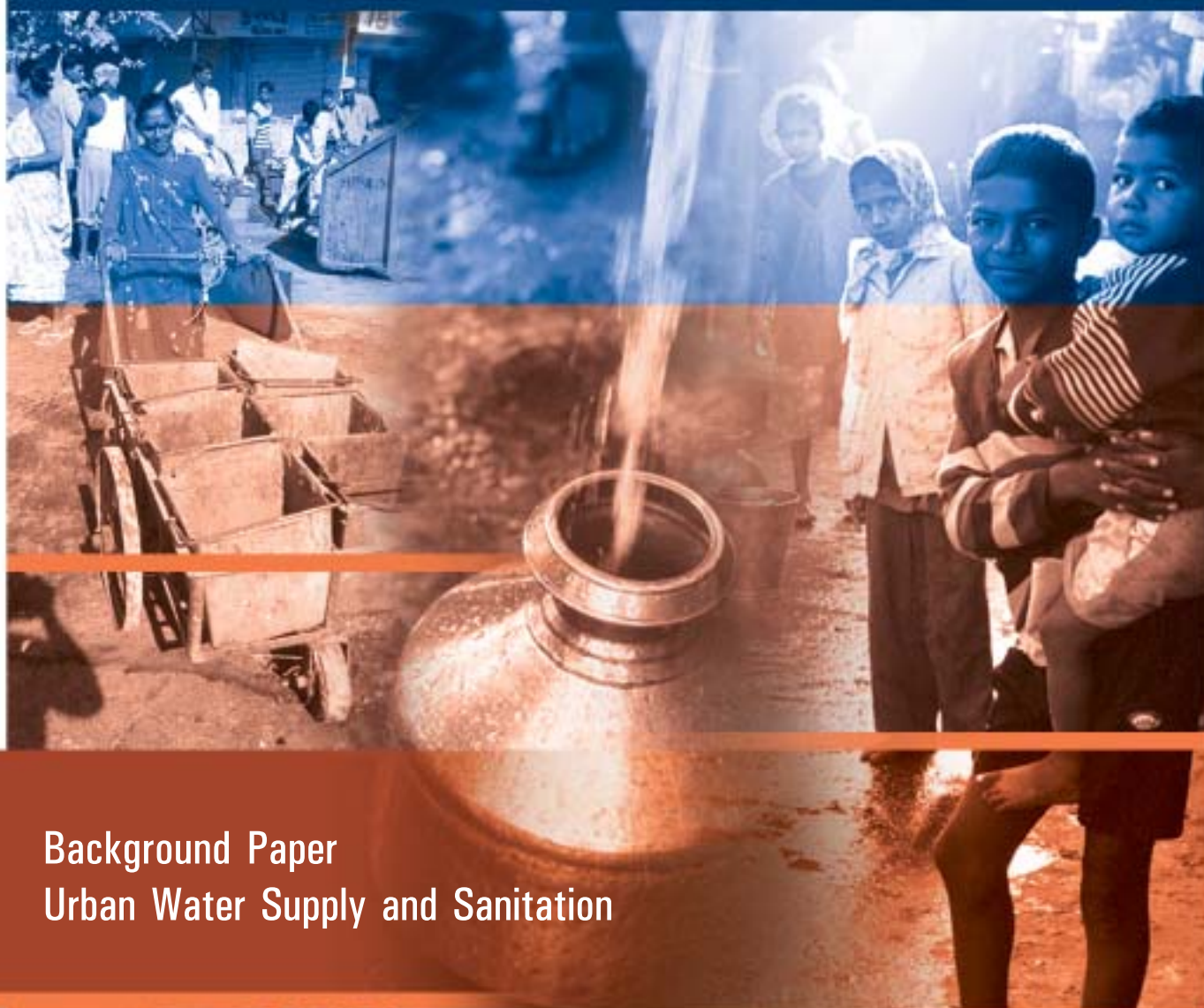


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# India

## Water Supply And Sanitation

Bridging The Gap  
Between Infrastructure and Service



Background Paper  
Urban Water Supply and Sanitation



THE WORLD BANK

January 2006

India Country Team  
Energy and Infrastructure Department  
South Asia Region, World Bank



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Background Paper

Urban Water Supply and Sanitation



THE WORLD BANK

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The Report has been discussed with the Government of India but does not necessarily bear their approval for all its contents, especially where the Bank team has stated its judgements / opinions / policy recommendations.

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# Abbreviations and Acronyms

<b>AUWSP</b>	Accelerated Urban Water Supply Program	<b>MWRRRA</b>	Maharashtra Water Resources Regulatory Authority
<b>ARWSP</b>	Accelerated Rural Water Supply Program	<b>NICD</b>	National Institute of Communicable Diseases
<b>BWSSB</b>	Bangalore Water Supply & Sewerage Board	<b>NSSO NSDP</b>	Nat'l Sample Survey Organization Nat'l Slum Development Program
<b>BOD</b>	Bio-Chemical Oxygen Demand	<b>NRW</b>	Non Revenue Water
<b>CPHEEO</b>	Central Public Health and Environmental Engineering Organization	<b>NC</b>	Not Covered
<b>CRSP</b>	Central Rural Sanitation Program	<b>O&amp;M</b>	Operations and Maintenance
<b>DPR</b>	Draft Project Report	<b>OBCs</b>	Other Backward Castes
<b>DDWS</b>	Department of Drinking Water Supply	<b>PRIs</b>	Panchayati Raj Institutions
<b>FC</b>	Fully Covered	<b>PHED</b>	Public Health Engineering Department
<b>GoM</b>	Government of Maharashtra	<b>PC</b>	Partially Covered
<b>GSDA</b>	Groundwater Survey Development Agency	<b>PCs</b>	Production Centers
<b>GPs</b>	Gram Panchayats	<b>PIC</b>	Performance Index Card
<b>HRD</b>	Human Resource Development	<b>RGNDWM</b>	Rajiv Gandhi National Drinking Water Mission
<b>ICCDE</b>	International Commission for Certification of Draculasis	<b>RSMs</b>	Rural Sanitary Mats
<b>IDSMMT</b>	Integrated Development of Small and Medium Towns	<b>SWSM</b>	State Water and Sanitation Missions
<b>IEC</b>	Information, Education and Communication	<b>SRP</b>	Sector Reform Project
<b>IHHL</b>	Individual Household Latrines	<b>SVS</b>	Single Village Schemes
<b>IPP</b>	Individual Power Pump	<b>TSC</b>	Total Sanitation Campaign
<b>M&amp;E</b>	Monitoring & Evaluation	<b>TWAD</b>	Tamil Nadu Water & Drainage Board
<b>MoU</b>	Memorandum of Understanding	<b>VAMBAY</b>	Valmiki Ambedkar Malin Basti Awas Yojana
<b>MoWR</b>	Ministry of Water Resources	<b>VL0M</b>	Village-Level Operation and Maintenance
<b>MoUD</b>	Ministry of Urban Development	<b>VWSC</b>	Village Water & Sanitation Committee
<b>MCs</b>	Municipal Corporations	<b>WSS</b>	Water Supply and Sanitation
<b>MCS</b>	Mega City Scheme	<b>WQM&amp;S</b>	Water Quality Monitoring and Surveillance Program
<b>MJP</b>	Maharashtra Jeevan Pradhikaran	<b>WTP</b>	Willingness to Pay
<b>MVSs</b>	Multi-Village Schemes	<b>WHO</b>	World Health Organization



## Chapter 1

# Overview of the Current Situation

### Trends in Urban Population

**Trend in Urbanization.** Based on the results of the 1991 and 2001 census, it is estimated that the urban population evolved from 210 million in 1992 to 290 million in 2002, i.e. the end of the 8th and 10th Five Year Plan period respectively. The share of the urban population represented slightly less than 25% of a total population of 850 million in 1992 and slightly more than 28% of a total population of 1,030 million in 2002. It is estimated that the urban population will reach 500 million or about 38% of the total population of 1,300 million in 2017, i.e. the end of the 12th Plan period.

**High Concentration of Urban Population.** The most urbanized States are the National Capital Territory of Delhi (with 93% of the population classified as urban), Tamil Nadu (43.9%), Maharashtra (42.4%) and Gujarat (37.4%). Maharashtra, with an urban population of 41 million, represents 14% of the India's total urban population; Uttar Pradesh accounts for about 35 million and Tamil Nadu for 27 million.

**Classification of Urban Centers.** Urban centers are classified according to their population: Class I: 100,000 and above; Class II: 50,000-99,999; Class III: 20,000-49,999, and Classes IV to VI: 5,000 to 19,999. In 2001, Class I cities comprised 61% of the urban population while Class II, III and IV to VI comprised 13%, 15%, and 11% respectively. At the same date, the total population of the 425 Class I cities and towns was 170 million. One third of India's urban population resides in large cities of more than a million people, whose number increased from 23 in 1991 to 40 in 2001. The total population of Class I cities and towns is estimated to reach 250 million in 2017 and that of Class II to IV towns also 250 million.

**Slum Population.** According to the 2001 Census, 607 urban centers with a total population of 178 million were reported to have slums<sup>1</sup> and the total population of these slums was estimated at 41 million. Following historical trends, the slum population is expected to increase at an average growth rate of 3.5% during the next fifteen years to reach about 69 million in 2017.

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<sup>1</sup> The slums are defined as: (i) all specified areas notified as "Slum" by State/Local Government and UT Administration under any Act; (ii) all areas recognized as "Slum" by State/Local Government and UT Administration which may have not been formally notified as slum under any Act; (iii) a compact area of at least 300 population or about 60-70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities.

## Urban Water Supply and Sanitation Sector Institutional Structure

**Role of the Central Government.** The responsibility for the urban water supply and sanitation (WSS) sector in India is divided between the central government and State governments. The central government is responsible for the regulation and development of inter-state rivers and river basins to the extent that such regulation is in the public interest. The central government also establishes the policy framework for the management of water resources and provides funds for WSS projects via the budgetary routes. The Ministry of Urban Development (MoUD) is the principal department of the central government that coordinates urban WSS sector activities; the Central Public Health and Environmental Engineering Organization (CPHEEO) is its technical arm. The MoUD

receives assistance from the Ministry of Health and Family Welfare, Ministry of Water Resources (MoWR), Ministry of Environment and Forests, and the Planning Commission (Table 1). MoWR has some responsibility in the regulation of ground water, but no agency currently plays the role of the economic regulator of the urban WSS sector.

**WSS is a State Subject.** Apart from above described functions, all matters relating to the urban WSS sector are within the functional domain of State governments which lay down policies for the allocation of water for different purposes, and establish institutional systems for their development and management (Table 2). Institutional arrangements vary from State to State: State-level Public Health Engineering Departments (PHEDs), specialized State-level WSS Boards, specialized city-level Boards, and Municipal Corporations (MCs) and Urban Local Bodies (ULBs)

**Table 1: Central Government Institutions in the WSS Sector**

Ministry	Institution	Responsibility
Planning Commission	Planning Commission	Planning and allocation of central government funds through Five Year Plans
Ministry of Water Resources	Central Water Commission (CWC)	Central policy making
	Central Ground Water Board (CGWB)	Regulatory activities of ground water concerning quality and overexploitation
Ministry of Environment and Forests	National Rivers Conservation Directorate (NRCD)	Responsible for river bodies
	Central Pollution Control Board (CPCB)	Pollution watch
Ministry of Urban Development (MoUD)	Central Public Health Environmental Organization (CPHEEO)	Standards setting and harmonization between States
Ministry of Health and Family Welfare	National Institute of Communicable Diseases (NICD)	Research and Advocacy, particularly with civil society
Others	Housing and Urban Development Corporation (HUDCO)	Funding four housing and other infrastructure sectors.
	Life Insurance Corporation (LIC)	Development funding

Source: Govt web pages and consultant reports

Table 2: Institutional Arrangement in the Urban WSS Sector

Agency type	Jurisdiction	Responsibilities		Examples
		O&M	Capital works	
State-level Specialist Agency (SSA)	Entire State Large cities	City-level specialist agency Local Government	SSA SSA	Kerala Uttar Pradesh
	Small cities		SSA	Karnataka Maharashtra Tamil Nadu Uttar Pradesh Delhi
Public Health Engineering Departments (PHED)	Entire State Small Cities	Local Government	PHED PHED	Rajasthan Andhra Pradesh
Municipal Departments	Large municipal corporations	Municipal Department	Municipal Department	Gujarat Tamil Nadu Andhra Pradesh
Metropolitan-level Specialist Agency (MSA)	Metropolitan centers	MSA	MSA	Bangalore Chennai Hyderabad
Specialist Municipal Undertaking (SMU)	Metropolitan centers	SMU	SMU	Mumbai

Source: (Urban WSS - WB Group Strategy; May 2000)

deal with urban WSS related issues. The 74th Constitutional Amendment Act of 1992 envisages WSS for domestic, industrial, and commercial purposes to be one of the 18 functional responsibilities of ULBs. However, the decentralization process has been very slow, leaving the main responsibility for planning and implementation of urban WSS programs in cities that do not have their own WSS Boards to the State-level WSS Boards and PHEDs. The O&M responsibility is supposed to be passed on to ULBs upon completion of the works; but due to a lack of capacity and incentives, ULBs often leave State-level entities to carry out O&M functions.

**Only a few “Ring Fenced” City Water Boards.** Several metropolitan cities, such as Delhi, Chennai, Hyderabad, and Bangalore have semi-autonomous WSS Boards. These are nominated Boards with limited functional autonomy. Separate departments of the Calcutta and Mumbai MCs handle WSS operations. However, most of the 5,000 plus MCs and ULBs, have either not taken up the responsibility of the WSS service or have merged it with other municipal services. As staff, financing and accounting functions are common the absence of transparency and accountability has led to a low level of service.

## Central Government Urban WSS Policies and Programs

**Gol Policies.** Central government policies address issues of access to WSS, water resources management and decentralization of management responsibilities. Provision of WSS services has been included in the first Five-Year Plan as a developmental priority, but it was not until the first National Water Policy of 1987 was formulated that drinking water was given priority over other water uses. In 2002, the central government put out another major water policy statement reinforcing the importance of drinking water over other uses, and introduced the concept of private sector participation, commercialization and cost recovery. The evolution of Gol sector policy is summarized in Box 1.

**Urban WSS Programs.** The Accelerated Urban Water Supply Program (AUWSP) is a centrally sponsored program for extending access to urban WSS infrastructure. The Engineering Training and Research and Development Programs are the other centrally sponsored program aimed at developing the capacity of urban WSS staff.

## Box 1: Major Principles of the National Water Policy and Five Year Plans

**National Water Policy (1987):** This policy assumed a holistic view of the water sector and advocated for the development of Integrated information systems, conservation of resources, emphasis on multipurpose projects, and periodic groundwater assessment. It also prioritized drinking water over other water uses and stated that water rates should not only convey the value of scarcity but also cover a portion of fixed costs and the annual maintenance and operation charges.

**National Water Policy (2002):** The policy stipulates the progressive new approaches to water management including Re-enforcement that drinking water is the top priority over competing water uses, monitoring and limitation of ground water exploitation, monitoring and enforcement of water quality measures, and increasing awareness of conservation measures and water scarcity. One of the most notable features of the 2002 Policy is the proposal to increase private participation in the sector and access to commercial borrowing.

**9th Five Year Plan:** Some of the major policies highlighted in the Plan included extending water services to the entire population and sanitation services to “reasonable levels”, reinforcing the Constitutional Amendment that decentralized responsibility to ULBs, enhancing financial viability through full cost recovery, and enhancing social and environmental sustainability through eco-friendly and inclusive programs.

**10th Five Year Plan:** Major policy components of the Plan include prioritizing water service to the currently “uncovered” populations, emphasizing participation of stakeholders in planning and implementation of schemes, integrating water and sanitation programs to emphasize conservation, and recommending the use and provision of subsidy of select latrine technologies.

