66        |
| Total Domestic Consumption (m <sup>3</sup> per day) | 246,138   | 291,863   | 343,779   | 390,335   | 444,402   |
| Net Per Capita Consumption (l/c/d)                  | 133       | 140       | 145       | 149       | 156       |

Source: Kaluganga Water Supply Project Report.

**Table A2.9 Nondomestic Demand Forecast in Greater Colombo**

|  | 2002    | 2005    | 2010    | 2015    | 2020    |
|--|---------|---------|---------|---------|---------|
| Nondomestic Demand ( m <sup>3</sup> per day) | 181,297 | 221,108 | 251,446 | 281,152 | 299,722 |

Nondomestic demand, which includes industrial, commercial, institutional, and special demands for the GC area, is outlined (in Table A2.9).

### Tariff Structure

At present, the domestic tariffs are set well below cost recovery levels, and they are heavily subsidized by the nondomestic tariff and through government grants by way of capital subsidies for new water supply schemes. For urban water supply schemes, such as the GC scheme, the Government provides a 50% subsidy of the foreign loan component and a 100% subsidy on the local component of funds. The domestic tariff in Greater Colombo in 2002 for given monthly consumptions is shown (Table A2.10).

| <b>Table A2.10 Domestic Tariffs in Greater Colombo</b> |       |
|--|-------|
| 10 m <sup>3</sup>                                      | \$0.6 |
| 20 m <sup>3</sup>                                      | \$1.1 |
| 30 m <sup>3</sup>                                      | \$4.3 |

The nondomestic consumer is charged \$0.40/m<sup>3</sup>. The 20 unit nondomestic consumer pays a monthly water bill of \$8. And the domestic consumer pays only \$1.10, which amounts to a cross subsidy of 1 to 7.7.

The Colombo population essentially consists of urban residents, and as per available statistics more than 80% of the GC population has an average household income of more than \$100 per month. *For an average household of 5 persons, and 140 l/c/d consumption, the average water bill is \$1.10, which amounts to just 1% of household income.*

As per available data, the income distribution pattern of the GC area is as follows:

10% of Population—Annual Income is < \$220  
10% of Population—Annual Income is \$220–750

40% of Population—Annual Income is \$750–1,200  
20% of Population—Annual Income is \$1,200–1,800  
10% of Population—Annual Income is \$1,800–6,000  
10% of Population—Annual Income is > \$6,000

The lowest 1/10th income group is entitled to free water through standpipe supplies, and the other income groups are in the higher range of the income brackets. *The irony is, those who are in the \$6,000 bracket also pay a water bill of less than \$12 per year.*

The present cost of production and distribution of one unit of water for Greater Colombo is \$0.10. With NRW, the cost to the Water Board of each unit of water sold is \$0.15. (This cost includes capital subsidies).

If the tariff is appropriately adjusted, and the consumer is made aware to limit consumption to 100 l/c/d (i.e., 15 m<sup>3</sup> per month per average household of five) a monthly bill of \$3 is easily affordable to a GC consumer. Even with very high water losses, still the cost for 15 m<sup>3</sup> per month is \$2.25, and if \$3 is charged, each consumer will contribute \$0.75 per month for capital expenditure and development of the network.

*At present, there are 304,000 domestic consumers in the GC area. If consumption is restricted to 100 l/c/d, the connections could be increased to 426,000 consumers, which means that \$3.8 million could be collected annually by way of additional revenue for capital expenditure.*

### Operating Performance Indicators and Efficiencies

NWSDB has substantially improved its performance indicators through some innovative strategies. Some of the major achievements are listed below.

- (1) Through tariff revisions the l/c/d, which was around 200 in 1995, has been brought down to 140 as of 2002.
- (2) The number of employees per 1,000 connections, which once stood around 19, has been brought down to 10.8 in 2002.

- (3) The overall NRW, which was in the region of 47% in 1995, is now down to 35%.
- (4) The cross subsidy from nondomestic to domestic, which was around 1 to 13 in 1995, is now 7.7.
- (5) Through proper financial management information systems, budgetary control was exercised to monitor performances of the utility.

**Future Potential for Greater Colombo Water Supply**

- (1) The large non-revenue component of 35% speaks of the potential. In Colombo City alone, 20,000 water meters are estimated readings. Obviously the l/c/d will be high in these areas, as they are billed on an estimated basis. An investment of \$250,000 to replace these 20,000 city meters can bring enormous amounts of revenue and water savings.
- (2) It is estimated that about 24,000 m<sup>3</sup> are not billed due to meter reading errors. Of 332,000 connections in the GC area, 2,000 connections consist of large corporate customers. These 2,000 consumers contribute 43% of GC revenue. The total annual revenue of GC for 2002 is estimated at \$28 million, and these 2,000 consumers account for \$12 million. Our concentration should be on these 2,000 consumers. Fix the best possible meters, and rotate the meter readers, and another \$1 million in revenue is easily achievable.
- (3) At present, meter readers on a monthly basis read all 332,000 meters and spot bills are issued. The annual revenue collection pattern for these consumers is as follows (see Table A2.11):

| Consumer Type         | Number of Consumers | Revenue (\$ million)   | Percentage (%) |
|-----------------------|---------------------|------------------------|----------------|
| Domestic Consumers    | 304,000             | 8.67                   | 31%            |
| Nondomestic Consumers | 26,000              | 7.33                   | 26%            |
| Priority Consumers    | 2,000               | 12.00                  | 43%            |
| <b>Total</b>          |                     | <b>\$28.00 million</b> | <b>100%</b>    |

Each meter reading is costing a minimum of \$0.20, and 90% of meter reading cost is bringing only 31% of our GC revenue. Good and accurate meter reading, particularly in the nondomestic area, can bring in almost 70% of

current revenue. Colombo needs at least 200 meter readers to take the monthly readings. Since the domestic bill is just below \$1.50, many consumers do not pay the bill monthly. This task could easily be outsourced at half the cost, and NWSDB could achieve its purpose. NWSDB needs to employ only about 28–30 quality meter readers to take the readings of 28,000 nondomestic consumers.

- (4) At the lower level, NWSDB salary cost is comparatively high. The average cost of an unskilled laborer for NWSDB is \$200 per month. The national income average is \$100 per month. The annual GC budget for personnel emoluments is \$4.37 million for 1,900 personnel. By subcontracting services such as new connections, meter reading, vehicle hiring, etc., personnel costs can be reduced at least by 35%.
- (5) Approximately 24,000 m<sup>3</sup> per day is effectively not billed for tenement gardens and standpipe supplies. The revenue loss in this sector could be substantially reduced by facilitating individual connections at a subsidized cost and also by adopting a community representative approach to discourage garden taps and standpipes.
- (6) To reduce the 23% leakage figure requires considerable effort, cost, and time. To achieve progress in this area, it is necessary to simplify the procurement procedures. The Government procurement procedures are too lengthy and thus involve excessive costs. Attending to leakage should be subdivided into geographical areas and awarded to prime contractors, so that these contractors would have the liberty to procure the required equipment and materials.
- (7) Proper allocation of O&M funds for assets maintenance is another key area where there is potential. At present only 4% is allocated for repairs and maintenance of assets. Due to this insufficient allocation, the assets are not well maintained, and thus in the long term additional costs are incurred by way of operational inefficiencies. At least 7.5% of the O&M budget should be allocated for assets maintenance.
- (8) Rather than implementing new projects, the present plant capacities can be augmented by investing sufficient funds in the rehabilitation and augmentation of existing schemes. An annual allocation of revenue can increase plant capacities substantially through carefully planned expansions.

- (9) *Capital expenditure planning needs attention. Due to some excessively high-cost capital expenditure projects of the past, NWSDB is unnecessarily burdened with huge debt service costs. Capital expenditure could be reduced almost by 50% through efficient procurement mechanisms, proper contract administration, and through professional management inputs, very particularly in the financial management area.*
- (10) *The managerial capacity of the top management needs to be strengthened. Very low salary structures for the managerial staff have not helped NSWDB retain the best managers. An autonomous corporate body should be established to attract the best management skills.*

*Based on the above recommendations, GC Water Supply can generate sufficient funds to maintain the system and bring substantial returns to the stakeholders. What is required is creative management thinking and an independent regulator to monitor the affairs in*

*the interest of the consumer, since Greater Colombo Water will be a monopoly. How I see Greater Colombo Water in 2015 from a financial perspective is given below (see Table A2.12).*

### Lessons Learned

This case study illustrates the potential for efficiency improvements in a water utility, which are basically "average" for the Asian region. Potential improvements include NRW reduction through better metering; outsourcing meter reading and installing new connections; vehicle hire; replacing standpipe supplies with individual connections, outsourcing leakage reduction with streamlined procurement, allocation of funds for asset maintenance, and rehabilitation of treatment plants; more efficient procurement in terms of capital works; and better remuneration for management. The most important finding, however, is the potential shown in Table A2.12 for capital investments to come directly out of tariffs.

**Table A2.12: Greater Colombo Water Supply Tariff Model (2003–2015)**

|   | 2003              | 2005              | 2010              | 2015              |
|---|-------------------|-------------------|-------------------|-------------------|
| Total Population  | 3,522,513         | 3,632,925         | 3,853,750         | 4,076,025         |
| Maximum Water Available (m <sup>3</sup> per day)                              | 590,980           | 636,440           | 697,800           | 879,600           |
| Non-Revenue Water (%)   | 32                | 23                | 20                | 18                |
| Available Water for Distribution (m <sup>3</sup> per day)                     | 401,866           | 490,059           | 558,240           | 721,272           |
| Domestic Demand (l/c/d)   | 110               | 100               | 100               | 100               |
| Nondomestic Demand (m <sup>3</sup> per day)                                   | 201,203           | 221,108           | 251,446           | 281,152           |
| Available Water for Domestic Demand (m <sup>3</sup> per day)                  | 200,664           | 268,951           | 306,794           | 440,120           |
| Number of People Who Could Be Served  | 1,824,217         | 2,689,508         | 3,067,940         | 4,401,200         |
| Population that Could Be Served (%)   | 52%               | 74%               | 80%               | 100%              |
| Number of Domestic Connections (Average of Five Persons per Household)        | 364,843           | 537,902           | 613,588           | 880,240           |
| Domestic Revenue @ \$3 per month per Household                                | 13,134,364        | 19,364,458        | 22,089,168        | 31,688,640        |
| Commercial Revenue @ \$0.40/m <sup>3</sup>                                    | 28,973,160        | 31,839,552        | 36,208,224        | 40,485,888        |
| Cross Subsidy for 15 m <sup>3</sup> per Month                                 | 2                 | 2                 | 2                 | 2                 |
| On-line O&M Cost @ \$0.10/m <sup>3</sup> (\$)                                 | 21,275,280        | 22,911,840        | 25,120,800        | 31,665,600        |
| <b>Amount Available for Annual Capital Investment and Debt Servicing (\$)</b> | <b>20,832,244</b> | <b>28,292,170</b> | <b>33,176,592</b> | <b>40,508,928</b> |

## Dalian Case Study (People's Republic of China)

[Contributed by local consultants during the ADB Impact Evaluation Study of Water Supply and Sanitation Projects in Selected Developing Member Countries]

### Introduction

Phase III of the Yinbi Water Supply Project began at the end of 1992 and was completed in October 1997. At that time the project contributed 670,000 m<sup>3</sup> per day and the overall water supply capacity reached 1.2 million m<sup>3</sup> per day. The total cost was 2.41 billion yuan, of which almost 1.28 billion yuan came from loans (including \$110 million from ADB).