**Accelerated Urban WSS Program – AUWSP.** Launched in 1993-94, the AUWSP aimed at extending WSS services to households of Class IV to VI cities and towns. 50% of program funds are provided by the central government and 50% by the States. As of January 2003, AUWSP had sanctioned WSS schemes in 796 towns and completed or commissioned WSS schemes in 298 towns. Towns to be covered by the program are selected by State committees. Priority towns are those that have low per capita water supply, distant or deep water sources, contaminated water sources, high incidence of water borne diseases or are located in drought prone areas. Although the guidelines for the selection of towns require that: (i) a provision for sustainable O&M mechanism is evolved and incorporated in the Draft Project Report (DPR); (ii) a sustainable WSS tariff system is approved by the State government and also incorporated in the DPR; and (iii) a provision be made for a 5% contribution from the ULB towards

the project cost, there is no evidence that these conditions are respected.

**Public Health Engineering Training, Research and Development Programs.** Initiated in 1956 by the Central Public Health and Environmental Engineering Organization (CPHEEO), this centrally-managed program aims at training employees of States, ULBs, and mega-cities about Public Health Engineering (PHE) components of WSS projects. Programs are for long term post-graduate level courses, short term courses, and refresher courses. Between 1989 to 2002, Rs 100 million (US\$2.2 million equivalent) have been allocated to the programs, with approximately Rs 83 million (US\$1.85 million equivalent) already spent. Over this period, nearly 16,000 PHE engineers have been trained. Since 1985-1990, MoUD has also sponsored development programs targeted specifically at water extraction and treatment technologies as well as project implementation and management methods.

## Urban WSS Infrastructure

### *Water Supply: Infrastructure versus Service.*

According to Gol, India has extended access to urban water supply to 90% of urban households in 2001; this means that an estimated eight million people have been provided access to a safe source of water every year during the period 1990-2000, a very commendable progress. However, data related to water supply that are available in the Census and the National Sample Survey Organization (NSSO) are limited and mostly focused on access to infrastructure; there are no comprehensive data quantities of water produced, distributed and sold, quality of water produced and distributed and overall quality of the WSS service provided. For example, Gol and States typically rely on a “liters per capita per day – lpcd” indicator as a proxy for access, but there is no indication of the number of hours the service is provided per day or per week. Well-designed water supply indicators, such as that of the UK Regulator Ofwat, are presented in Table 3.

**Access to Water Supply.** Figure 1 summarizes the evolution of access to “safe” water supply in urban

areas. Coverage, however, is unevenly distributed between States or classes of Cities (Figure 2 and Figure 3). For example, in 2001:

- Kerala, Manipur, Nagaland, and Mizoram, had coverage below 60%, significantly lower than the national average of 90%, mostly reflecting the availability of shallow aquifers and the use of open wells, that cannot really be considered a “safe” source of water in an urban environment;
- Mega-cities, including Bangalore, Delhi, Chennai, Hyderabad, Calcutta, and Mumbai, claimed that all urban households had access to safe water either through a piped system, a handpump, or a tubewell;
- Access to piped water infrastructure decreases with the size of ULBs; 73% of the population living in Class I cities had access to piped water against only 58% in Class IV to VI.

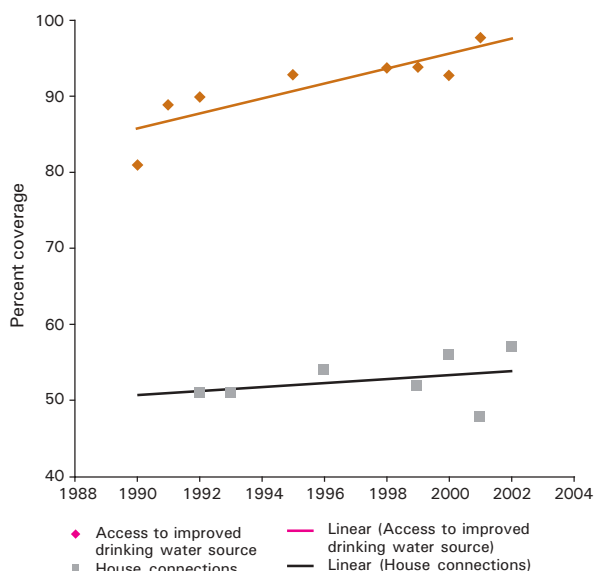
**Access to Piped Water.** In 2001, nearly 74% of the urban population had access to piped water supply, a figure to be compared with about 50% in 1991. But States such as Assam, Bihar, Madhya Pradesh,

**Table 3: Examples of Water Serviceability Reporting Standards**

United Kingdom	India
<b>Properties at risk of receiving low pressure</b> <b>Reliability and Continuity</b> Supply interruptions: Percentage of properties in the area that have: <ul style="list-style-type: none"> <li>• Unplanned and unwarned supply interruptions</li> <li>• Interruptions that are greater than 6, 12, and 24 hours</li> </ul>	<ul style="list-style-type: none"> <li>• Total hours of supply per day</li> <li>• Number of times supplied daily</li> <li>• Quantity water supplied through tankers daily (m<sup>3</sup>/day)</li> </ul>
<b>Water Quality</b> Non-compliance of water supply zones (%) with contaminants – seven separate measures including iron, pesticides, and nitrate. Number of times enforcement was considered for breaching microbacterial standards.	Whether laboratory [water quality monitoring] facilities are adequate? Yes/No Periodicity of monitoring water quality? Yes/No
<b>Customer Service</b> Customer complaints dealt within 10 days. Enforcement of metering: customers with meters receiving bills based upon metering.	No indicator or standard. No indicator or standard (less than 1 % of connections are metered in the sample ULB).



**Figure 1: Access to Urban Water Sources: "Improved Access" versus House Connections**

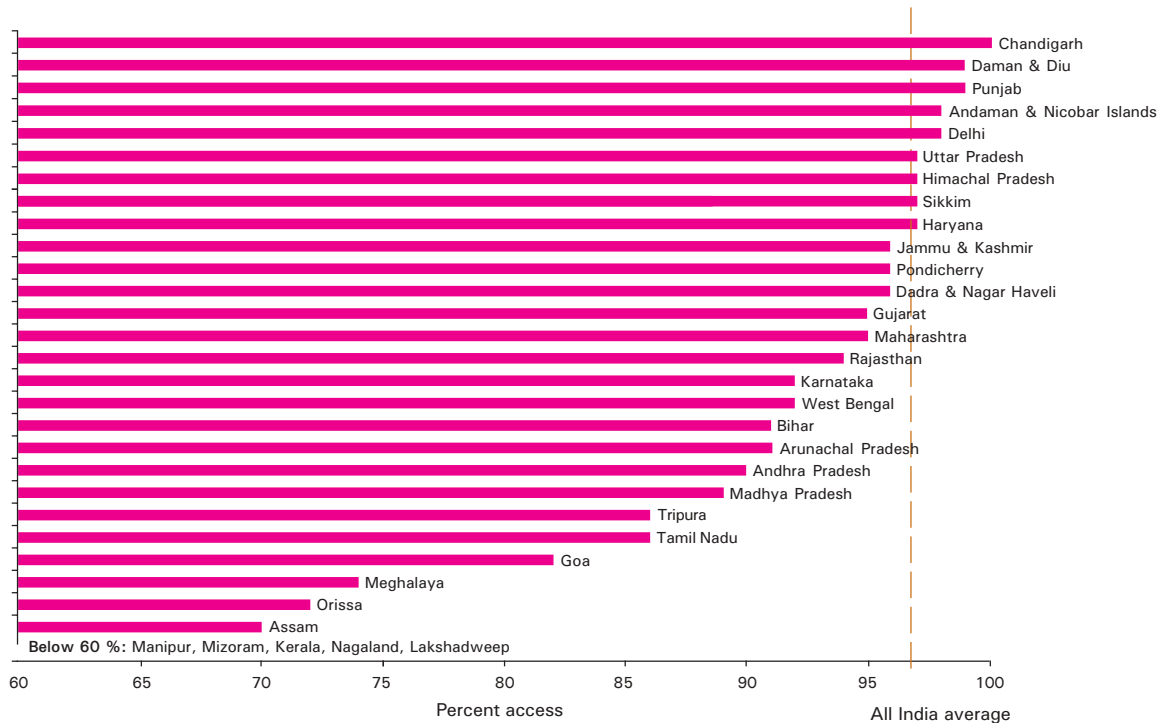


Note: Data sources are 1991: Census of India; 1993: Demographic and Health Survey 1992/93 and NSSO; 1996: NSSO 1999: National Family Health Survey 1998-1999; 2000: Multi-Indicator Cluster Survey; and 2002: Census of India

Meghalaya, Nagaland, Orissa, and Uttar Pradesh seem to have experienced decline in access to piped water (Figure 4) during this decade. However, the 2001 Census does not distinguish between water available within and outside of premises. Based on other surveys, it is estimated that about approximately 50% of the urban population had a direct connection to piped water in 2001. The trend of other types of service (handpumps, tubewells, wells) is more difficult to track because the 1991, the Census did not distinguish between handpump and tubewell.

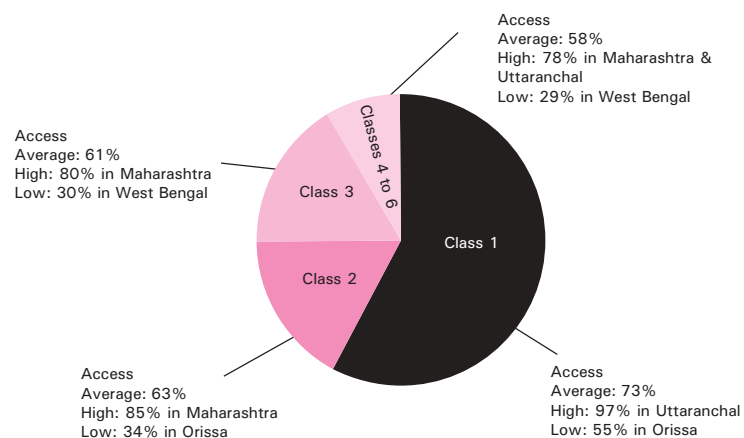
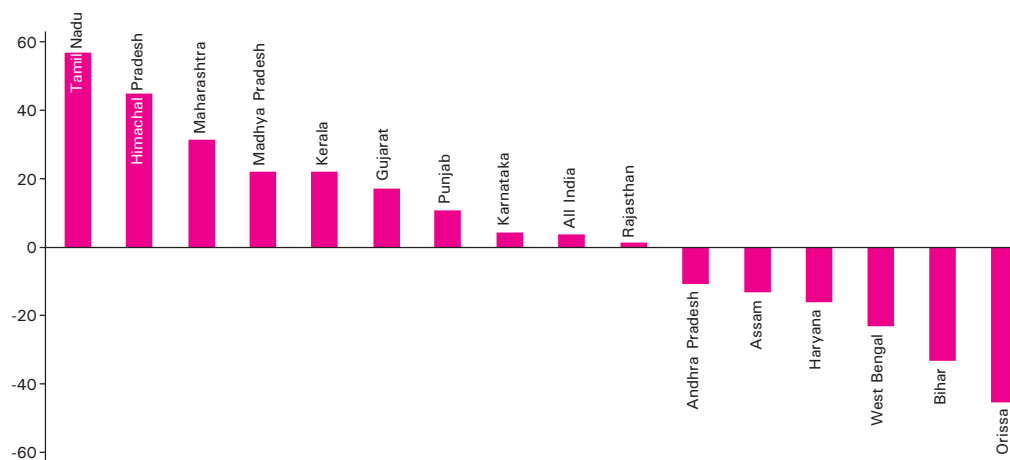
**Slum Settlements.** Access to water services is universally low for those living in slums or squatter settlements. Across India, 65% of urban slums have access to water through communal taps, 25% obtain access through wells and handpumps and the remainder water from tankers. These data are however inclusive only of "authorized" slums while "semi authorized" and "unauthorized" slums are not recognized by ULBs and therefore are not required to obtain water services. Provision of sanitation facilities occurs even less often; 70% of Indian slums do not have access to sanitation. This problem is

**Figure 2: State-wise Access to Water Infrastructure**



Source: Census 2001

Figure 3: Distribution of Population and Respective Access to Water

Figure 4: Progress and Slippage—Access to Piped Water in 1991 and 2001<sup>2</sup>

Source: Census 1991 and 2001

compounded by other living conditions – 66% of Indian slums remain water-logged during the monsoon and become breeding grounds for mosquitoes and are at the origin of many water borne diseases. Government initiatives targeting slums are summarized in Box 2. In addition to Gol programs, several Cities and States have taken initiatives to address the issue of services to slum areas, with the support of NGOs or donor agencies, such as in Ahmedabad and Hyderabad.

**Sanitation – Infrastructure versus Service.** In 2001, about 62% of the urban population had access to toilets, either connected to sewers or septic tanks or to pit latrines and serviced latrines (Box 3). Depending on soil condition and maintenance, septic tanks and pit latrines can be considered as safe disposal. But poorly maintained septic systems often contaminate ground and surface water, as do pit latrines located near sources of water supply. Serviced latrines are problematic, because servicing of these latrines is

<sup>2</sup> Note: Piped access includes pipes that are both within and away from the premises.

## Box 2: Government Initiatives that include Provision of Water and Sanitation Services to Slums

GoI programs that include provision of services for slums are listed below:

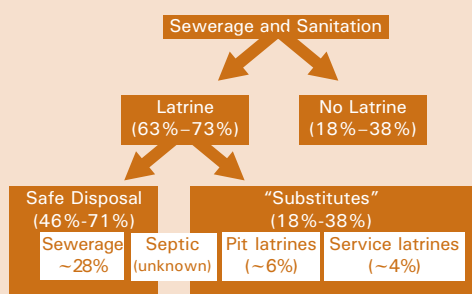
- Integrated Development of Small and Medium Towns (IDSMT): One of the objectives of IDSMT, launched in 1979, is the development of infrastructure, including WSS, in towns that serve as intermediaries for rural-urban migration.
- Mega City Scheme (MCS): Launched in 1993 for the mega-cities Mumbai, Calcutta, Chennai, Bangalore, and Hyderabad, this program created a revolving fund to finance urban infrastructure in particular in slums.
- National Slum Development Programme (NSDP): Targeted specifically at female slum dwellers, the NSDP sponsors infrastructure development, including WSS facilities and environmental improvement.
- Valmiki Ambedkar Malin Basti Awas Yojana (VAMBAY): Launched in 2001, the program targets slum dwellers; it has earmarked 25% of its total funds for WSS.

Source: Ramanathan Foundation 2002b

done manually, a task often delegated to socially disadvantaged groups. According to NSSO 2002, nearly 18% of the urban population had no access to latrines.

## Box 3: Sanitation Terminology and Approximate Use

Different reporting standards of the National Census, National Sample Survey Organization (NSSO), and the Central Public Health Environmental Engineering Organization (CPHEEO) classify sanitation access in several different ways. Common threads to terminology and ranges of percentage urban access include:



Source: NSSO 2002, CPHEEO 2000, Census 2001

**Access to Toilets and Sewerage.** Estimations for access to toilets range from 46% to 71%, with Gujarat having the highest coverage (71%), followed by Maharashtra (49%) and Punjab (44%). In Orissa and Rajasthan, as much as 80% of toilets are connected to septic tanks. Despite a higher proportion of slum areas, mega-cities have good access rates to toilets, ranging from 52% in Delhi to 90% in Hyderabad (Table 4). Access to sewerage is far lower than that of toilets; an average of 28% of the surveyed population had access to sewerage facilities (Figure 5).

## Urban WSS Services

**Assessing the Gap.** This section analyzes the gap between access to “WSS infrastructure” and access to “WSS service” according to four main criteria: reliability, financial sustainability, environmental sustainability and affordability.