### Social, Economic, and Environmental Impact of the Water Supply Project

After the project was put into operation in 1997, the water supply conditions in Dalian (population: 2.63 million in 1999) have been greatly improved, and the daily residential water usage rose from 40 to 70 liters per capita, which has ensured that the water demands for urban construction and people's living will be met. It also promoted the sustained rapid growth of the national economy. In 1999, Dalian's gross national product reached 100.31 billion yuan, 11.2% higher than 1998. In 2001, Dalian broke the record of 120 billion yuan for gross national product. In 2000, the city of Dalian ranked the highest in the country in urban comprehensive environmental quality, having been approved by the state as a demonstrating model city for environmental protection, industry development,

and facilities operation. Since 1999, new residential buildings, totaling over 9 million square meters, have been constructed. The Changjiang Square, World Trade Mansion, Jinshi International Convention Center, etc., have been put into operation. Moreover, a batch of large public buildings have been completed, such as the Forest Zoo, Municipal Science and Technology Museum, a library, Modern Museum, Lushun History Museum, International Tennis Center, Friendship Hospital, New World Square, Wangfu Commercial Mansion, New Mart, Peace Commercial Square, Yuexiu Square, Centenary Commercial City, Tiger Beach Polar Region Halls, and more. Thirty-two plots of green land have been established in the newly built parks or rehabilitated parks or squares, involving 1.65 million square meters of new landscaping. The urban greening coverage has reached 41%, with an average of 9 square meters of public greening area per capita. The United Nations has awarded Dalian the honor of being one of the top 500 cities of the world for its environment, and the city received the Ministry of Construction's Award of China-habitat Environment.

### Operation and Economic Situation

Since the project was formally put into operation, it has been running smoothly. The quality and scale have reached design requirements, which can meet the city's water demand. It has fully conveyed 1.1 billion m<sup>3</sup> of water to the city, averaging 240 million m<sup>3</sup> of water annually. Up to now it operates well. The revenue can satisfy the needs for repaying debt principal and interest as well as normal production and operation expenses, having attained good social and economic benefits. The Dalian water consumption for 2001 is given below (see Table A2.13).

**Table A2.13 Dalian Water Consumption (2001)**

| Category                            | Annual (10,000 m <sup>3</sup> ) | Daily (10,000 m <sup>3</sup> ) | Percentage (%) |
|-------------------------------------|---------------------------------|--------------------------------|----------------|
| Industrial                          | 6,464.8                         | 17.7                           | 30.0           |
| Commercial                          | 1,588.7                         | 4.4                            | 7.4            |
| Institutional                       | 1,340.8                         | 3.7                            | 6.2            |
| Domestic and Army                   | 7,404.7                         | 20.3                           | 34.4           |
| Special Service Sectors             | 51.7                            | 0.1                            | 0.2            |
| Others                              | 1,821.5                         | 5.0                            | 8.5            |
| Economic Trade and Development Zone | 2,884.3                         | 7.9                            | 13.4           |
| <b>Total</b>                        | <b>21,556.5</b>                 | <b>59.1</b>                    | <b>100</b>     |

## Water Tariff, Policy, and Structures in Dalian

On August 1, 1998, the Liaoning Province Price Administration Bureau approved the Dalian municipal government's decision to adjust the water tariff. The principles behind the tariff adjustment were to (i) make industrial and commercial rates higher than the cost of production, (ii) make domestic rates (including those applied to army buildings and schools) lower than the cost of production, and (iii) offer appropriate subsidy to employees. The tariff for domestic users (including army buildings and schools) was raised from 1.20 yuan/m<sup>3</sup> to 1.60 yuan/m<sup>3</sup> with a quota of 6 m<sup>3</sup> per month per household, the extra would be charged from the original 2.00 yuan/m<sup>3</sup> to 3.00 yuan/m<sup>3</sup>. The industrial tariff (affecting institutions and public bathhouses) increased from 1.50 yuan/m<sup>3</sup> to 2.20 yuan/m<sup>3</sup>, and the commercial and tourism tariff (affecting various amusement places and tourist spots) increased from 2.00 yuan/m<sup>3</sup> to 3.00 yuan/m<sup>3</sup>. The cost of raw water supply to the Economic Trade and Development Zone increased from 1.20 yuan/m<sup>3</sup> to 1.80 yuan/m<sup>3</sup>.

In accordance with the stipulations issued by the provincial government, beginning in 1998 domestic sewage treatment fees were levied throughout the province. In Dalian, the charges are collected from domestic, army, and school users, and from other institutions based on the amount of running water used, at 0.20 yuan/m<sup>3</sup>. The policy was issued together with the water tariff adjustment.

After considering the investments and loans directed toward the project, as well as the cost of the water supply enterprises, on August 1, 2001, the water tariff was readjusted in Dalian.

1. The domestic tariff (applied to army buildings and schools) was increased from 1.60 yuan/m<sup>3</sup> to 2.30 yuan/m<sup>3</sup>. The quota was raised to 8 m<sup>3</sup> per month, instead of 6 m<sup>3</sup> per month per household, but the extra would be charged based on 10 yuan/m<sup>3</sup>.
2. The industrial tariff increased from 2.20 yuan/m<sup>3</sup> to 3.20 yuan/m<sup>3</sup>.
3. The institutional tariff increased from 2.20 yuan/m<sup>3</sup> to 3.20 yuan/m<sup>3</sup>.
4. The commercial and tourism tariff (affecting various amusement places and tourist spots) increased from 3 yuan/m<sup>3</sup> to 5 yuan/m<sup>3</sup>.
5. Tariffs affecting public bathhouses increased from 2.20 yuan/m<sup>3</sup> to 5.00 yuan/m<sup>3</sup>.
6. Tariffs applied to saunas, swimming pools, and other special sectors temporarily increased from 12 yuan/m<sup>3</sup> to 20 yuan/m<sup>3</sup>.

The average water tariff became \$0.35/m<sup>3</sup> (tax included) after the water tariff readjustment in 2001.

### Lessons Learned

The success story in Dalian (see Box A2.1) is no different than elsewhere in the PRC, where strong government commitment to tariff and governance reform is the foundation for development. But note also that low per capita consumption results from higher tariffs.

#### Box A2.1 Domestic Customer Survey Success Story—Dalian

This story is about Mr. Zhang and his family in Dalian.