### Reliability of WSS Services

“Reliability” refers to the ability to meet norms. GoI norms for quantity and quality of WSS services are infrequently monitored and are often unmet when monitored. GoI establishes norms based on classes of cities but most States have their own classifications

Table 4: Access to Toilets in Mega-Cities

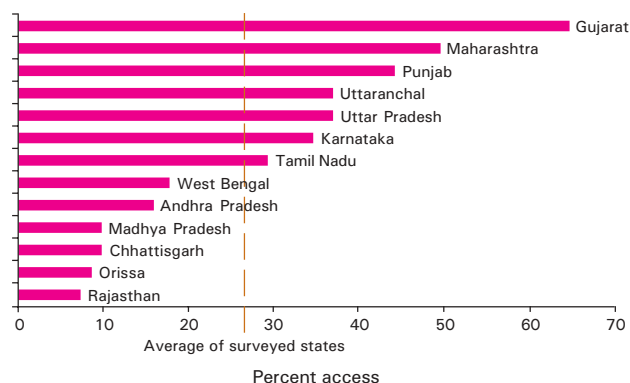
	Bangalore	Calcutta	Chennai	Delhi	Hyderabad	Mumbai
Households having Closed Drainage or Sewerage Systems	78%	62%	83%	52%	90%	56%

Source: Estimates gathered from field visits.

and norms. Gol norms propose dimensioning of the facilities on the basis of: (i) 150 lpcd for metro-cities (which are all equipped with sewerage systems); (ii) 135 lpcd for towns and cities equipped with a sewerage system; (iii) 70 lpcd for towns and cities not equipped with a sewerage system; and (iv) 40 lpcd for the population relying on standpipes. State requirements are usually lower than Gol norms. In most cases, the quantity of water reaching consumers is low; in some cases it is only half of the norm.

**Reliability** also refers to the permanence of the WSS service. No Indian piped water supply serving either mega-cities or smaller towns distributes water more than a few hours per day; this occurs regardless of the quantity of water available for distribution. While wealthy customers cope with an erratic service by developing substitutes such as backyard boreholes, boosters, storage reservoirs and purification equipment, the poor, who cannot afford them, suffer most by investing their time waiting for the water to come, often late at night, or by fetching it from distant sources. Across States, mega-cities, MCs and ULBs, water availability is at a very low average of 2.9 hours per day (Table 5). Despite regular investment during

Figure 5: Access to Sewerage Facilities



Source: CPHEEO 2000.

the last decade, these extremely low levels have barely improved: availability has even declined, for example in the case of Delhi<sup>3</sup>. Permanence of the water supply service is the lowest amongst developing countries comparable to India. The percentage of connections that have access to a service provided 24 hours per day, seven days a week ("24/7") is 90% in Jakarta, 88% in Manila, 60% in Colombo: it is only 1% in Delhi.

Table 5: Poor Accessibility to Water Supply in India

Class of Cities	Hours of Water Service per Day (average)	Days of Supply per Week (average)	Mega-cities	Hours of Water Service per Day (average)
1	4.2	5.9	Mumbai	5
2	3.3	5.6	Calcutta	10
3	3.7	5.1	Delhi	3.5
4 to 6	4.4	5.6	Chennai	4

Source: Sample of ULB data from CPHEEO, State Governments, and ULBs, ADB 1997

<sup>3</sup> In 1992 water was available on average for 7 hours per day as compared with 3.5 as measured in 1997 (MIDS 1995, ADB 1997, and Ruet and others 2002).

**Reliability** also refers to the seasonal variation of service. The distribution of rainfall and groundwater across India, combined with insufficient storage capacities has created severe seasonal water shortages. Most of the annual four billion cubic meters of rainfall is concentrated over four monsoon months of June to September WSS WHO/UNICEF. There is no national data collected on seasonal variation of water supply service for cities, but several studies have noted that urban areas consistently under-perform in summer months. In Karnataka, water availability in cities and towns can be as low as 20 lpcd, roughly 16% of demand. In 2004, water production in Chennai, which suffered from three bad annual rainfalls in a row, was limited to an average of about 20 lpcd; the Water Board was unable to distribute piped water for the entire month of May.

**Reliability** also refers to the safe removal of waste water and excreta from the immediate environment: overflows of raw sewage in open drains resulting from blocked sewers or non functioning pumping stations, are common, as are latrines used for other purposes than that they were intended for. Intermittent water supply and inadequate sanitation translate into high contamination risks and affect overall public health.

## Financial Sustainability of WSS Services

**Best Practices.** Best practice worldwide suggests that “financially sustainable” WSS service providers recover O&M costs, and ideally capital costs, from user charges, rather than from taxes. Only a few Indian mega-cities recover such costs. Revenues generated by most piped water systems have to be complemented by ULB and/or State fiscal transfers. Financial dependence of WSS operations has led to well below standard O&M, deterioration of WSS assets, poor level of service and, as a consequence, low willingness to charge by decision makers despite

evidence of willingness to pay for a good quality service by users.

**A Sector in Poor Financial Shape.** Despite advocacy from the Central government for financial self sufficiency the current financial situation of the UWSS sector is alarming. Most WSS operations do not generate sufficient revenues to recover their O&M expenditures, as evidenced by working ratios (ratio of operating costs, excluding depreciation and debt service, to operating revenues, excluding operating subsidies) exceeding 1. The performance of Indian WSS Service Providers is the lowest among comparable Asian countries. Mega-cities, except Delhi and Kolkata, usually cover their O&M costs from user charges. Also, in these mega-cities, the connection and collection ratios are somewhat higher than in other MCs or ULBs, and a larger commercial and industrial consumer base allows cross subsidization among categories of customers (Table 6 and Table 7). The main factors contributing to the lack of financial sustainability are mostly; (i) poor financial management and accounting system; (ii) inadequate tariff level and distorted tariff structure; (iii) high capital and O&M costs; (iv) overstaffing; and (v) high level of non-revenue water.

**Poor Financial Management and Accounting Systems.** In most small to medium ULBs, WSS related revenues and expenses are handled and recorded in various departments within and outside of the municipality; this makes it difficult to provide a clear overview of the financial situation of WSS operations. There are many recorded and unrecorded subsidies in the accounts, and the cash based single entry accounting system widely used in India does not provide sufficient information for constructing accurate individual financial statements, needed to make sound management and investment decisions. ULB-based

**Table 6: Working Ratios in Selected Indian Mega and Medium Cities<sup>4</sup>**

Working Ratio	Bangalore	Calcutta	Chennai	Delhi	Hyderabad	Mumbai	Average
Mega-cities	0.75	4.4	0.58	2.13	1.01	0.53	1.56
	Jaipur	Chandigarh	Ludhiana	Average			
Medium Cities	3.01	1.72	1.78	2.17			

<sup>4</sup> Source: WSP-SA Benchmarking study report and field visits.



Table 7: Working Ratios for Selected Indian States<sup>5</sup>

Working Ratio	Karnataka	Maharashtra	Rajasthan	Tamil Nadu	Uttar Pradesh	Average
	3.2	3.6	3.1	2.5	2.3	2.94

Table 8: Overview of Tariff Structures in Urban India

		Metropolitan Cities (%)	Smaller Cities and Towns (%)
Metered	Uniform Volumetric Tariff	58	77
	Increasing Block Tariff	42	23
	Flat Rate Charge	56	72
Unmetered	Ferrule-based Charge	39	20
	ARV-based Charge	5	5
	Tap-based Charge	0	3

Source: PPIAF and WSP 2002 (adapted from NIUA 2002).

WSS operations are also handicapped by a limited degree of autonomy on staffing, often shared with other services, and on financial matters. Actually, very few urban WSS Service Providers have been able to build the capacity needed to effectively discharge their duties.

#### ***Inadequate Tariff Level and Distorted Tariff***

**Structure.** With a low or even declining quality of service, decision makers are not willing to raise tariffs, despite a proven willingness to pay for improved WSS service. In the absence of systematic metering (only about 50% of the connections are metered) and because the poor reliability of meter reading in a non permanent water supply situation, bills are often established on assessed consumptions or simply on a lump sum basis (Table 8). Revenues from residential customers are way below O&M costs: domestic tariffs are sufficient to cover only 10% of O&M costs in cities with metered consumption and 15% in cities with unmetered consumption. Large industrial customers are charged tariffs that are several times domestic tariffs, on the assumption that they can afford it. In mega and large cities a small percentage of customers generate a large share of revenues, placing the WSS service provider in a fragile situation: if large customers opt out of the service,

revenues may decrease significantly. WSS tariff structures are overly complex and generally skewed to benefit high and middle income domestic consumers. Most tariff structures include a lifeline tariff aimed at low income households, which in fact benefits middle income households, as the poor seldom have access to piped water. Among mega-cities, only Chennai and Bangalore have highest blocks of tariffs that compare with the full cost (O&M plus capital) or WSS service provision.

**High Capital and O&M Costs.** Because of the absence of reliable data, it is difficult to assess whether the WSS service is provided in an efficient manner. Standard design criteria which do not take into account elasticity of demand to pricing may be too generous, in particular in small towns. Planning of infrastructure development is often deficient and selection of new water sources or waste water treatment plants is not always done on the basis of a rational cost benefit analysis. Mega-cities which have been implementing Performance Improvement Plans for many years, often as part of externally financed projects, still have significant excess staff, high power costs and high Non Revenue Water (NRW). Data available suggest that mega-cities have staffing levels much higher than international best-practice of roughly two to three time staff per 1,000 connections

<sup>5</sup> Source: Estimates gathered from field visits and CPHEEO 2000.

in developed countries and four to eight staff per 1,000 connections in developing countries (Table 9). It is more difficult to assess the adequacy of the level of staffing in smaller non “ring fenced” WSS operations for which State Engineering Agencies usually carry out many tasks. NRW which measures the amount of water that is produced but does not generate revenues includes, in addition to physical losses, metering inaccuracies, unbilled consumption and unauthorized consumption. Across India average NRW is estimated at 45%. The few data available show that higher NRW occur in larger cities: (Figure 6) in Delhi, it is estimated at 59%.

## Environmental Sustainability of the WSS Service

“*Environmental Sustainability*” relates to the proper recharge of aquifers and reservoirs, the robustness of the water rights and the capacity to protect water quality against domestic, agricultural and industrial pollution. Most cities have to compete with agriculture to secure water rights and very few are able to contribute to the abatement of the pollution level in the receiving bodies.

**Water Rights.** Many urban water supply systems rely on surface water sources that affect several States, but the lack of clear inter-State allocation rules have led to growing conflicts from which the cities are first to suffer. Many States heed more attention to laying claims for future water right awards than for using current allocations efficiently; this applies in particular to “surplus” States that may have the feeling that they will not be properly compensated for water taken away from them by less-endowed States. Drinking water is in theory given the first priority, but farmers usually do not want to give up their rights, because

they often feel that they may not be properly compensated. Chennai is an example of difficult water resource management. While the infrastructure to bring large quantities of water from the Krishna River is completed, the city has yet to receive its first cubic meter of water from this scheme, because there is still no agreement among riparian States on the water allocation for the city. Also, while a large aquifer exists outside of the city and is being used mostly for irrigation purpose, no formal water rights trading mechanism is in place; an informal mechanism exists, however. Nevertheless, in 2004, Chennai waste water generation was three to four times piped water production, and in May of the same year, when the

Figure 6: NRW by Class of Cities and Mega-Cities

Class of City	Non Revenue Water (%)
1	44
2	39
3	35
4 to 6	34

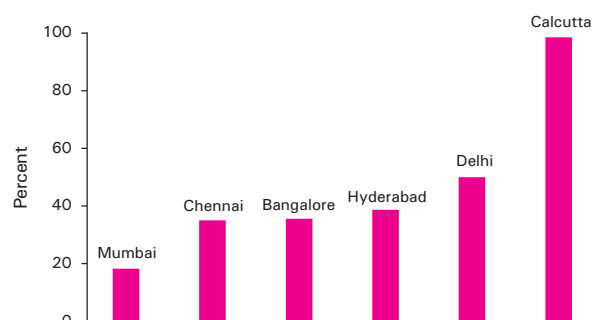


Table 9: Total Staff per 1,000 Domestic Connections<sup>6</sup>

	Bangalore	Calcutta	Chennai	Delhi	Hyderabad	Mumbai
Total Staff per 1,000 Connections	8	37	16	18*	17	30

Source: Estimates gathered from field visits.

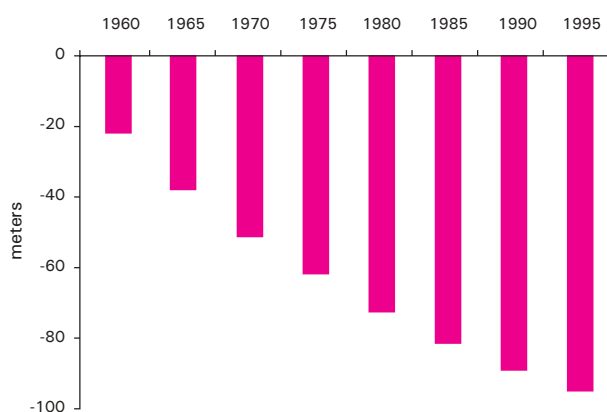
<sup>6</sup> \*There is great variation in data reported for staffing - one example is for Delhi where DJB reports 18, the Asian Development Bank found it to be 21.4 (1997), and other estimations find numbers to exceed 25.

Metro Water Board could not distribute piped water at all, 11,000 tankers were crisscrossing the city to provide minimum quantities of water to households and businesses. Coping strategies have obvious physical and environmental limits in addition to high financial and economic costs.

**Depletion of Groundwater.** Figure 7 shows the steady decline of water levels in tubewells in Ahmedabad. Depletion and contamination of aquifers underlying cities is the norm, as unregulated urban groundwater abstraction is the main mechanism to cope with a deficient public piped urban WSS service. Improving the performance of urban WSS utilities should contribute to the rejuvenation of urban aquifers.

**Water Quality.** Water quality has deteriorated in many receiving bodies as a result of uncontrolled discharges or raw domestic, industrial waste waters, as well as agricultural run-off. In most urban WSS operations, the solution to the problem has too often been to build additional waste water treatment plants, designed to provide high level of effluent treatment, and not enough to rehabilitate the collection of waste water. In many cities, only a fraction of the waste water generated and discharged into sewers actually reach the treatment facilities, as sewers are silted up because of poor maintenance and pumping stations are faced with unreliable power supply. As a result, quality in receiving bodies has seldom improved. River Basin Agencies, which are the proper instrument to address comprehensive improvement of the water quality have been created on paper, but in fact do not exist.

Figure 7: Depletion of Groundwater in Ahmedabad



**Realistic Environmental Objectives.** While substantial investments in wastewater collection, treatment and disposal have been made throughout India, the environmental condition of water bodies in and near urban areas is still very poor. The reasons commonly cited include explosive urban growth, financial constraints limiting both further investment in wastewater infrastructure and adequate O&M of existing systems. However, there is growing acknowledgement that the deterioration of urban environmental conditions is primarily due to a chronic lack of strategic sanitation planning. Investments are typically made in an ad hoc manner, often at high cost to meet effluent standards, but without concern for their cost-effectiveness to achieve environmental objectives (which are usually lack clarity and realism), and without comparing the expected environmental benefits in response to the costs of improvements in the pollution control infrastructure.

## Affordability of Services

**"Affordability"** can be defined as the ratio of the "total cost" of the WSS service(s) a household relies on to the cost of a WSS service meeting standards that would be charged at its full (O&M plus capital) cost. The "total cost" includes in addition to the WSS bill: (i) direct coping costs in terms of investment for and O&M of substitutes to the public WSS service; and (ii) indirect coping costs in terms of time spent, productivity losses, and treatment of waterborne diseases.

**Coping.** Coping with a poor quality WSS service is expensive. In Delhi, it has been estimated that a household whose official water bill is Rs 500 per year (US\$11.75/year) spends about Rs 4,000 per year (US\$94/year) installing and operating substitute sources (storage tanks, booster pumps, purification equipment, back-up borehole and motorized pump). Based on an average consumption of 100 lpcd, a household of five would consume about 185 m<sup>3</sup>/year; its current water related expenditures are close to Rs 25/m<sup>3</sup>, to be compared with the current average tariff of Rs 2.7/m<sup>3</sup> and an average tariff of Rs 15 to 20/m<sup>3</sup> needed to cover O&M costs. Box 4 summarizes the outcome of a survey carried out in the greater Bangalore area on coping costs and willingness to pay.