Six years ago, they lived in an old house of very low quality. In their old living area, about 15 families shared one public tap, and the water quality was not good enough. Moreover, the water from this tap was not available frequently. They spent a lot of time trying to get and use water in their daily lives, and as a result they paid more attention to getting and storing water and less to water quality. This situation made their work and lives very inconvenient and also affected their health negatively during that time.

After they moved to an apartment, and following the completion of the Dalian Water Supply Project, they got a piped water house connection. "We can finally experience the concept of real tap water," they said. "We changed from slaves of water to the masters of water." They now can freely use water in the way that they want. The water can be used so conveniently that sometimes they don't feel that a set of water supply devices exists in their house. With tap water, they obtain more time for their careers and education, improved hygienic conditions in their house, and (eventually) better health and more income. Also, they noticed that the surroundings of their city have become more suitable for living, as they can now use toilets other than latrines in public areas. They can enjoy clean water from each potable water tap, and the water-irrigated grasslands create innumerable beauty spots in their city. Finally, the piped water house connection helped them live life more hygienically and stimulated them to demand higher water quality.



## Appendix 3

# Examples of Small-Scale Water Providers

This appendix looks at examples of SSWPs in Cebu, Delhi, Dhaka, Ho Chi Minh City, Kathmandu, and Manila. These include water vendors using pushcarts and tankers and entrepreneurs providing piped water from their own sources and water supplied in bulk from the utility.

### Example 1 Cebu (Philippines)

#### Old Philippine Railway Residents' Association (OPRRA) Sitio<sup>21</sup> in Barangay Kalunasan, Cebu City, Philippines.

Kalunasan is a *barangay* situated in the southwestern section of Cebu City. It is composed of 36 *sitios*, one of which is sitio OPRRA. The barangay has a total population of 10,168 living in 2,021 households.

It is presumed that because much of the barangay is situated at an elevation higher than the service reservoir, the Metropolitan Cebu Water District (MCWD), the city's water utility, has not extended its piping network to the area. Access to water has therefore become a pressing need of the majority of residents. Some households that are situated near a barangay that is directly serviced by MCWD, however, have household connections from the water utility.

#### Description of the System

Presently, OPRRA operates two water distribution networks, and each is serviced by two separate wells. Both wells are roughly 408 feet deep, and water is drawn from each by a 5-horsepower submersible pump powered from the AC grid of the Visayan Electric Company, the city's power utility. The first system has a water reservoir with a capacity of 104 m<sup>3</sup>, while the 30-foot-high second reservoir has a capacity of 31.5 m<sup>3</sup>. The design of the distribution network is similar to that used by the water utility. A 50-millimeter, 430-meter-long galvanized iron pipe serves as the main distribution line. A series of 40-millimeter "stab-outs" are tapped from this line. Connected to these "stab-outs" are 12-millimeter metered pipelines. Each system provides an average of 15 m<sup>3</sup>

per household per month. The systems, together, produce an average monthly volume of 6,555 m<sup>3</sup> to 437 household-clients. The six original tapstands, which have remained operational, each provide an average of 4.8 m<sup>3</sup> per month per household.

#### Administration

OPRRA has 22 employees (one operations supervisor, one maintenance supervisor, six pump operators, six maintenance personnel, six communal caretakers, one watchman, and one security guard). Like most private establishments, employees are expected to attend to their responsibilities on an eight-hour basis.

Prior to being connected, an applicant-household would be required to submit a barangay clearance, resident's certificate, and a letter of approval from the president of the homeowners association, who happens to be the barangay captain of Kalunasan. Once these documents are in place, the applicant is asked to give a refundable deposit of 1,000 pesos (insurance against nonpayment of dues in case the applicant decides to leave the sitio without prior notice) and a connection fee of 350 pesos. In addition, the applicant is required to purchase a brand new water meter.

The tariff is set at 130 pesos for the first 10 m<sup>3</sup>. If consumption is higher, a rate of 32.40 pesos/m<sup>3</sup> is charged. Billing and receipt of payments are facilitated by adopting a color scheme for the meters (yellow: every 20<sup>th</sup> of the month; blue: every 10<sup>th</sup> of the month; pink: every 19<sup>th</sup> of the month; and green: every week or every 15<sup>th</sup> of the month). OPRRA claims that color coding was adopted for the convenience of the clients, who are given the option to choose the payment period that best fits their budget schedules.

The tariff set for tapstand users is 0.25 pesos for 4 liters, and payment is collected by caretakers at the taps. Water for those with household connections is available 24 hours a day, while water at the tapstand is available only for eight hours a day.

Periodic treatment with chlorine (every 6 months), makes the water safe for drinking. The most recent test report of the Cebu City Health Department Laboratory,

<sup>21</sup> A sitio is the smallest unit of a community.

dated 29 July 2002, shows no coliform organisms in the water.

Clients rated the services of OPRRA as “very good,” saying that their water supply is continuous, they receive 24-hour service, they can use communal tapstands, and they are allowed to participate in tariff setting. They expressed their approval of the rates set, and the level of service provided.

Residents also say that although OPRRA does not give a share of its monthly earnings to the barangay, it has provided funding to some of the barangay’s activities (for example, the annual fiesta) and projects (including the creation of a recreational complex).

### Key Issues and Problems

OPRRA’s biggest threat, at the moment, is the plan of MCWD to expand its coverage to Kalunasan. They fear that the association may eventually be eased out if the plan of the franchised utility is pursued.

OPRRA’s requirements for connections are easier to secure and the cost of installing a connection is cheaper when compared with that of the water utility. The tariff set by OPRRA is higher, but considering the fact that, at the moment, it is the only water provider present in the sitio, the residents may have no choice. What is important is that member-households are satisfied with the tariff, service, and water quality.

### Summary and Conclusions

Establishing OPRRA is indeed a step in the right direction, and it has resulted in greater satisfaction among the majority of member-households, because the association has adequately and positively addressed their water needs. Although management may need to further develop its entrepreneurial skills to operate the system effectively, OPRRA is still a good model of a community-initiated water system.