**Poverty.** According to the Planning Commission, in 1999-2000, about 24% of the urban population lived under the official poverty line of Rs 454 (US\$10.7) per capita per month. A recent analysis<sup>7</sup> concludes that the percentage of household income spent on water is between 1 and 2%, even for the households below the poverty line. This is below the usually quoted WHO reference point of 5% of income. A household of five with income at the level of poverty line spends about Rs 35/month on water. Connection fees to the distribution network are typically in the Rs 1,000 (US\$23.5) range and represent an economic barrier to poorest households.

## Capacity Building in Urban WSS

**WSS Training.** WSS training and capacity building programs are conducted through dedicated agencies which work in coordination with MoUD, the Ministry of Health and Family Welfare and the Central Water Commission. CPHEEO is the technical wing of MoUD that is responsible for setting technical design standards and urban water supply norms. CPHEEO

also coordinates the provision of training as well as the syllabus of 31 local training institutions and the demand for skills enhancement by PHEDs and State Water Boards. Several other major public training institutes also provide capacity building in the urban WSS sector (see Annex 1 for more details):

- The Engineering Staff College of India (ESCI);
- The Anna University;
- The India Water Works Association (IWWA);
- The Human Settlement Management Institute (HSMI);
- The Chennai Metropolitan Water Supply and Sewerage Board Resource Center;
- The All India Institute of Local Self Government (AIILSG); and
- The Society of Promotion of Area Resources Centre (SPARC)

### Box 4: Demand for Improved Water Supply and Sewerage Services in Eight Urban Local Bodies of Greater Bangalore (WSP-SA 2005)<sup>8</sup>

About 10,000 consumers were surveyed in 2004 to assess coping costs and preferences for improved WSS services in the Greater Bangalore, where there is currently a water deficit estimated at about 60% if the demand, and coping strategies include private bore wells, sumps and overhead reservoirs to manage irregular and inadequate supplies; booster pumps to cope with low pressure; use of storage mechanisms, like earthen pots, small tanks and buckets by low income/poor households; purchase from vendors and purchase of bottled water; time spent in queuing up for water collection; use of filter or boiled water. Most non-domestic consumers have their own borewell or purchase water from vendors. The average coping cost for households is about Rs 24/m<sup>3</sup>, varying from Rs 3/m<sup>3</sup> for high rise flats to Rs 13/m<sup>3</sup> for low income group plotted houses, and Rs 7/m<sup>3</sup> in slum areas. Coping costs reach Rs 71/m<sup>3</sup> for small and medium industries and Rs 39/m<sup>3</sup> for large industries. The expected O&M cost of the upcoming water supply and sewerage extension project is estimated at Rs 16/m<sup>3</sup> suggesting that it would generate significant savings. A detailed econometric analysis of the survey data was also carried out to estimate the consumers' Willingness To Pay (WTP) for improved WSS services. Among household categories, WTP is about Rs 16/m<sup>3</sup> for high-rise flats, between Rs 10 and 12/m<sup>3</sup> for plotted houses and between Rs 7 and 10/m<sup>3</sup> for lower incomes households. Industries and commercial establishments have expressed a WTP of about Rs 67 and 43/m<sup>3</sup> respectively.

<sup>7</sup> *Water tariffs and subsidies in South Asia: A scorecard for India, funded by PPIAF, WSP-SA, and WBI, 2002.*

<sup>8</sup> *WSP-SA (2005) Report: Demand for Improved Water Supply and Sewerage Services in Eight Urban Local Bodies of Greater Bangalore. Task Managers (World Bank): Junaid K.Ahmad, Smita Misra and Salman Zaheer.*

***Institutional Support.*** With a few exceptions, these institutions primarily improve skills of engineers and technicians, with courses focused mostly on engineering and design issues. They seldom address the commercial, managerial and strategic aspects of WSS services. But there is slow movement towards a more comprehensive approach to capacity building in WSS: the AILSG has introduced a customer service and consumer satisfaction dimension to its courses. The ESCI has initiated a holistic approach to capacity building in the water sector, including WSS through broadening faculty expertise base and revision of curriculum. Anna University has introduced training in digital mapping and applied research in WSS. However, topics such as sector reform, policy, tariff, utility corporatization, private sector participation, sanitation, do not appear in most programs. Staff of most institutes lack many of the skills required to develop and/or deliver comprehensive capacity building programs in WSS.

***WSS Boards.*** Metropolitan WSS Boards generally have staff training programs also aimed primarily at technical staff. After the increases in wage bills following the 5th Pay Commission (1996), most Boards have frozen recruitment and have relied on normal attrition to reduce staffing and cost. As a result, entry of new full-time dedicated WSS professionals into the Boards has been negligible in the past decade. Consequently, the current staff profile (i.e., skill mix, training) is highly skewed towards older professionals with experience, but

without the modern skills and capacity needed to contribute to the shift from the development of infrastructure to the provision of service. There seems to be a little interest in new graduates from universities to join the WSS sector; this is caused, in part, by the slow rate of hiring in the sector and in part by the far more attractive opportunities in other sectors, such as Information Technologies (IT). Temporary or contractual staff appointments are generally not covered by ongoing staff training programs. This is a problem in utilities where the lack of flexibility to hire new permanent staff has resulted in extensive reliance on such contractual arrangements. Also, this may have led to a significant number of temporary/ contractual staff actually carrying out permanent staff functions, without access to proper training.

***Indian Administrative Service.*** The Indian Administrative Service (IAS) trains and prepares Managing Directors of WSS Boards. These individuals are generally well trained, younger, and aware of the issues and challenges, but tend to change assignments every three or four years. It would be beneficial to the WSS reform agenda if managers and decision makers had more access to independent roundtables and workshops to discuss the political economy of reform. In that sense, India currently lacks an independent, credible institution which could act as the voice of the “WSS industry” to foster reform.



## Chapter 2

# Bridging the Gap Between Infrastructure and Service

### Water Supply and Sanitation Infrastructure Needs

**Access to Urban WSS Infrastructure.** According to the 2001 Census, whose data do not provide details on the many aspects of WSS service, about 90% of the total urban population or 252 million out of 280 million had access to “safe” drinking water. At the same date, only about 50% of the urban population or 140 million, was directly connected to the distribution networks and an additional 24% (67 million) had access to public standpipes. Other sources of “safe” water, i.e. wells or boreholes equipped with hand or motorized pumps, served about 16% or 45 million. In 2001, about 62% of the urban population, or 182 million had access to adequate sanitation, out of which about 36% or 100 million to sewers and estimated 29% (82 million) to septic tanks; the other types of safe sanitation include pit latrines and community toilets.

**Is India on Track for Meeting the MDG Target in Urban WSS?** Since the early 1990s, India has made good progress in developing WSS infrastructure in urban areas (Figure 1). Whether India is on track for meeting the MDG depends upon whether non-piped water can be considered a “safe” source of drinking water in an urban environment. If it is, access to “safe” water which increased from 81% in 1991 to about 90% in 2001 can possibly reach 100% within the next ten years or so; this is consistent with MoUD’s objective

which aims at 100% access in 2007. If non-piped water is not considered a “safe” source, access to piped water which was about 69% in 1990 would have to reach about 87% at the end of the 12th Plan, i.e., 2017. With an estimated 74% access to piped water in 2001, India seems to be on track to achieve the MDG target. Similarly, it can be argued that if access to sewers and septic tanks was about 43% in 1990, the MDG target should be about 72% at the end of the 12th Plan; with an official figure of about 62% in 2001, India should be able to exceed the MDG target. The discussion of future estimates presented in this report, is based on the following targets for the end of the 12th Plan (2017): (i) piped water coverage ratio: about 87%, of which 69% directly connected to distribution networks; (ii) sanitation coverage ratio: about 82% broken down as follows: about 52% connected to sewers, 30% to septic tanks, and an additional 16% to latrines.

**Evolution of Urban WSS Services.** Table 10 summarizes the past and future evolution of the WSS service in urban areas at the end of each Five-Year Plan period. It also provides past investment in the sector and an estimate of what is likely to be needed, based on unit costs consistent with that recommended by CPHEEO, to meet the MDG objectives in WSS. Table 11 also provides an estimate of O&M costs, excluding depreciation and financing costs, required for running the urban WSS service. It is not the objective of this report to carry out detailed estimates of investment needed for the urban WSS

sector, but rather to use figures to support the discussion on cost recovery and financing strategies. In fact, the Economic Survey 2004-2005 (Table 11) mentions investment needs for urban WSS for the 2002-2007 period of Rs 537 billion, a figure that also include solid waste management; funds currently available are estimated to be about Rs 358 million.

## The True Challenge of the MDG in Urban WSS

### Meeting Infrastructure and Service Objectives

As shown above, meeting the objective of halving the percentage of the population that had no access to "WSS infrastructure" in 1990 by 2015 is likely to be

Table 10: Urban WSS Investment required for meeting the MDG

		1992	1997	2002	2007	2012	2017
Total Urban Population	Million	210	250	290	350	420	500
Access to piped Water Supply	%	65	68	75	79	83	87
• Served population	Million	136	171	218	277	349	435
– Connection	Million	90	115	148	200	265	345
– Standpipes	Million	46	56	70	77	84	90
Access to Sanitation	%			63	70	76	82
• Served population <sup>(a)</sup>	Million	152	189	184	246	319	408
– Sewer	Million			104	144	193	260
– Septic Tanks	Million			80	102	126	148
– On-site	Million			54	60	67	79
Investment <sup>(b)</sup>			92-97	97-02	02-07	07-12	12-17
• Water	Rs billion				310	385	470
• Sanitation	Rs billion				230	310	405
Total	Rs billion		60	117	540	695	875
GDP	Rs billion		70,000	95,000	127,500	170,000	210,000
% of GDP	%		0.09	0.12	0.42	0.41	0.42
O&M Costs	Rs billion				295	415	575

<sup>(a)</sup> Population connected to sewers or having access to septic tanks.

<sup>(b)</sup> All costs are given in 2001 Rupees, except if otherwise noted.

Table 11: Likely Availability of Funds for the 10th Plan (2002-2007)

	Rs billion
Central Government Funds	25.0
State Governments Funds	200.0
HUDCO Loans	68.0
Life Insurance Company Loans	25.0
Loans from other Public Financial Institutions and External Funding Agencies	40.0
Total funds likely to be available	358.0
Estimated required Funds	537.0
Possible Deficit	(179.0)

met if Gol and the States increase the share of the GDP devoted to urban WSS sector, that has represented about 0.1% of the GDP during the 8th and 9th Five-Year Plans to about 0.4% of the GDP during the 10th, 11th and 12th Plans. Indeed, Gol has more ambitious objectives and envisages to provide access to 100% of the urban population to water supply facilities and to 75% of the urban population to sewerage and on-site sanitation facilities by the end of the 10th Five-Year Plan (March 31, 2007). But the definition of Target 10 of MDG 7 is “*halving by 2105 the proportion of the people without sustainable access to safe drinking water and basic sanitation service*” not only infrastructure. As pointed in the overview of the sector, the service provided in Indian urban centers is neither reliable, nor financially sustainable, nor environmentally sustainable and, because of the need to revert to substitutes nor affordable despite extremely low tariffs by international standards.

**The True Challenge of the MDG.** The true challenge of the MDG is therefore not to move access to WSS infrastructure from already fairly high levels to close to 100% before the end of the 12th Plan or earlier, but rather to increase access to a “reliable, sustainable and affordable” WSS service from a very low level to about 50%. This obviously is a much more difficult task, as it requires adjustment of policies, institutional arrangements and incentive frameworks. This report argues that if Gol does not consider such changes and continues “business as usual” it is unlikely that the MDG can be met.

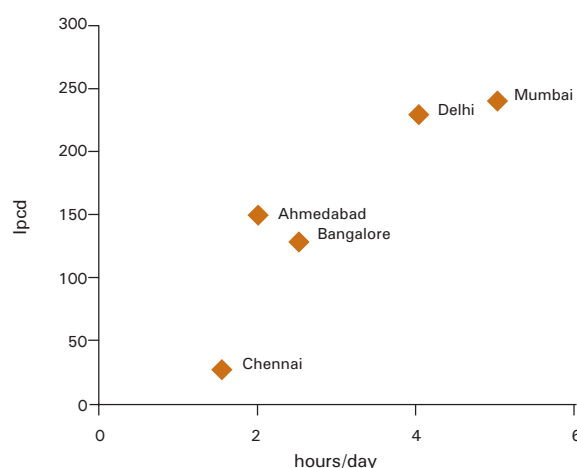
## Improving the Reliability of the WSS Service

**Improving Reliability.** Obviously, sufficient raw water and a power supply of good quality affect the *reliability* of the WSS service. But current policies, institutional arrangements and incentives also constitute obstacles for improving it, as evidenced by the fact that even cities which have access to large quantities of water (measured in lpcd) are not able to supply water on a continuous basis (Figure 8 and Figure 9). To improve reliability of the WSS service, there is also a need for clarifying the role of the various actors, consolidating the functions of promoter of infrastructure and provider of service, “ring fencing”

WSS operations at the local level, develop a framework for performance improvement and involving the private sector in the “supply chain”.

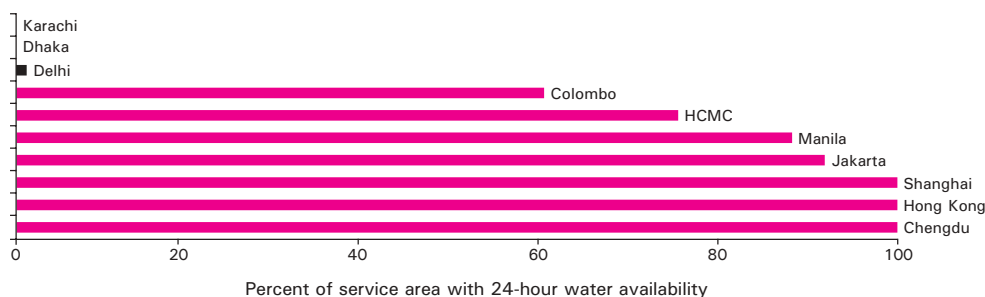
**Clarify the Role of the Various Actors.** As described in the overview of the sector, in most States, the functions of policy making, financing and economic regulation overlap or are improperly distributed. State WSS Departments set policies in terms of quality of service and cost recovery, supply grant funds to ULBs and act as Regulator of the WSS Service by authorizing WSS tariffs and monitoring the quality of the WSS service. On the other hand, while ULBs are, according to the 74th Amendment, responsible for the WSS service, the WSS infrastructure is developed by the “WSS Service Providers” only in a few megacities. In most cases, SEAs acting as “Promoters of WSS Infrastructure” manage State grants on behalf of ULBs and create WSS infrastructure that is handed over, once completed, to ULBs. SEAs obtain generous engineering fees for this, calculated as a percentage of the infrastructure delivered. SEAs, where most of the technical expertise resides have little incentive to ensure that the WSS infrastructure they have developed translates into a good quality WSS service to users. To complement State grant financing, SEAs sometimes raise debt financing, on behalf of ULBs, from the Housing and Urban Development Corporation (HUDCO); as most ULB-level WSS operations are bankrupt, HUDCO loans are guaranteed by the States.

Figure 8: Availability of Water (hours/day)



Source: Benchmarking Project, WSP-SA

Figure 9: 24-hour Service is Attainable



SEAs are sometimes requested to operate WSS schemes they have built because ULBs are either ill equipped or not willing to do so. Users are seldom part of the equation. Increasing the reliability of the WSS Service means that: (i) “Promoters of Infrastructure”, “Providers of Service” and “Users” should better work together; (ii) the delineation of the roles of policy maker, regulator, and service provider should be redefined; (iii) the relations between the various actors should be formalized in enforceable contracts with the objective of increasing accountability; and (iv) the autonomy and capacity of the ULBs should be strengthened. Figure 10 shows what could be a typical contractual arrangement between the various key actors in the WSS service.

**Consolidate the Functions of Promoter of Infrastructure and of Provider of Service.** These two functions should be consolidated at the ULB level to encourage the design of WSS projects that better correspond to the need of the customers and the technical and financial absorptive capacity of the Service Provider (Box 5). These functions are currently consolidated in mega-cities, but while projects implemented by the latter are more “service oriented” than that designed by SEAs, the service provided is often of similar quality: water is never distributed on a continuous basis regardless of its availability (Figure 8). Combining the functions of Promoter and Service Provider is a necessary condition but not a sufficient one for

bridging the gap between infrastructure and service; proper incentives have also to be put in place.

**Transform the Status of Users from “Beneficiary” to “Customer”** by involving them in the design of WSS projects, including the definition of cost recovery arrangement that should become part of any WSS project design, and the monitoring of the quality of the WSS service. To increase accountability of the Service Providers to Users, the status of the latter should move from that of “Beneficiaries” of a highly subsidized but poor quality WSS service to that of “Customers” of an up to standard service provided at cost. A paying customer has more rights than a Beneficiary; such rights should be clearly spelled out in a “Customer Service Contract” between the Service Provider, or a private WSS Service Operator employed by the latter when relevant, and the Customer.

**Leave ULBs free to Select Engineering Consultants** and NGOs of their choice to identify, prepare and implement WSS projects on the basis of the best technical and financial proposals received; there is no justification for continuing the de facto monopoly of SEAs as both the Indian WSS markets and available human resources are large enough to support a viable private consulting industry. If ULBs do not have the capacity to appoint and supervise consultants, they could request technical assistance from a SEA, whose role should gradually evolve to that of a “Facilitator” and “Advisor”.

Figure 10: Operational Framework for Improving Accountability

#### *Ring Fence WSS Operations at ULB Level.*

Decentralization may be a necessary condition for improving reliability of the WSS service; but it is usually not sufficient. Good quality WSS service is almost always provided by agencies that are distinct from the local governments they report to<sup>9</sup>. As described in the overview of the sector, the prevailing accounting system at the ULB level does not allow the production of financial information on their WSS

operations; it is thus difficult to make sound management, investment, and policy decisions. Very few urban WSS Service Providers possess the autonomy or the capacity needed to effectively discharge their duties. States should request ULBs to create autonomous and “Ring Fenced” “ULB-level WSS agencies”. In case ULBs do not reach a minimum size to justify an efficient operation, States should further encourage ULBs to regroup into geographical

#### **Box 5: The Consolidation of Promoter and Provider Functions in Ivory Coast**

Until the end of the 1980s, the responsibility for developing the WSS infrastructure in Ivory Coast (West Africa) was with the central government agency DCE and that for operating the WSS service with a private local company under an Affermage contract with DCE. While the Operator was providing a WSS service of good quality (water is distributed on a “24/7” in all cities and towns served) and making a reasonable profit, the urban WSS sector was on the brink of bankruptcy, as DCE was unable to service the large debt contracted during the past two decades to finance the creation of new WSS infrastructure. As part of a reform of the urban WSS sector, the Government transferred the responsibility for identifying, designing and financing new WSS infrastructure projects to the Operator. There was a noticeable shift of focus of WSS projects from the creation of new water production units to the extension of distribution networks to reach new customers, from whom additional revenues would be generated and rehabilitation to reduce O&M costs. The number of water connections doubled in about 10 years, but more than 95% of them were provided to small domestic customers consuming an average 6 m<sup>3</sup>/month.

<sup>9</sup> There are hundred of examples from Washington, DC, to Indonesia, Morocco, Brazil or China.



### Box 6: Autonomous Municipal WSS Utility Companies in Indonesia

In Indonesia, each local government had to create an autonomous WSS agency (PDAM) about 20 years ago. The 300 PDAMs are responsible for preparing extension plans and get grant or loan financing from the central government for implementing them. PDAMs are required to cover, depending upon their size, either O&M costs or O&M costs plus depreciation and financing costs. The production of standard financial statements and other performance monitoring reports developed by the Ministry in charge of local government helped the design of a well targeted rescue package when the financial crisis hit the country in the late 1990s. Although the size of the PDAMs vary significantly and the magnitude of issues to be addressed accordingly, PDAMs have created a professional association, PERPAMSI, that now plays a key role in disseminating best practice in modern WSS management operation.

“syndicates” to achieve economies of scale. Creating an “*Identity of WSS Service Providers*” distinct from that of other municipal services, and supporting its “*Professionalism*” are likely to be keys for improving reliability of the WSS Service. Box 6 gives the example of autonomous municipal WSS utility companies in Indonesia as a possible reference.

**Develop Performance Improvement Plans.** Even when ULB-level WSS agencies have been created, the performance of the WSS service is seldom monitored, beyond access to WSS infrastructure. States have provided and are still providing grants and/or loan guarantees without being able to properly monitor their outcomes. In addition to coverage, the key indicators to closely monitor should be: (i) technical indicators such as the permanence of the WSS service, unaccounted for water (UfW) and non revenue water (NRW), quality of water distributed and effluent discharged; (ii) efficiency indicators such as staffing ratio and energy consumption; (iii) commercial indicators such as metering, billing and collection ratios; and (iv) financial indicators such as working and operating ratios, cash contribution to the capital expenditure program (Capex), debt service coverage and debt/equity ratios. This would require that good practice in the urban WSS industry, such as bulk and individual metering and permanent supply to guarantee reliability of meter reading (in addition to protecting water quality) be introduced. This would also require that a major accounting reform be implemented to convert the existing single entry cash accounting by a double entry accrual accounting as has been done in Tamil Nadu (Box 7). Independently certified monitoring indicators and audited financial statements should be submitted by ULB-level WSS

service providers together with credible medium term Performance Improvement Plans (PIP) while applying for State grants, HUDCO loans or State guarantees. Standard performance reporting formats should also be developed to allow States and lending agencies a proper appraisal of financing applications.

**Support Private Sector Participation.** Contracts are always easier to enforce if awarded by a public entity to a private company. India has so far had a mixed experience with Private Sector Participation (PSP) in WSS, and despite systematic advocacy, there are only a few examples of PSP schemes, mostly limited to “enclave” projects serving industrial estates. With past emphasis on provision of WSS infrastructure, PSP has so far been sought primarily to attract private equity and commercial debt to finance new WSS systems; however, the legal and regulatory environments and the current widespread policy of not recovering actual cost of the WSS service from user charges has not provided the guarantees investors and lenders need.

**Seek PSP Mostly for Improving Efficiency of WSS Operations.** Until revenues generated are sufficient to cover O&M costs, asset depreciation and financing costs, PSP schemes would have to be limited to: (i) either short term “Service Contracts”, for example, reducing NRW or overhauling commercial activities; or (ii) medium term “Management Contracts” for operating the WSS service for a fixed fee plus a bonus linked to actual performance. Options that transfer the commercial risk to the Operator, such as medium term “Lease and “Affermage Contracts”, could only be considered when the WSS tariff is sufficient to cover at least O&M costs and where there is good track record of payment of WSS bills. Table 12 summarizes

### Box 7: Accounting Reform in Tamil Nadu<sup>10</sup>

Tamil Nadu, with the assistance of the World Bank funded TNUDP project and the USAID funded FIRE project has introduced a double entry accrual based system in phased manner. This activity initially developed accounting manuals with the municipal administration and the State Finance Department, and prepared a technical guide for implementation with the Institute of Chartered Accountants of India (ICAI). Through contracting 25 professional chartered accountant firms, technical assistance was offered to 107 ULBs during an 18 month period to ease the transition. Presently, all accounts are being finalized under this new accrual based system. The key success factors in Tamil Nadu were: (i) the strong commitment and support from the State government; (ii) a State-wide unified accounting system approach; (iii) a significant training and opinion-building workshops at all levels and for all types of officers/employees within and outside of the ULBs; (iv) the involvement of experienced government officers; (v) an appropriate implementation methodology; and (vi) the motivated participation by municipal bodies.

the key features of the various PSP arrangements that are usually implemented in the WSS sector.

**Communicate the Rationale for PSP.** PSP often leads to an emotional debate centered on the themes of “privatization” of an essential public good or the “selling” of public assets to – mostly foreign – private interests. Communication on the rationale for involving private service providers or operators has been deficient in the WSS sector in many countries. Even when contracting out simple activities such as meter reading or bill collecting, the support of affected parties has to be gained, through proper consultation. Many stakeholders with widely differing interests need to be consulted before a sustainable PSP scheme can be put in place: politicians, management and staff of the public utility, consumer associations, NGOs concerned with the WSS to the poor and those concerned with the transparency of the dealing with the private sector and of course the local and international private sector itself.

**Support the Local Private Sector.** Initiating PSP schemes in mega-cities de facto translates into the need for tapping international expertise and experience. But PSP should not be limited to high visibility operations: smaller urban WSS operations can also be profitable and attractive to a nascent Indian private expertise in urban WSS, mostly within

the context of Service and Management contracts. Box 8 gives the example of successful management contracts in Ugandan small towns; it is worth noting that these contracts are financed from the revenues of the WSS operation, not a government grant. The feasibility of developing “franchising” agreements between local operators and reputable international operators who would provide technical assistance and quality control should be investigated. As ULBs willing to award operation contracts to private operators are likely to lack expertise for preparing bidding documents, selecting operators and negotiating an operation contract, standard technical specifications for Service and Management (and possibly Lease/Affermage) contracts as well as guidelines for pre-qualifying and selecting operators could be prepared by a central government agency. Technical assistance to ULBs could be provided by SEAs as part of their new mandate.

**Select Appropriate Economic Regulatory Arrangement.**

Economic regulation is a relatively new concept in India which has been introduced as part of broader sector reforms and the increasing role played by the private sector, mostly in the power and telecommunication sectors. But unlike the power and telecommunication sectors, the WSS sector is characterized by a very large number of public service providers with a wide range in size and management capacity. A Regulator would have two main functions:

<sup>10</sup> Source: Project Note number 22 Indo-US FIRE(D) Project October 2000 and Accounting reforms in ULBs, Ravikant Joshi, India Infrastructure Report 2003, 3i Network.

Table 12: Contractual Arrangements for Private Provision of Water Supply Services

Option	Service Contract	Management Contract	Affermage Contract	Concession Contract	BOOT (for production facility)
Main Objective Pursued	Limited improvement of operations	Overall improvement of operations	Overall improvement of operations (with transfer of commercial risk)	Overall improvement of operations and mobilization of private capital	Mobilization of private capital
Typical Contract Duration	1 to 3 years	4 to 6 years	10 to 15 years	25 to 50 years	25 to 50 years
Contractual Relations with Users	Public authority	Private manager on behalf of public authority	Affermage contractor	Concessionaire	No direct relation with users
Commercial Risk Taken by	Public authority	Public authority	Lease contractor	Concessionaire	Public authority through "take or pay" arrangement
Financing of Investment	Public authority	Public authority	Public authority and lease contractor	Concessionaire	Concessionaire
Financing Working Capital	Public authority	Public authority	Lease contractor	Concessionaire	Concessionaire
Financing Risk Taken by	Public authority	Public authority	Mostly public authority	Concessionaire	Concessionaire
Remuneration of Private Company	Lump sum, work done, unit price	Cost-plus and productivity bonus	Part of user rate	User rate	Bulk water rate
Responsibility for Setting User Rates	Public authority	Public authority	Public authority	Concession contract	BOOT contract

(i) independent setting, or reviews of requests for adjustment, of WSS tariff adjustment to meet financial, economic, equity and simplicity objectives; and (ii) independent monitoring of the performance of the WSS service. These functions require accurate data, a commodity that is badly missing in India<sup>11</sup>; there is an urgent need for establishing a credible baseline data for all urban WSS operations. As long as public service providers do not issue auditable

financial statements and performance reports and cannot react to financial incentives and/or penalties, there is little scope for economic regulation; thus, regulation should initially be envisaged mostly for those utilities that operate on a commercial basis. Regulators also have the mandate of protecting Customer rights; in this context they should closely monitor the performance of the WSS service provided to the poor. Finally, Regulators often play an advocacy

<sup>11</sup> Except in mega-cities that have benefited from projects financed by international agencies (Mumbai, Chennai, Bangalore).

## Box 8: Management Contracts in Ugandan Small Towns

The technical and commercial operations of the piped water supply service in most Ugandan small towns (with populations of 10,000 to 25,000) have been sub-contracted to local operators within the framework of three-year Management contracts. Three of four small towns are regrouped by the Government in one single operation to allow economies of scale. Each piped system serves no more than 500 connections. Pre-qualification criteria were relaxed to allow local consulting firms and contractors that had expressed a special interest in running a water supply service to participate in the bidding process. WSS tariffs are set by Town Water Supply Committees and are controlled by the Government in the absence of a Regulator. All connections are metered and water is distributed, as a general rule, on a permanent (24/7) basis. The tariff is uniform, regardless of the consumption level and sufficient to cover O&M costs, including the cost of the Management contracts. The Government closely monitors the performance of the small operators.

role for sector improvement. There is no “one size fits all” regulatory arrangement, although it is likely that State-level Regulators, rather than ULB-level Regulators, would have to be considered. One can also assume that because of the likely limitation of regulatory capacity, it would make sense to envisage a multi-sector (power and water) Regulators. Urban WSS sectors that have made great use of private operators have not always relied on formal Regulators; well drafted Management, Affermage or Concession contracts could initially substitute to Regulators<sup>12</sup>. Regulation of the WSS service requires a change of mindset and (from the provision of WSS infrastructure to the provision of WSS service) and regulatory bodies would mostly have to recruit outside of the traditional WSS work force. Environmental and public health regulations have to be handled by separate agencies.

## Improving the Financial Sustainability of the WSS Service

**Price the WSS Service According to Sound Principles.** Pricing of the WSS Service requires financial, economic, equity and simplicity objectives be met. To ensure financial sustainability of a WSS operation, user charges should generate revenues sufficient to cover O&M costs, asset depreciation and yield a return on WSS assets. Depreciation provides for the

recovery of the capital investment over the useful life of assets and the return on assets covers financing costs, i.e., the interest on loans as well as a “fair” rate of return on equity<sup>13</sup>. The rate of return on assets is usually set by the Regulator to impose an upper limit on earnings and thus the average WSS tariff. In the Indian context, an initial objective would obviously be to recover O&M costs from user fees; many utilities, even in mega-cities such as Delhi, do not always meet this criterion. For rapidly expanding WSS utilities, a contribution to the capital expenditure program (Capex) from internally generated revenues can also be used to estimate the appropriate level of average tariff: well performing public and private WSS utilities worldwide finance their development primarily from cash generation. An average cash contribution of about 30% of the Capex is considered good practice; a few large Indian WSS operations, such as Mumbai achieve this.

**Finance the Transition in a Transparent Manner.** In many cases, it would not be feasible to rapidly increase user charges to a level sufficient to cover O&M costs. It would therefore be perfectly acceptable to provide a decreasing operating subsidy to ease the transition towards cost recovery. Such subsidy should be time limited and preferably linked to a performance indicator that is easy to monitor, such as for example actual collection of user charges. Mechanisms for moving towards full recovery of O&M costs (and beyond) should be clearly spelled out in the PIPs

<sup>12</sup> If a Regulator is created, it would not be directly involved in contractual matters between the Owner of the WSS assets and the Operator of the WSS service.

<sup>13</sup> Net operating income after taxes divided by net fixed assets in operations.

submitted together with financing applications. Box 9 gives the example of a transparent subsidy scheme implemented in Guinea to help moving towards full cost recovery (O&M and capital costs) over a reasonable period.

***Assessing the Magnitude of Financial Support to the Urban WSS Sector.*** Simplified financial forecasts have been prepared to assess the magnitude of the financial support to be provided by Gol and the States to the urban WSS sector's Opex and Capex during the 10th, 11th and 12th Plans depending on cost recovery objectives set by decision makers. Calculations have been carried out using assumptions summarized in Annex for four scenarios.