All told, the factors necessary to replicate the successes of this association are as follows: (i) a committed and organized community, (ii) an efficient and sanitary system to distribute water, (iii) an acceptable water tariff, and (iv) client’s satisfaction with the rates set and with the quality of service provided.

## Example 2 Delhi (India)

### PART A WATER SUPPLY PROFILE IN DELHI

Delhi’s population in 2001<sup>22</sup> stood at 13.78 million, up from 9.42 million in 1991, registering an annual growth rate of 4.1%. The average family size in Delhi is about five persons.

There is a huge disparity in water supply to various parts of the city. While the norm for Delhi is 220 l/c/d, the supply ranges from a low of 130 l/c/d (in east Delhi) to 280 l/c/d (in some parts of north Delhi). Parts of south-west Delhi also get very low levels of supply. The supply levels are very high in the Cantonment and some other areas, where the average supply is over 380 l/c/d.

The water shortfall in the underserved areas is met through tanker supply. The Delhi Jal Board (the utility) operates about 1,000 tankers a day, of which it owns 450–500. The remaining tankers are hired. Supply through tanker service costs the Delhi Jal Board almost nine times what it costs to supply water through pipelines. The average cost of supply through the piped system is Rs5/m<sup>3</sup>,<sup>23</sup> while the tanker services cost the utility about Rs46/m<sup>3</sup>.

Yammna River is Delhi’s main source of drinking water. The utility produces around 2.94 million m<sup>3</sup> per day of water, representing about 83% of all water supplied. The balance (17%) is provided by privately commissioned tubewells with handpumps. About 23,000 m<sup>3</sup> per day of water from the Delhi Jal Board is supplied through tankers.

The SSWPs in Delhi can be classified into two types.

1. Organized
  - Private tankers
  - Bottled-water service providers
2. Unorganized
  - Private pipeline water providers (in unauthorized settlements)
  - Pushcart service (low-income settlements)

According to the Economic Survey of Delhi, 2001–2002, nearly 60% of the city’s residents live in slums, resettlement colonies, and low-income clusters.

<sup>22</sup> According to the Census of India, 2001.

<sup>23</sup> \$1 = Rs48 (approximately).

### Consumers with Household Connections

The results of the survey, which covered 250 localities throughout the city, indicate that almost 73% of the households have direct connections, while 27% depend only on other sources of water, such as standpipes, tankers, and their own tubewell arrangements. While almost all middle- and high-income households have house connections, only 60% of low-income households have house connections. Only a small proportion (5%) of households have illegal connections, and most of these are concentrated in low-income areas. A large proportion (68%) of households get water for less than four hours per day. About half of these households get water for less than two hours a day in the summer. The bulk of the customers getting water from the utility pay less than Rs100 per month for their household connections. This, however, is only for water from the utility and does not indicate the total amount spent on obtaining water, as many of these customers draw water from personal tubewells.

### Households Accessing Other Sources of Water

Having a water connection in the house does not guarantee that the quantity of water supplied will be sufficient. **In Delhi, the situation is such that almost 44% of households with individual household connections access other sources of water to fulfill their daily needs.** The most significant sources of additional water are tubewells. Almost one fifth of households having direct connections from the utility use tubewells as an additional source of water. The next most commonly used sources are handpumps (15%) and tankers (6%).

### Standpipes

Standpipes mainly serve low-income localities, informal settlements, resettlement colonies, and unauthorized settlements. **Standpipe water is supplied free of charge by the utility. But it should be noted that many people have to pay to transport water from standpipes to their homes.** Nearly half of standpipe users use the water only for drinking and cooking and fulfill their remaining needs from handpumps.

The supply hours at standpipes are not very good. Half of standpipe users get water for less than four hours a day. Since there are nearly 500 households to each standpipe, the hours of supply need to be longer to provide water to all. The pressure in many standpipes is usually low, and people have to struggle to collect water. This is the reason why almost three fourths of standpipe users rate the service as average to bad. **Some households using standpipes have stated that**

**the water does not come at any fixed time, and that they often have to spend the entire night filling water containers.** Some others said that there are far too few standpipes for their localities. They also said that the utility should provide more standpipes to improve the situation.

### Tankers

The utility runs about 1,000 tankers per day to supply water to various parts of the city. The utility's tankers serve all income groups in the city, but they first serve the poor, particularly those who have no other source of water. The utility's water supplied through tankers is free. In the middle- and high-income areas, tankers are only requested when there is a shortage in supply, and this does not happen daily. Water from tankers is used for all purposes by the households using this service. The service is rated medium to bad by the users. This is mainly because the tankers of the utility are not regular, often do not respond to requests made, and the water supplied by them is not sufficient for all.

### Private Pipeline Providers

Private pipeline providers operate in some unauthorized settlements in the city. There are probably 50–75 such private operators in just one unauthorized settlement, which houses more than 400,000 residents. These providers lay pipelines in the streets they serve, and individual households connect to these pipelines. The source of water for the pipeline provider is a tubewell.

Water from private pipeline providers is used for all purposes by the households receiving this service. Their customers rate the service as medium to good. Many customers are happy that they at least have house connections, saving precious time every day in going out to retrieve water. They also get a reasonable amount of assured water through these private providers. People pay \$4–10 per month for this service, which assures them a supply of 500–1,000 liters per day per household.

### Pushcart Services

These services operate only in low-income localities, especially unauthorized settlements. There could be up to 1,000 pushcart operators in the city. They draw water from the utility's standpipes and deliver the water to individual households. They do not charge for the water itself, but they do charge for transporting it. **People pay \$0.12–0.21 for this service for 20 to 40 liters of water.**

Households using pushcart services are reasonably happy with the service, as it provides drinking water at home at low cost. For the remaining requirement of water, these households depend on handpumps.