- Scenario 0 "business as usual" assumes that the current estimated average WSS tariff of Rs 2.5/m<sup>3</sup> remains unchanged until 2017 and that the Capex

is financed 90% from Gol/State grants and 10% from (mostly from HUDCO) debt;

- Scenario 1 envisages that cash costs of the sector, i.e., O&M plus debt service would be fully recovered by the end of the 12th Plan (2017), and the same Capex financing plan as above;
- Scenario 2 envisages that the Opex (O&M, depreciation and financing costs) would be fully recovered by the end of the 12th Plan and the same Capex financing plan as above;
- Scenario 3 envisages that the Opex would be fully recovered from user charges at the end of the 11th Plan (2012) and that thereafter the WSS tariff would be set to allow financing of the Capex one third from internal cash generation, one third from borrowing and one third from Gol/State grants.

### Box 9: Guinea Water Supply Assisted Transition to Full Cost Recovery

In the late 1980s Guinea initiated a program aimed at improving the urban WSS service. The public Direction des Eaux de Guinée (DEG), responsible for the provision of piped water in urban centers, including the capital city Conakry, was transformed into an asset holding company "SONEG", mostly responsible for developing WSS infrastructure sub-contracting WSS operations to a private operator "SEEG" under a ten-year Affermage contract. As part of its contract, SEEG was requested to: (i) collect from users the "Customer tariff" set by the Government; (ii) retain an agreed part of it – the "Operator tariff"; and (iii) pay the difference to SONEG – the "Owner tariff". The Operator tariff was set after open competition at a level sufficient to cover all SEEG's O&M costs and yield a reasonable profit. The Owner tariff was supposed to be sufficient to service SONEG's debt and contribute to SONEG's Capex. At the time this reform was put in place, the Customer tariff that could reasonably be requested from users was only about one third of the total of the Operator and Owner tariffs. The World Bank, approached to finance an extension of the Conakry water supply system, accepted to support a transition to full cost recovery by financing the foreign exchange component of the Operator tariff, 100% during the first four years of the Affermage contract, and on a declining basis for an additional four years; payment to SEEG were based on actual collection of water bills. In addition, SONEG's debt to the Ministry of Finance was frozen for two years and gradually transferred to SONEG over a four year period. The Customer tariff remained at its initial level for two years and then was gradually increased, to reflect the above "cost sharing" arrangement, as the quality of service improved. The full cost of water (O&M and capital) was transferred to users in eight years. By linking the complement of the Operator's revenues to the collection of water bills, the arrangement created an incentive to maximize its profit by reaching new customers and reducing NRW to increase billing and collection and by limiting operating costs, mostly pumping and treatment costs, by reducing physical leaks.

Figure 11 shows how average tariff would have to be adjusted and GoI/State financial support to the sector would evolve for scenario 0 and 3; graphs for all four scenarios are given in Annex. Between 2008 and 2017, the financial support to the sector if “Scenario 0” is implemented would be in the order of Rs 2,850 billion (US\$67 billion), of which about 27% for the Opex. If “Scenario 3” is implemented, the average tariff would have to increase from Rs 2.5/m<sup>3</sup> in 2007 to Rs 17/m<sup>3</sup> in 2012 and be kept at an average level thereafter; between 2008 and 2017, the financial support to the sector would drastically be reduced to a total of Rs 800 billion (US\$19 billion), and only about Rs 60 billion (US\$1.3 billion) would have to be provided for the Opex until 2012. “Scenario 3” would require that a gradual adjustment of the average WSS tariff to about Rs 17/m<sup>3</sup> (US\$0.40/m<sup>3</sup>) which is still very low by international standards; in African countries where sustainable urban WSS sectors recover all costs from user charges (governments typically do not have the revenues to complement them), average WSS tariffs are in the US\$0.5 to 1.0/m<sup>3</sup> range (Rs 22 to 45/m<sup>3</sup>).

**Keep the WSS Tariff Structure Simple.** The WSS tariff structure should be simple enough for customers to understand and to adjust consumption according to price signal; it should also be simple for the Service Provider to administer effectively. Most Indian Service Providers apply tariff structures that are overly complex and that include a multitude of blocks and categories based on metered or assessed consumptions. Large cross subsidies between industries and domestic customers should be avoided: when a large part of revenues comes from a small number of customers, revenues are very sensitive to the behavior of these few customers. Industries realize that the availability of a reliable and affordable WSS service is as important as availability of energy and roads and tend to opt out of the public WSS service and use more reliable and less expensive alternatives. The use of a uniform volumetric tariff that applies regardless of the level of consumption is often considered as the simplest and most equitable tariff structure<sup>14</sup>. Charging users on the basis of actual metered consumption is the most equitable way, but

meters provides inaccurate information in case of intermittent supply and require proper maintenance, a task that few WSS Service Providers are able to carry out satisfactorily. Even if the long term objective should be to meter consumption, most of it would still have to be assessed in the near future. WSS tariffs should be stable over time, because large price fluctuations are a source of uncertainty for customers, for the cash flows of the WSS Service Provider and for and long-term investment planning. Due to capital lumpiness, pricing on the basis of short-run marginal costs could result in large price increases over time, as short-run marginal costs rise sharply when the capacity is reached and drop immediately after the capacity is expanded.

**Create Financial Incentives.** Performance of a WSS Service Provider greatly improves when it and its staff have actual financial incentives. In particular, if a Service Provider has to generate revenues solely from the sale of water, while having to follow commercial practices and to operate within the context of strict technical specifications, it is in theory encouraged to maximize its profit by: (i) increasing sales and thus the number of customers served; (ii) reducing commercial losses by improving metering, billing and collection; (iii) reducing production costs by limiting physical losses in the distribution network; and (iv) adapting the size of staff to what is strictly needed. Private operators, of course, react much better than public operators to financial incentives. Financial incentives are usually embedded in the contract between the Owner of the WSS assets and the Operator, either under the form of a performance bonus (Management contract), or by transferring the commercial risk to the Operator (Affermage contract). Again, PSP should initially be sought primarily to improve performance and efficiency.

**Use Existing Funds More Efficiently.** Both GoI and States policies advocate financial self sufficiency of urban WSS Service Providers; but in fact the latter are mostly dependent on public grants and loans. Moving from full dependence to financial self sufficiency requires a stepwise approach to be encouraged by reform programs.

<sup>14</sup> To protect small domestic customers, a flat discount could be provided; for example, if the uniform tariff is Rs 15/m<sup>3</sup> and one wishes to limit the WSS bill of small domestic customers consuming less than 10 m<sup>3</sup>/month (65 lpcd for a household of five), to Rs 75/month, a flat discount of Rs 75/month could be provided.



**Figure 11: Gol and State Financial Support to the Urban WSS Sector according to Two Cost Recovery Strategies**

Base Case Scenario: Business as Usual

Scenario 3: Full Recovery of Opex by 2012,  
1/3 Contribution to Costs Thereafter

*Opex* : Operation and maintenance expenditures  
*Capex* : Capital expenditures  
*Rs/m<sup>3</sup>* : Rupees per cubic meter

**Use Gol Funds to Support Reform.** Gol budget allocations are currently based on Five-Year Plans prepared by the Planning Commission and annual budget transfers are estimated using a “WSS infrastructure gap filling” approach<sup>15</sup>. While several centrally sponsored programs cover urban WSS as part of urban services, there is only one centrally sponsored scheme dedicated to urban WSS: the Accelerated Urban Water Supply Program (AUWSP). Initiated in 1994, AUWSP focuses on towns with population of less than 20,000 in 1991; the criteria for allocating funds to the States are based mostly on population, poverty level, and number of towns that fit the category. Although guidelines list conditions to be met by participating towns on cost recovery and proper maintenance plan, the release of funds has so far not been linked to satisfying these criteria. The proposed National Urban Renewal Mission (NURM) currently being designed is the only central instrument available to support a reform in the urban WSS sector,

it may be advisable to create a special window within NURM to avoid the dilution of urban and municipal issues. To ensure a level playing field between reforming States and those with past poor performance, Gol could provide specific technical assistance to help design and launch reforms. Reform linked conditions could include measures related to actual decentralization and creation of autonomous WSS agencies, tariff rationalization and accounting reforms. Technical assistance could also help prepare comprehensive Financial Recovery Plans (FRPs) and Performance Improvement Plans (PIPs), capacity building programs and Monitoring and Evaluation (M&E) arrangements to ensure that funds are primarily used in relation to the planned reforms. Gol reform linked funds (see Box 10 on the Tamil Nadu Urban Development Fund) currently correspond to a small share of the total financing made available to the urban WSS sector; they have to compete with much larger State budget transfers to ULBs. To encourage

<sup>15</sup> Source: Twelfth Finance Commission Report, Government of India, November 2004

## Box 10: Tamil Nadu Urban Development Fund (TNUDF)

TNUDF is funded by a public private partnership between the Government of Tamil Nadu and three local financial institutions. To date, US\$60 million from a World Bank's line of credit has leveraged a total of US\$128 million in urban infrastructure and financing, with a debt repayment rate of 99.6% from the ULBs. The fund represents a successful model to ease access of municipalities to capital markets, particularly for smaller municipalities with small projects, each of which alone is unable to access commercial debt finance. The TNUDF is the first in India to provide debt finance to municipalities on a non-guarantee basis. TNUDF has also provided pooled finance to 14 small participating municipalities, representing the first pooled financing in India<sup>16</sup> (Box 11 and 12). TNUDF could represent a good model to scale up financing for urban WSS; however the debt attached to WSS projects is currently structured to be repaid from the ULBs' general tax revenues, not from the WSS user charges. To ensure that loans for WSS projects are repaid from the proceeds of the WSS operation, a "project finance" type of approach would need to be adopted. Only when urban WSS operations reach independence from the rest of municipal operations, would a TNUDF type of financing mechanism be a fully financially sustainable option for the urban WSS sector.

improved performance, States should consider increasing the share of "reform based" funds and gradually phase out the "gap based" funding approach.

### *Channel Grants to ULB-Level WSS Service Providers.*

At the State level, most funds for urban WSS flow to statutory bodies like SEAs, Municipal corporations and ULBs; in addition States also provide project specific loan guarantees. Transfers to ULBs are not reported in a uniform manner across entities and across States; it is thus difficult to estimate the breakdown of fund allocation and utilization. The urban WSS sector expenditures are rarely separated from the general urban infrastructure that also includes transport, solid waste management and other urban services; investments in sanitation are often included in environment or health sectors expenditures. Budget transfers are normally based on historical allocation rather than on actual usage of funds, and little assessment has been made of the effectiveness of these funds. State grants should be directed to ULB-level WSS Service Providers, rather than to SEAs and ULBs. Standard formats for grant application by ULB-level WSS Service Providers should be developed; they should emphasize the formulation of clear and realistic project objectives, the economic justification of the project, the financial sustainability of the WSS operation and simple monitoring and evaluation (M&E) mechanisms. Similarly, standard appraisal procedures

by State agencies in charge of distributing grants should be developed; in addition to the appraisal of the technical, financial and economic aspects of the project, it should also cover the review of environmental and social assessments and of mitigation plans.

**Restructure Conditions for Public Borrowing.** The Housing and Urban Development Corporation (HUDCO) is the largest source of debt to the sector. It has provided loans totaling Rs 22.5 billion (US\$500 million equivalent) in 2003-2004 mainly to State-level WSS Boards and municipalities. The Life Insurance Corporation (LIC) is the only other player which has provided Rs 4 to 6 billion (US\$95 to 140 million) in loans per year recently. The total outstanding debt to the urban WSS sector is however not known. As a fully GoI owned institution, HUDCO is mandated to implement GoI policy for high priority investments in the sector. HUDCO's appraisal procedures relate to financial and operational viability of the projects they finance, including a debt service coverage ratio of 1.5 and a financial rate of return of more than or equal to cost of capital. According to the Indian Credit Ratio Agency (ICRA), HUDCO's non-performing assets were almost 14% of the total loans in 2002 and slightly less than 9% in 2003, despite State guarantees provided on most loans<sup>17</sup>. Loans are often arranged by SEAs on behalf of ULBs which have to repay them.

<sup>16</sup> Source: Presentation made by TNUDF in Washington DC in February 2005.

<sup>17</sup> Source: ICRA, May 5, 2004.

Several States are putting ceilings on total guarantees provided, recognizing their deteriorating fiscal deficit. Also, GoI has recently decided to discontinue its equity investment in HUDCO shares. Public institutions are thus encouraged to review their operational procedures and carry out more rigorous appraisal of the borrower's creditworthiness and of the project soundness to ensure sustainability of investments and limit risk of non payment. This, in turn, should create incentives for ULBs to meet stricter conditions to access public loans. In most cases, however, State guarantees would still be needed, as ULB-level WSS Service Providers, struggling to recover O&M costs from user charges have no capacity to service debt. Technical assistance in the design and implementation of FRPs and PIPs should be extended to WSS Service Providers.

**Leverage External Funding.** International Financing Institutions (IFIs) which have supported the urban WSS sector usually require that a set of measures aimed at increasing efficiency and improving sustainability be implemented before approving their financial support to particular projects. There are some differences in the project approach, but there is a broad consensus among these agencies that there is a large gap between urban WSS infrastructure and urban WSS service and thus that there is a need to shift the focus of future programs to support mostly the development of sound policies and institutional reforms. As mentioned in earlier, local resources are likely to be sufficient to fund access to WSS infrastructure. So, the limited funding provided by IFI, i.e., only about 5% of the total funding for the urban WSS sector, should be used in priority to fund "pilot" projects aimed at increasing reliability, sustainability and affordability of the WSS service and to identify conditions for a scale up.

**Access Capital Markets.** The prerequisite for tapping capital markets is to build the creditworthiness of urban WSS Service Providers. According to CRISIL, the largest Indian credit rating agency, credit rating of municipal bodies entail an assessment of the following

six factors: (i) legal and administrative framework; (ii) economic base of the service area; (iii) municipal finances; (iv) the municipal body's existing operations; (v) managerial assessment; and (vi) project-specific issues<sup>18</sup>. Some parastatal, such as mega or metro-city WSS Boards with "ring fenced" WSS operations have adequate credit worthiness to access the bond market<sup>19</sup>. To boost the municipal bond market, GoI decided in 2000 to provide them a tax free status. So far, nine municipal corporations have issued bonds worth Rs 7.1 billion (about US\$160 million) and over 30 major cities have obtained credit rating in preparation for entering the bond market<sup>20</sup>. However, the growth in municipal bond issuance has been limited. "Pooled financing" could reduce transaction costs and provide opportunities for smaller municipalities which, unlike large ones, lack strength in their balance sheets to access the capital market or apply for stand alone loans. Municipal bonds have so far been structured using the escrows of dedicated revenue streams, including general municipal revenue such as property tax and octrois, which are not directly linked with the investments bonds are issued for. A project finance structure or balance sheet borrowing, focusing on revenues generated from user charges and efficiency gains is a much preferable approach for building the sustainability of urban WSS operations.

**Limit Expectations About Direct Private Investment.**

The urban WSS sector has traditionally attracted much less private investment than other infrastructure sectors, even in industrialized countries. The recent bankruptcy of large WSS concessions in Latin America and East Asia has led to an extreme prudence of investors. In India, low user charges and lack of a clear and independent regulatory framework are additional impediments. Except in enclave projects, serving industrial, tourist or high end real estate, private investment is unlikely to play a major role during the years to come. The case study on Tirupur illustrates the difficulties of implementing a project that involves private equity and private operator (Box 13).

<sup>18</sup> Source: Rating Criteria for Municipal and Urban Local Bodies, CRISIL.

<sup>19</sup> In 2003-2004, both Hyderabad and Chennai Metropolitan WSS Boards issued bonds in the order of Rs 420 to 500 million (about US\$10. million). The first municipal bond without State guarantee was issued in 1998 by the Ahmedabad Municipal Corporation to partially finance a Rs 4.4 billion WSS project.

<sup>20</sup> Source: Sub national capital market development in India, Dr. HK Pradhan, Xavier Labor Relations Institute, January 10-12, 2005.

### Box 11: Experience with Municipal Bond Issuance in India<sup>21</sup>

The major limitation in the evolving municipal bond system has been the limited number of municipal authorities with adequate credit quality to use this potential source for financing their infrastructure investments. Even if municipalities have reached an adequate degree of financial self sufficiency, significant capacity building is needed to meet the requirements set by the credit rating agencies. New potential issuers would need technical assistance to develop their financial plans, build relationship with the capital markets, make investors aware of the issuer profile, and establish familiarity with market intermediaries and the regulatory environment. To help States reform their municipalities, the central government has recently prepared sample municipal laws to promote reforms in accounting and financial management practices, improve municipalities' revenue base, and enable public private partnerships.

### Box 12: Tamil Nadu Pooled Financing

In Tamil Nadu, a WSS pooled fund was set up in 2002 with USAID guarantee. USAID supported the efforts of the pooled fund to structure a Rs 304 million (US\$6.4 million) bond issue whose proceeds would finance small WSS projects in 14 ULBs. While this model provided technical assistance for smaller ULBs to pilot alternative financing methods to State budget transfers, partial guarantee provided by USAID limited the participation of the private sector in appraising the project<sup>22</sup>.

### Box 13: Tirupur BOOT

In Tirupur, India's leading cotton knitwear center, a Public Private Partnership (PPP) consortium was established to develop the water supply infrastructure on a BOOT basis. A project-specific public limited WSS company, with equity contributed by major beneficiaries, State and central governments and financial institutions was granted a concession by the State government to draw raw water and distribute it to industrial and domestic users. Charges collected from users were initially set a level sufficient to recover all O&M and capital costs and were to be regularly adjusted according to a cost index formula<sup>23</sup>. The model was structured in a financially viable manner which is not easy to replicate: in Tirupur water consumption is dominated by industries with predictable consumption patterns and high willingness to pay. The project took almost 10 years for financial closure because: (i) high project costs (resulting in high tariffs of Rs 45/m<sup>3</sup>) led to disputes and renegotiations between the promoters and industries; (ii) lenders perceived a high risk as the majority of project's revenues depended on the fortune of the textile industry, that is cyclical in nature; (iii) a lack of a principal/key sponsor to drive the project; and (iv) a weak regulatory structure, particularly with respect to enforcement on groundwater abstraction.

<sup>21</sup> Source: *Meeting the financing challenge for water supply and sanitation, WB and WSP.*

<sup>22</sup> Source: *Project note number 31 Indo-US FIRE(D) Project, March 2003.*

<sup>23</sup> Source: *Project Note number 13, Indo-US FIRE(D) Project, January 1999.*

**Provide Support to Project Development.** Most urban WSS Service Providers lack the capacity to structure projects that rely on private financing. They all need significant technical assistance to prepare bankable projects including proper technical studies, comprehensive risk analysis and realistic mitigation plans. Urban WSS Service Providers can get technical assistance from: (i) State level project support facilities such as the Gujarat Infrastructure Development Board; (ii) integrated agencies that provide project development and financing support, such as TNUDF in Tamil Nadu; (iii) private consultancy services for developing PSP projects; (iv) donor programs, including USAID, WSP, and AusAid; and (vi) quasi public institutions such as Infrastructure Leasing and Financial Services (IL&FS) and Infrastructure Development Finance Corporation (IDFC) who could, if successful, also contribute equity to the PSP project.

## Improving the Environmental Sustainability of the WSS Service

**Refer to the “Dublin Principles”.** The “Dublin Principles”, formulated in the early 1990s, are articulated around four main themes: (i) the “institutional” principle that advocates stakeholder participation, including a greater role for NGOs, women and the private sector; (ii) the “subsidiarity” principle that translates in the need to manage the WSS service at the lowest level of government deemed appropriate; (iii) the “ecological” principle that suggests that water management should be designed in a holistic manner to ensure that inter-sectoral needs are taken into account and environmental consequences are properly mitigated; and (iv) the “instrument” principle that encourages greater attention to economic value of alternative uses and the use of economic instruments such as water rights and user charges. Topics under (i) and (ii) have already been covered. The ecological and instrument principles have been adopted by India’s decision makers, who recognize the need for integrated water resource management and economic pricing as the best way to ensure efficient use of the water resource, as well as the need for a coordinated approach for a rational pricing of water and electricity.

**Price Water According to Economic Principle.** The theory of long run marginal cost (LRMC) suggests that the price of water should be equal to the cost of providing an incremental unit of supply. Incremental cost includes O&M, expansion of capacity and externalities, such as collection and safe disposal of waste water. When the price of water is equal to the LRMC, social benefits, i.e., the sum of consumer and producer benefits, are maximized. Marginal cost pricing implies that pricing is determined individually for each WSS operation. It also implies that incremental costs are calculated to avoid that inefficiencies, such high physical and commercial losses or high staffing ratio, be passed on to Customers. A WSS tariff that produces an acceptable financial performance may not necessarily be economically efficient, as it uses past costs that are not relevant for long-term capacity planning. Similarly, an economically efficient tariff may not always lead to a satisfactory financial outcome: either excessive surpluses or losses may accrue to the utility. When a marginal cost-based price generates a large surplus, service to the poor could possibly be subsidized. On the contrary, when a marginal cost-based price results in loss making, a two-part tariff could be implemented with a fixed part set to cover costs that do not depend on amount of consumption and a variable part set according to marginal cost to ensure that financial performance is achieved. LRMC analysis should be carried out when WSS master plans are prepared or updated and the pricing strategy is defined, as a guideline for tariff setting.

**Water Rights and Water Markets.** As in most countries, drinking water is given the first priority in India, but farmers do not want to give up their rights and indeed they are encouraged to pump more groundwater than needed by highly subsidized electricity costs. Many urban areas rely on surface water sources that affect several States, as 90% of India is drained by inter-State rivers. The lack of clear inter-State allocation rules has led to growing conflicts which cities are the first to suffer from. Many States in fact pay more attention to laying a claim for future water right awards than for using current allocations efficiently; this applies in particular to “surplus” States that may have the feeling that they will not be

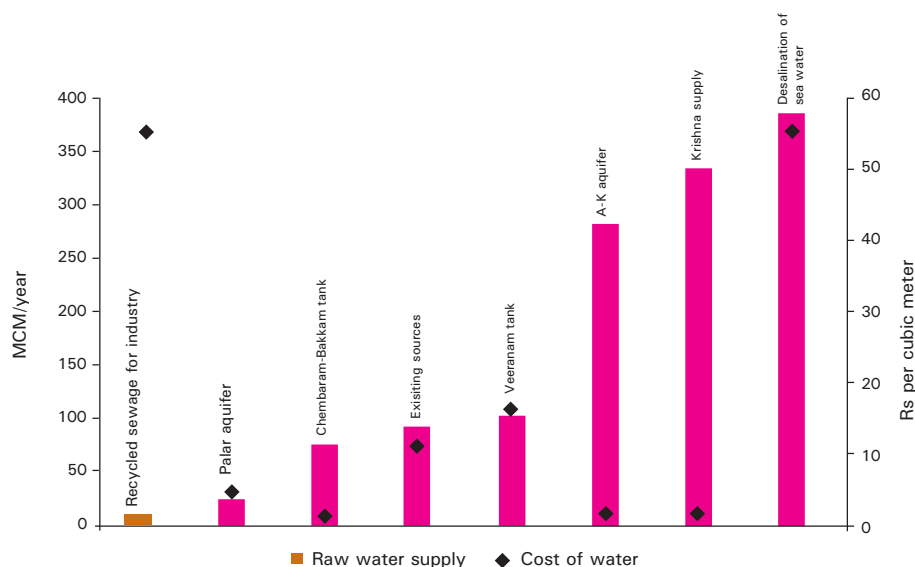
properly compensated for water taken away from them by less endowed States. There are potentially enormous gains from sensible trades, as shown in Figure 12 that illustrates options available for Chennai, before large scale desalination can reasonably be envisaged. Instruments to make informed decisions on proper allocation of water resources still have to be developed in most States. The development of water rights markets is probably the only option that would allow most cities and towns establish an environmentally sustainable WSS service, as coping strategies have obvious limits.

**Assess Limits of the Coping Strategies.** Whether the poor water service provided actually results from insufficient water resource or from a “tradition” of supplying water on an intermittent basis even when it is plentiful and the production capacity is sufficient, customers have to develop alternative sources such as backyard boreholes, booster, storage tanks and purification equipment, rain water harvesting and complement deficient piped water supply from on tankers and/or vendors. Coping strategies are expensive and, in case of uncontrolled groundwater abstraction endanger aquifers. Economic costs of

coping with poor WSS service should be estimated carefully when water resource allocation decisions have to support pricing decisions and the opening of Water Rights markets. Improving the performance of urban WSS utilities could only contribute to the rejuvenation of urban aquifers that are depleted and contaminated.

**Protect Water Quality.** Water quality has deteriorated in many receiving bodies as a result of uncontrolled discharges or raw domestic, industrial waste waters, as well as agricultural run-off. The solution to the problem has too often been to build additional waste water treatment infrastructure, designed to provide high level of effluent treatment, and not enough to rehabilitate the collection of waste water. In many cities, only a fraction of the waste water generated and discharged into sewers actually reach the treatment facilities, as sewers are silted up because of poor maintenance and pumping stations are faced with unreliable power supply. As a result, water quality in receiving bodies has seldom improved. River Basin Agencies, which are the proper instrument to address comprehensive improvement of the water quality have been created on paper, but in fact do not exist.

Figure 12: Other Potential Sources of Water for Chennai



Source: Briscoe, John. 1996. "Water Resources Supply and Management Issues in Chennai (Formerly Madras). Mimeo. World Bank: Washington, D.C.



**Plan WSS Infrastructure to Achieve Realistic Environmental Objectives.** As already mentioned, investments in waste water collection and treatment are made in an ad hoc manner, often at high cost to meet strict effluent standards, but without concern for their cost-effectiveness to achieve environmental objectives (which usually lack clarity and realism), and without comparing the expected environmental benefits in response to the costs of improvements in the pollution control infrastructure. To address planning issues, objective methods exist to analyze alternative wastewater schemes and compare the benefits of different options at a catchment or even river basin level. Environmental benefits could be compared to financial costs in order to develop a ranked list of possible schemes to identify those with the highest economic rate of return. This list could be used as a planning aid for decision makers in prioritizing schemes when used in conjunction with information regarding financial and affordability constraints, and other economic and social factors. Another environmental issue frequently overlooked in WSS is the disposal of sludge: the development of strategic sludge management plans, considering both sludge utilization and disposal should become part of any WSS scheme.

## Improving the Affordability of the WSS Service

**Reduce Costs by Adapting Design Criteria and Technology.** Design criteria used to dimension water production and distribution systems and waste water collection and disposal facilities should be revisited. A systematic metering program should be developed to monitor water production and consumption. Elasticity of demand to pricing should be assessed thoroughly, as highly subsidized user charges encourage high consumption and wastage. Also, the technical cost of intermittent water supply should be estimated, in particular when water production is sufficient<sup>24</sup> to support a more aggressive move towards internationally accepted water distribution standards: water can only be safely distributed if provided 24 hours per day, seven days a week. More generally, least cost options have to be investigated by

comparing discounted values of investment and O&M costs: this applies to all WSS assets, and in particular to waste water treatment facilities.

**Reduce Costs by Adapting O&M Arrangements.** As already mentioned, meeting O&M costs cannot only be achieved by increasing user charges; fighting inefficiencies built in the institutional arrangement by a series of “perverse incentives” would be essential to achieve sustainability. NRW reduction, energy efficiency and staff adjustment programs would have to be prepared as part of PIPs, and preferably supported by financing mechanisms linked to outputs (Output Based Aid – OBA or Output Based Financing – OBF) rather than inputs. A key element of financial recovery of most WSS Service Providers is likely to lie in improvement of metering, billing, collection and regularization of illegal connections that are all activities for which the private sector could play a major role. Performance improvement should be facilitated by the consolidation of the role of promoter of WSS infrastructure and that of the provider of WSS service and the decentralization of these responsibilities to the lowest appropriate level of government.

**Design Subsidies Targeted to the Poor.** Implicit and untargeted subsidies provided by the States to WSS Service Providers are inefficient as they benefit mostly better-off customers. Further, they seldom support improved performance. Subsidizing the WSS service provided to the poor could be justified when: (i) the poor have limited ability to pay; (ii) the WSS service has some public good characteristics; and (iii) the WSS service has important externalities in terms of improved public health. Subsidies should preferably be transparent, targeted, linked to actual performance and time limited. OBA has become an increasingly popular concept to achieve such objectives (Box 14). OBA could be targeted to specific category of customers; for example, a subsidy aimed at increasing access to piped water could be paid on the basis of the actual number on new connections built or to complement revenues from certain categories of customers on the basis of actual quantities of water consumed and paid for. OBA is more efficiently implemented if subject to competition and it is often a type of financing associated with Management or

<sup>24</sup> Obviously distributing 250 lpcd in four hours requires larger pipes and pumping equipment than distributing it in 24 hours.

### Box 14: Output-based Aid in Cambodia

The piped water supply service in several towns of Cambodia is provided by a private operator under 15-year operation contracts. Because much of the population cannot afford the high price of a one-time connection fee to the piped system (about US\$500), targeted subsidies to poor households are implemented to make piped water service feasible. The operator was also awarded, after open competition, a contract to build these connections; the price offered was about 25% below that of the former public water service provider. The operator receives payment for each targeted household, based on the actual delivery of a new connection, after inspection by an independent engineer. Households who can afford the connection fee are billed directly by the operator. The “Output Based Aid” is provided by a fund replenished by a Credit from the International Development Association (IDA). Poor households are responsible however for paying their water bill; the water tariff is about US\$0.50/m<sup>3</sup> and their water budget amounts to an average 4.1 to 6.4% of their income.

Source: Mumssen 2004.

Affermage contracts. However since the WSS service is likely to still be operated by public service providers in most cases, reforming States could enter into negotiated agreements with selected ULB-level WSS Service Providers to support specific aspects of their PIP aimed at improving WSS service to the poor.

## Building the Capacity of the Urban WSS Sector

**Scale up Capacity Building Programs in WSS.** Training provided in the urban WSS sector is traditional in content and aimed at a rather narrow grouping of professionals. In order to keep pace with actions needed to bridge the gap between infrastructure and service, training programs would require major revisions to broaden both their contents and target audiences. Also, the current training rate should be significantly scaled up in order to meet demand, as utilities get progressively engaged on a reform path. The scaling up and the revision of the content of the training programs should be coordinated among training institutions. Fortunately, a great deal of learning and capacity building materials exists in the WSS community, both from the World Bank Institute (WBI) and water training institutes in other countries. The challenge is to identify material potentially relevant for the needs of India, and transform it for use in the Indian context.

**Assess Institutional Strengthening Needs for WSS Capacity Building Services.** A complete needs assessment and options analysis exercise should be carried out to fully evaluate the capacity of the public agencies described in the overview of the sector in order to provide the full range of WSS capacity building services required. Given the number of institutions and the broad range of topics, efforts should be made to distribute capacity building functions among the institutions according to their specific strengths and links to particular stakeholder groups. The capacity of key agencies such as the Indian Water Works Association (IWWA), the All India Institute of Local Self Government (AIILSG) and the CPHEEO to conduct needs assessments of target stakeholder groups, such as staff of the State Engineering Agencies at all levels, consumers, professional associations, NGOs, politicians, and decision makers should be evaluated.