### Conclusion

Overall, it can be stated that the water situation in Delhi is not good and that people do not get adequate water. The utility is unable to provide sufficient water, especially in areas inhabited by the poor. The high- and middle-income groups make up this shortage by using tubewells, while the poor mainly use handpumps to make good the shortage in supply. Yet, the role of SSWPs is very limited in the city. This is mainly because the utility's water is priced very low and is provided free to the poor. This creates barriers for private providers to operate on a large scale. People prefer to have their own arrangements for water rather than buy water regularly, because such an option would be very expensive when compared with the utility's water rates.

## PART B PUSH CART WATER PROVIDERS

Pushcart providers mostly operate in low-income areas that depend mainly on public standpipes for water. The number of users at these public standpipes is large, and often people have to stand in long queues and spend many hours to retrieve water. While those who are very poor have no choice but to stand in these long queues to collect water, those who can afford the expense use pushcart providers to get water delivered to their doorsteps. This water is mainly used for drinking and, in some cases, for cooking. For the remaining uses, water is obtained from handpumps. Not all households purchase water every day, some purchase water only once in every 2 or 3 days and use stored water for the remaining days.

Table A3.1 gives profiles of three pushcart providers. **It can be seen that even though free at the source (standpipe), the effective price of this water is in the range of \$3–5/m<sup>3</sup>.** Pushcart businesses are generally family enterprises, as these require three to four workers. All the cans are lined up at the standpipe at night.

**Table A3.1 Operational Details of Pushcart Providers in Delhi**

|  | 1 <sup>st</sup> Provider                     | 2 <sup>nd</sup> Provider       | 3 <sup>rd</sup> Provider      |
|--|--|--------------------------------|-------------------------------|
| Area (all unauthorized)                      | Okhla Vihar                                  | Batlahouse Extension           | A.F. Enclave                  |
| Size of Settlement<br>(number of households) | 800–1,000                                    | 1,500–2,000                    | 2,000–2,500                   |
| Age of Settlement                            | 18 years                                     | 15 years                       | 18 years                      |
| Provider Living in the Locality or Not       | No (living nearby)                           | Yes                            | Yes                           |
| When Service Began                           | 10 years ago                                 | Last 2 years                   | 6 years ago                   |
| Number of Client-Households                  | 40 households                                | 30 households                  | 50–60 households              |
| Source of Water                              | Standpipe                                    | Standpipe                      | Standpipe                     |
| Hours of Water at Source per Day             | 8 <sup>a</sup>                               | 8 <sup>a</sup>                 | 10                            |
| Provider's Hours of Work per Day             | 12–14 hours                                  | 8–10 hours                     | 12–14 hours                   |
| Quantity of Water Delivered per Day          | 1,600–1,800 liters                           | 1,200–1,500 liters             | About 2,000 liters            |
| Charges <sup>b</sup>                         | Rs8–10 for a<br>25–40 liter can <sup>c</sup> | Rs6–8 for a<br>25–40 liter can | Rs10 for a<br>25–40 liter can |
| Type of Vehicle Used                         | Tricycle                                     | Tricycle                       | Tricycle                      |
| Investment                                   | Rs1,500                                      | Rs1,000                        | About Rs1,500                 |
| Source of Funds                              | Own funds                                    | Loans <sup>d</sup>             | Own Funds                     |
| Average Monthly Earnings                     | Rs10,000–14,000 <sup>e</sup>                 | Rs5,500–9,000                  | Rs9,000–15,000                |

<sup>a</sup> Four hours in the morning.

<sup>b</sup> Depends on the distance to be traveled.

<sup>c</sup> There are charges for regular users, which are approximately Rs150 per month.

<sup>d</sup> Loans are taken from friends. They can be repaid when the amount borrowed is earned.

<sup>e</sup> These are generally family enterprises, and at least three members of a family work in this business.

Rs48 = \$1

Since the water pressure is generally high only at night, one member from each provider's family works all through the night to fill the cans with water, and in the morning another takes over. Other family members transport water to the client-households. Cans are also filled during the day, but it takes a very long time to fill each can, as the water pressure is very low.

There are a large number of private providers in each locality, and each one has its own clientele. While they do not have any problems with the water utility, there are local problems, such as fights at the standpipes and the general struggle to collect the water.

Pushcart providers are a necessity in areas where only standpipes are provided and the supply pressure is low. Moreover, they prevent more people from queuing at standpipes, which could result in more fights.

### Example 3 Dhaka (Bangladesh)

This describes an illegal SSWP operation providing drinking water through standpipes and connections to 9,100 households (50,000 persons) in a low-income settlement in Gulshan, a suburb of Dhaka. **The main reason for the business being established (in 2000) was a water crisis caused by the failure of the water utility to serve low-income residents.** The people were very ready to pay for the water supply service. A 1.3-kilometer distribution pipeline was laid from the source (an illegal connection to the utility network) to the settlement. Due to the flat terrain, pumping is required to deliver approximately 300 m<sup>3</sup> of water per day to a reservoir built in the settlement. The owner and his family live in the locality where the business is operating, and they designed the system themselves. The owner had to deal with low-income residents and the local level employees of the water utility, to establish the operation.

**The quantity of water used per household equates to about 1 m<sup>3</sup> per month. Most people obtain water from the 15 standpipes,** although there are 100 households with individual connections. There are no metered connections. Water is available four hours per day, usually two hours in the morning and two hours in the evening. **While the water utility charges around \$200 for a new connection, this SSWP charges only a \$17 installation fee. The tariff, however, is \$0.86/m<sup>3</sup>, while the utility charges only \$0.12/m<sup>3</sup>.** Bills are paid monthly. Those with individual connections pay \$1.17 per month. The initial cost of the installation of the system was about \$862, which came from the owner's own funds. The money for maintenance also comes from the owner.

There are five employees, all living in the service area. The motivation for the business was the chance to make a good profit.

### Example 4 Ho Chi Minh City (Viet Nam)

#### Overview

A study revealed that about 19% of households in Ho Chi Minh City use SSWPs. Most of these (61%) being households with connections from the water company, use resellers that service an average of three to five other households in the neighborhood. About 19% of SSWPs are tanker operators who access water from the water company. Another 11% of SSWPs provide water through piped systems, and the balance (9%) provide bottled water. The average amount of water used per household per month that is purchased from neighbors' connections is 17.5 m<sup>3</sup>, which costs the equivalent of \$9.80 (\$0.56/m<sup>3</sup>) per month. Those who purchase water by tanker pay \$0.40/m<sup>3</sup> for that service, and they use 3–12 m<sup>3</sup> per month with an average of 6.6 m<sup>3</sup> per month.

#### Phuc Doan Company Ltd. (Private Piped System)

District 12 is a new urbanized area that looks rural but is definitely growing fast. It is close to Quang Trung Software City. This is an interesting area, but it is also rather far from the city center. Officially, it is an urban district that looks well organized, with plots and new roads set out. There is no drainage and sewerage system at this time, and the roads are still unpaved.

The Phuc Doan Company Ltd. is the first private drinking water supply company in Viet Nam. It started distributing drinking water very recently. The contractor said that he had not been in the water business before, but that he owns a garment factory. He said that there is certainly a demand for water. The place is good for extracting groundwater, which is close to the surface and of good quality, but he feels the market will become quiet once the people are connected to a network. As the owner of a small company, it will have a lot of trouble safeguarding the supply 24 hours a day, 7 days a week. The design capacity of the network is 720 m<sup>3</sup> per day, but presently only 100 m<sup>3</sup> per day is distributed. The designed number of connections is about 2,000, but only 400 households have been connected over 2–3 years. In the meantime, the company is operating at a loss. To increase income, the company started putting water in plastic bottles, but this is a very competitive market, and they have only just begun (production is 10 m<sup>3</sup> per day). The profit margin is also

not very high (about \$0.01 per 0.5-liter bottle [after the cost of the bottle and the marketing].)

When asked how much it had cost to get started in terms of licenses, etc., the contractor said that the official procedure had taken a long time, since this was the first company in this field. The contractor did not state (or even know exactly) how much money he had to spend on making friends in the neighborhood. He also had to pay the people who live where his pipes pass, because these pipes are not on public land. The total investment, he said, was about \$75,000 for the water supply system. This was paid in cash from his own funds. The license is valid for 3 years, but it will most likely be extended. In addition, the contractor was granted a 5-year tax exemption as a form of investment encouragement.

The water price is \$0.22/m<sup>3</sup> and actual use is about 250 liters per household per day. This will make for about 7.5 m<sup>3</sup> per household per month. An average family will spend about \$1.65 per month on drinking water. This is not much, yet, but the contractor is sure it will increase. The cost of a house connection is \$33 per household. Employees go around with the bills and collect the money. The price of \$0.22/m<sup>3</sup> is seen as a feasible maximum. People are not willing to pay more. While this is already rather high, it is much less than the amount paid to vendors.

Water treatment consists of aeration and sedimentation plus filtration works. Sodium hydroxide is added to balance the acidity. The main parameter to be altered is iron. There is no water tower, and it remains unclear what will happen during electricity interruptions. The network pipework has a diameter of 90 millimeters laid at a depth of 50 centimeters. It has been laid out fully right from the start in the entire area.

There is a good impression of this company. The business plan looks good. And while there are risks, when the capacity reaches more than 300 m<sup>3</sup> per day, there will certainly come a reasonable profit.

## Example 5 Kathmandu (Nepal)

### Water Tanker Supply

In the dry season, about 7% of households rely on tankered water as their main source of safe water. This falls to about 4% during other months of the year. The origin of the water is either natural springs or groundwater, and the average daily supply taken over the whole year is about 2,500 m<sup>3</sup> per day, which is delivered

through 36 providers with 65 tankers. The average tariff is equivalent to \$1.30/m<sup>3</sup>, and the annual turnover of all tanker operators around \$1 million. This gives a 5% profit margin. About 260 persons derive an income from this industry.

The quality of the water depends on the source. Some natural spring locations have what is considered good water quality. Raw water is usually provided, which needs to be treated to make it potable. In the case of groundwater, some preliminary treatment is undertaken to check for excessive iron, ammonia, magnesium, etc. For construction purposes, inferior quality water is supplied.

There is no regulation that concerns abstraction of water resources. The Water Resources Act and the Local Governance Act empower separate institutions to exercise control. As a result, tanker operators take advantage of the confusion and abstract water at their convenience. Local level institutions (community-based organizations) and private property owners, however, levy certain charges on water from the tankers (\$0.2/m<sup>3</sup>). As far as government agencies are concerned, tanker operators consider the traffic police to be the main authority concerned with their business. In line with this, it has been reported that operators offer free tanker services to these officials. A tanker association has been formed to safeguard their common interests.

Control over the source of water seems to be more critical than striving for market share. Consumers prefer one company over the other, based on the source of water. Accordingly, tanker operators having access to a good quality source do better business. Finances are managed through commercial banks and finance companies at market rates, and mortgages or guarantees are a must.

## Example 6 Manila (Philippines)

### The Pushcart Water Vendor in Kabisig, Metro Manila

The water vendor starts work each day at 3:00 a.m., 7 days a week. He buys water from the concessionaire at 1 peso per 16-liter container and distributes it by pushcart (a bicycle with a large sidecar) to 20 customers, living an average of 2 kilometers from the source. He sells 40 containers per day at 5 pesos per container. As can be seen from the photo on the front cover of this book, the water vendor has his own containers. He pours water from his containers to his customers' containers when he delivers. Working an 84-hour week,

he earns 5,000 pesos per month, whereas the poverty line is more than 9,000 pesos per month. He has a family of five to support. He says his biggest problem is always money, and he receives no tips and no year-end bonus. It is surely a tough job pushing water with little reward. Still, he has been a water vendor for 9 years.

### The Customer of the Water Vendor in Kabisig, Metro Manila

Winnie Flores (shown on the book's cover) is the sole breadwinner in a family of six. She works for foreigners as a daytime domestic helper. Her husband, a former messenger, has been out of work for 2 years. She has to buy vended water, since the closest source of piped water is 2 kilometers away, and it costs her 900 pesos per month for 6 m<sup>3</sup>. If she were connected to the concessionaire, she would pay about 100 pesos per month for 20 m<sup>3</sup>. What she would save (800 pesos per month) would go toward her children's education. She has been living like this for 7 years.

Each day she buys four containers of good quality water from the water vendor mentioned above at 5 pesos per container, spending a total of 20 pesos per day. She also purchases eight containers of ground-water (poor quality) from an entrepreneur with a well. This individual lives about 200 meters away, and the water costs Winnie 1.25 pesos per container, or another 10 pesos per day. She uses the well (bad) water for washing, bathing, and cleaning. She uses the vended (good) water for cooking, drinking, washing white clothes, and rinsing the children after they bathe in the well water.

Asked when piped water will be coming, Winnie says that she is not sure. She thinks that she might be connected in 2004. She does not know what the connection fee will be, or if it can be paid in installments. She cites the lack of leadership, the need to first widen roads, the lack of budget, and politics as the main reasons she has not been able to get piped water. It should be noted that she lives not in an informal or unauthorized settlement but on a street with concrete roads. Her message to the world is that politicians should know the needs of the people around them, and she feels that water is the main need.

Even when piped water eventually comes, Winnie does not envisage using more than 6 m<sup>3</sup> per month for her family of six. She thinks everyone in Manila should pay the same for the same service, which means that large users on a piped supply should pay at a higher rate. Even if she were on a piped supply, Winnie says

she would still prefer to pay daily and would store some water each day, just in case the water stops.

## Example 7 Manila (Philippines)

### The Distribution Contractor Servicing 25,000 Households in 12 Locations

The contractor, Inpart Engineering, is small and run by one family. It started distributing water by using hoses connected to three well sites in three areas. Inpart, however, has expanded over 5 years to serve 25,000 households in different locations throughout Metro Manila. Another 75,000 households are requesting service. Of the 25,000 households served, about 70% receive their water from a hose connected to their homes every day, and 30% receive piped distribution to the house. The contractor estimates that 95% of its customers are below the poverty line. The source of water in nine sites is bulk water purchased from the concessionaires. The hose service reaches up to 180 meters from the source and is used to supply 200 liters of water per household per day into storage. The distribution service is laid underground for large diameter (50–150 millimeters) high-density polyethylene service connections up to 1,000 meters and above ground for small diameter (12–25 millimeters) connections up to 225 meters.

There are two main reasons why this system works. The first reason is that an *aguador* (caretaker) is appointed to provide water to 100–200 households, and payments are collected daily. The second reason is that there are water meters at the source, at junctions to the *aguadors*, and at junctions to each connection. All these meters are read every day, and if they do not tally, the reason is investigated. NRW is less than 10%. Inpart Engineering maintains the distribution system with the help of the *aguadors*. Neighbors share water, but always commercially.

Those getting water by hose get 200 liters per day and pay about 600 pesos<sup>24</sup> per month for 6 m<sup>3</sup> of water, or 100 pesos/m<sup>3</sup>. Those getting water by direct connection have to pay 1,000–1,200 pesos for connection pipes, fittings, and meters, then they are charged a flat rate of 35 pesos/m<sup>3</sup>. Most use around 6 m<sup>3</sup> per month, equating to a monthly bill of 210 pesos. These charges may be compared with the average tariff of about 8.50–7.00 pesos/m<sup>3</sup>, which those connected to piped water are charged by the conces-

<sup>24</sup> \$1 = 50 pesos (approximately).

sionaires, and the vended price for carted water, which is 125 pesos/m<sup>3</sup>. Bulk water is purchased from the concessionaires in all cases at 12.50 pesos/m<sup>3</sup>. Out of the collections, the aguadors retain 20% for themselves and pass on 13% to barangay (community) funds. The contractor retains a 30% profit, most of which is reinvested in new systems. Over the first 5 years of business, the contractor has spent \$300,000 in capital expenditure, of which about 25% has come from investors (friends) and 75% from tariff revenue. The interest rate on the borrowed money is 48–60% per annum, with repayment periods not exceeding 12 months. New proposals only take about 2–3 months to put in place. Two hardware shops provide most of the materials, and Inpart Engineering does its own construction work.

The contractor has about 30 staff and 100 aguadors. Some aguadors are former water vendors. Memorandums of understanding are signed between communities and the contractor that set out the conditions of supply. Sometimes the contractor also signs agreements with local authorities. The terms are essentially the same as those used in BOT contracts spanning 5, 10, or 20 years. Unfortunately, the concessionaires do not formally recognize the contractor with an agreement, but they do accept Inpart Engineering's payments for bulk water sales. MWSS (the regulator) has also failed to formally recognize this contractor. In fact, the contractor's greatest wish is that both MWSS and the concessionaires would formally recognize what this company is doing for the poor people of Manila and consider lowering the bulk

water rate to roughly 5 pesos/m<sup>3</sup>. The contractor does not pay illegal fees to operate but does engage in some modest public relations efforts. The best aspect of the business, as seen by the contractor, is providing employment for and serving the basic needs of poor people. The worst aspect is having to deal with politics.

When asked why concessionaires are not doing what Inpart Engineering is doing, the contractor responded that concessionaires are making a good profit selling bulk water to them and do not have to deal with the community. Furthermore, Inpart Engineering solves illegal connection and NRW problems for the concessionaires, and they can count Inpart Engineering's connections as official coverage. The contractor believes that everyone in Manila could be served with piped water in 5 years, if the constraints of financial resources, the concession contracts, and political issues could be overcome. The contractor says that concessionaires should be investing their own money to enlarge service areas, rather than make those connected to piped water pay higher tariffs so that the poor can be connected. "It is time for transparency in concession contracts and honoring the performance criteria set out therein. It would have been better if concessions had been awarded to those who are not 100% profit oriented. It is time for the Government to come out with a clear policy designed to get the people connected to piped water, and this policy should recognize the role of SSWPs. At the moment there is a policy for the rich but not the poor."



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