**Focus Capacity Building at the ULB Level.** It is imperative to build the capacity of ULB-level WSS Service Providers to make them more directly answerable to consumers. They would need to establish consumer service centers staffed with professionals trained in sector issues and with communication skills. These functions may include consumer help desk, problem-solving, consumer participation or consumer awareness programs. To prepare utilities to carry out these decentralized

functions successfully, staff training programs would be needed in the following areas:

- Adoption of a demand driven approach based on empowerment of communities to ensure their full participation of expansion projects through a decision-making role in the choice of scheme design and management arrangement;
- Adoption of an integrated service delivery approach that streamlines the functions of agencies involved in project implementation;
- Application of conservation measures for sustained supply of water; and
- Development of alternative source options via rainwater harvesting and ground water recharge.

***Establish Modern Capacity Building Programs within WSS Service Providers*** to support a shift from provision of WSS infrastructure to provision of WSS service, as well as “post shift”. The institutional capacity of ULB-level WSS Service Providers must be strengthened through: (i) modern management approaches; (ii) human resources management (HRM) policies and action plans, including appropriate incentive systems and; (iii) appropriate staff skill mix

and flexibility, particularly at the management level; (iv) institutional flexibility for timely decision making and action; (v) Information Technology (IT) capabilities; and (vi) consumer relations. Most WSS Service Providers also face the challenge of securing bulk water for their service area, particularly during droughts. Capacity building programs should be developed for the senior staff in areas such as use of treated wastewater; water trading and swaps with other sectors; interstate water transfer and negotiations; and public awareness of water scarcity and poor quality. One way to assist the WSS Board to scale up their capacity building activities would be to establish twinning arrangements between Indian utilities, as well as with other water utilities in developed countries. The rate of delivery of staff training programs would have to be increased through recruitment and training of additional qualified staff and modernization of existing training facilities. Also incentives, such as certification of professional staff should be incorporated in the training programs to attract staff and retain them in WSS utilities.

***Align Curricula of Training Institutions with Emerging Needs*** of WSS Utilities by developing and delivering comprehensive capacity building programs. These programs should include institutional, financial, management, customer orientation, and

### Box 15: Professional Association of Indonesian WSS Service Providers

Municipal WSS services in Indonesia are provided by some 300 semi-autonomous municipal water utilities (PDAMs). After the financial crisis that hit the country in 1998, most PDAMs struggled financially and the quality of the service provided deteriorated under the combined pressure of population growth, aging infrastructure, inefficiencies and low revenue. Corporatization of PDAMs, improved performance and increased accountability and provision of timely and accurate information to decision-makers are part of the challenges to be met. PDAMs are members of a Professional Organization of Water Enterprises (PERPAMSI), headquartered in Jakarta with 28 provincial centers. The mission of PERPAMSI is to assist its members improve the management of their water supplies, assets and finances, to provide training and to certify professional staff. In addition, PERPAMSI provides training in public awareness, negotiations with local governments and customer outreach. A strong PERPAMSI is considered a strategic element for improving WSS services throughout the country. Through a twinning arrangement, the World Bank Institute (WBI) assists PERPAMSI in three areas: (i) public communications and information services; (ii) performance benchmarking; and (iii) PDAM staff training programs. The program includes training of PERPAMSI's trainers in its 28 provincial centers; trainers will in turn train staff in the member PDAMs. WBI is also supporting PERPAMSI building stronger ties with universities and training institutions to strengthen their own capacity and engage them in the delivery of appropriate training services.

corporatization modules in addition to the current technical modules. Specific courses should be developed in Non-Revenue Water (NRW), marketing, WSS assets (physical and human) management, tariff structures, credit worthiness, benchmarking, water audit, private sector participation, regulation; and monitoring and evaluation.

***Use the Public Service Function of Training Institutions as a Vehicle for Extending Capacity Building to all Stakeholders.*** These institutions should design targeted programs to include training of trainers (TOT) for increased reach and scaled up capacity building of the WSS professional community, consumer, and consulting firms. A potential approach to help those institutions update their curricula and scale up delivery to a broader audience would be to establish partnerships with training institutions in other countries (such partnerships could possibly be supported by bilateral donors funding).

***Develop Special Programs for Consumer Associations and NGOs Advocating Service to the Poor*** to assist them with carrying out their mission effectively. In addition, these organizations require appropriate communication and training tools to better build the capacity of their own constituencies. These programs, in addition to the usual WSS learning materials, should include modules on subjects such as the rights and responsibilities of consumers; good practices in water

conservation and WSS cost recovery and tariff issues. The training institutions are in the best position to provide this service to consumer associations and NGOs through their public service function. The TOT programs should be used to increase reach at the grass roots level. They should be coordinated with the State Boards delivering training to both the urban and rural communities.

***Expand the Role and the Scope of Professional Associations*** to include strengthening the capacity of their membership. They are in a unique position because of their access to a wide spectrum of professionals in the sector. These include utility professionals, government staff (broad level), consultants, academics, and NGO members. The most relevant association in WSS is the Indian Water Works Association (IWWA). With some 21 local chapters throughout the country, IWWA could provide capacity building in WSS at all levels. The IWWA should compile and disseminate WSS guidelines, best practice, benchmarking, and M&E learning materials through its membership, seminars and its web site. The creation of a professional association of WSS Service Providers, similar to that created in Indonesia (Box 15) could help develop the “identity of the WSS industry” that is currently missing, should be considered. Box 16 gives in addition an example of a regional association of professional WSS service providers.

### **Box 16: Strengthening WSS Utilities through Regional Partnership – The Water Utility Partnership for Capacity Building in WSS in Africa**

The Water Utility Partnership (WUP) for Capacity Building in Africa was launched in 1996 at the initiation of the Union of African Water Suppliers (UAWS) in partnerships with African training institutions. Its goals are to foster capacity-building among stakeholders of the water sector in Africa, create opportunities for sharing experiences and to deliver training events. The challenge at that time was to establish an institution capable of linking water utilities and other water stakeholders, in the various African countries and to deliver capacity-building activities on a regional basis. WUP, in collaboration with donors and international institutions still develops and delivers WSS training and capacity building events aligned with the needs of African water practitioners. WUP is a recognized institution in the water sector in Africa, entirely staffed by African nationals, and has established its position as WBI key local partner for conducting capacity building activities. It plays an essential role in linking the stakeholders of the water sector of the various African countries.

***Increase Awareness and Support of Politicians and Decision Makers through Targeted Programs.*** This particular stakeholder group plays a central role in the implementation of any Performance Improvement Plan (PIP). Capacity building for this group should include awareness and appreciation of the facts and figures in WSS operations within their domain of influence and decision, such as the value of asset management (both human and physical), the long term benefits of WSS improvement, and the consequences of no action. High level workshops of small duration focused on discussion

and exchange of knowledge and experience between decision makers would prove beneficial; the participation of decision makers from other countries having to deal with similar problems should systematically be considered. As there are very few Indian institutions currently conducting such activities in a programmatic, coordinated manner, the donor community should be encouraged to initiate this activity with the goal of identifying and strengthening local partners, which could in turn take over this function after the start-up period.

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## Annex 1

# Urban Water Supply & Sanitation Sector – Overview of Training Institutions

*ESCI* (The Engineering Staff College of India), located in Hyderabad, has over 20 years of experience providing continuing education for engineers and managers as well as consulting services to industry and government. Its goal is to become a center of excellence for training technological and management personnel at all levels. ESCI offers a number of ongoing programs in water and sanitation services, including water treatment, wastewater treatment technologies, and sanitation and public health. In addition to the relatively small permanent staff in water, the College utilizes some 500 adjunct faculty drawn from the community of practice to help teach courses. ESCI's water curriculum is being revised to better reflect the current and future needs in water supply and sanitation training.

*Anna University* has a long history of providing higher education in engineering, technology and allied sciences. The University also fosters cooperation and exchange between the academic community and industry. Its Centre for Environmental Studies (CES) provides a number of programs tailored to the needs of practicing engineers, including a 3-month course in public health engineering as well as courses on treatment and reuse of wastewater, groundwater recharge, and effective design of water distribution systems. Other departments, including hydraulics and remote sensing, collaborate in providing an integrated curriculum in water management and water supply and sanitation. The approach to learning is traditional and the main focus remains on technical training.

However, the curriculum is being revised through introduction of new full courses and short courses to reflect the changing needs in capacity building. The newly developed materials in water supply and sanitation include legal and regulatory framework, rural sanitation, remote sensing for leak detection, operation and maintenance of water infrastructure, etc. The university is in a unique position to access and influence the political leadership, the NGO community and civil society through its public service activities. This particular aspect would be an important avenue to enhance for increased reach and scaling up in water supply and sanitation.

*IWWA* (India Water Works Association) is a voluntary organization of water professionals established to promote better municipal and agricultural water and wastewater management practices. Headquartered in Mumbai, IWWA has 26 local centers throughout India and over 5,700 members. IWWA provides a platform for individuals and organizations to share ideas and information about new and better technologies and approaches for effective water management. This organization provides a good mechanism for local-level capacity building of its members, who include local government staff, academics, consultants, and concerned citizens. Within the context of the Action Plan for meeting the MDG in water and sanitation, this organization can play an effective role through preparation and dissemination of guidelines and manuals, lecture and seminar series, and public awareness campaigns at the local level. Its ties to

organizations such as American Water Works Association (AWWA) in the U.S. could provide additional access to the most up-to-date standards of practice.

**HSMI** (The Human Settlement Management Institute) promotes the development and dissemination of conceptual and practical knowledge in the fields of housing and housing finance, urban infrastructure, urban finance, and other issues pertaining to utility, social, and commercial infrastructure. It provides training and education in these fields, especially for professionals from State Housing Boards, Water Supply and Sewerage Boards, Urban Development Authorities, Municipal Corporations, Housing Finance Institutions, Private Sector organizations, and NGOs. It also provides institutional capacity building by establishing regular training programs at state level training institutes in various States and Regions in the country. The Institute focuses on state-level policy issues, including provision of services (e.g., water supply) to facilitate reform. The institute can be quite instrumental in training trainers as part of the overall scaling-up required to meet MDG in water supply and sanitation.

**The Chennai Metropolitan Water Supply and Sewerage Board Resource Center** provides training and technical assistance to improve water and wastewater management in areas such as operations and management, leak detection and water conservation, human resources development, financial management, and customer satisfaction. Originally established as a

staff training center for Chennai Metrowater, the Resource Center has expanded its training and capacity building to serve government agencies throughout Tamil Nadu. The Center provides refresher technical courses in water supply to mostly engineering staff and has a relationship with Anna University to complement its training program.

**AIIILSG** (All India Institute of Local Self Government) was established over 75 years ago to assist local government agencies to better meet citizen needs. Today the institute has over 20 branches and provides a broad range of services, including research, training, seminars, and conferences. The institute established the Regional Centre for Urban and Environmental Studies to better serve local authorities in the States of Gujarat, Goa, Maharashtra, and Rajasthan. AIIILSG can help leverage resources to reach target audiences in these states.

**SPARC** (Society of Promotion of Area Resources Centre). This is a voluntary organization, which works in the areas of community learning and capacity building for urban poor in 42 cities across the country. It works in cities such as Mumbai and Pune, with the National Slum Dwellers' Federation. SPARC has been widely recognized (UN Centre for Housing and Services) for being instrumental in the design, construction, and maintenance of low-cost waste disposal systems and toilets and for sharing best practices with other countries. This Centre can be quite instrumental in grassroots capacity building and public awareness.

## Annex 2

# Cost Recovery Options and Required Gol and State Financial Assistance

Simplified financial forecasts of the Indian urban WSS sector have been developed to estimate the required levels of consumer charges and financial assistance to be provided by the Gol and the States to meet pre determined cost recovery objectives.

Population and access ratios to piped WS and sewers are that indicated in the ensuing section on bridging the gap between infrastructure and service. Per capita production levels (in lpcd) are consistent with CPHEEO standards, corrected however to reflect shortfalls in production estimated to regularly decrease from an average 30% in 2002 to 0% in 2017. NRW is estimated to regularly decrease from 45% in 2002 to 30% in 2017. Average O&M costs have been estimated at Rs 6.5/m<sup>3</sup> and current average WSS tariff at Rs 2.5/m<sup>3</sup> until, at least, 2007. In the absence of consolidated statements by lending agencies, the urban WSS sector outstanding debt has been estimated at about Rs 42,500 million (US\$1,000 million) in 2002. In the absence of consolidated balance sheet of the urban WSS industry, the value of net fixed assets in operation has been estimated at of Rs 665 billion (US\$15.7 billion) in 2002. Four scenarios have been envisaged.

**Scenario 0: Business as Usual:** The average user charge would remain at Rs 2.5/m<sup>3</sup> throughout the

forecast period, despite the large deficit, the sector would still borrow an average 10% of its Capex from HUDCO and similar agencies to finance it, as it is currently the case. For the 2007-2107 period, financial support to the sector would be about Rs 2,850 billion (US\$67 billion), of which close to 27% for O&M expenses.

**Scenario 1: Coverage of O&M Costs and Debt Service in 2017:** The average user charge would remain at Rs 2.5/m<sup>3</sup> until 2006, and gradually increase between 2007 and 2017 to about Rs 10/m<sup>3</sup> so that it is sufficient to cover in 2017 the cash costs, i.e., O&M plus debt service (principal and interest). For the 2007-2017 period, financial support to the sector would be reduced to Rs 2,500 billion (US\$59 billion) of which still 13.5% for O&M.

**Scenario 2: Coverage of O&M, Depreciation and Financing costs in 2017:** The average user charge would remain at Rs 2.5/m<sup>3</sup> until 2006, and be gradually increased between 2007 and 2017 to Rs 14.0/m<sup>3</sup> so that it is sufficient to cover in 2017 O&M plus depreciation, plus interest (as well as provision for bad debt). For the 2007-2107 period, financial support to the sector period would still have to be about Rs 2,480 billion (US\$58 billion) of which still about 7% for O&M.

**Scenario 3: Coverage of Cash Expenditures in 2012 and Contribution to Capex as of 2012:** The average user charge would remain at Rs 2.5/m<sup>3</sup> until 2006, and be gradually increased between 2007 and 2010 to Rs 12/m<sup>3</sup> to covers O&M costs and again to Rs 17/m<sup>3</sup> in 2012 so that the Capex during the 12th Plan be financed as follows: 1/3 grants from Gol/States; 1/3 loans from HUDCO and similar agencies; 1/3 from

cash generation. Financial support to the sector would be drastically reduced for the 2007-2017 period to Rs 800 billion (US\$19 billion) of which only Rs 60 billion for O&M between 2007 and 2012.

The following table and figures summarize the assumptions, tariff adjustments and financial support to the urban WSS sector for each scenario.

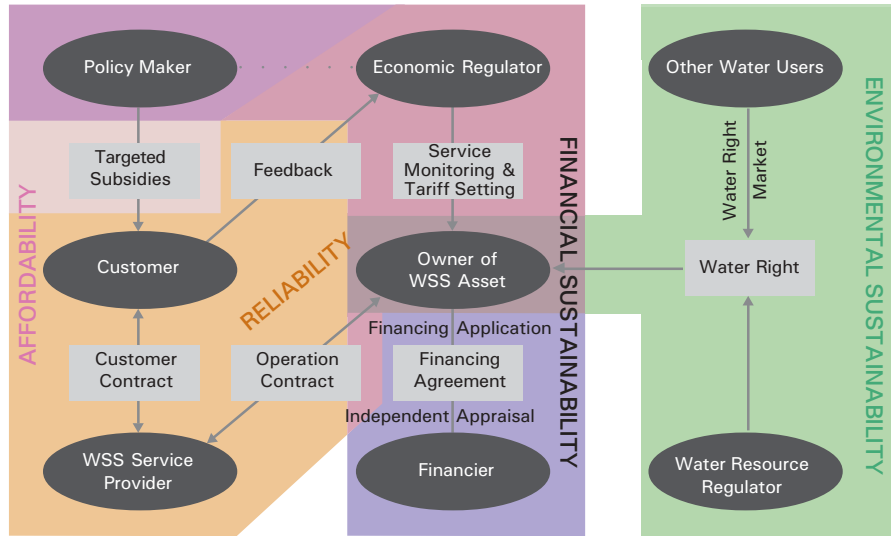
### Summary Assumptions and Scenarios

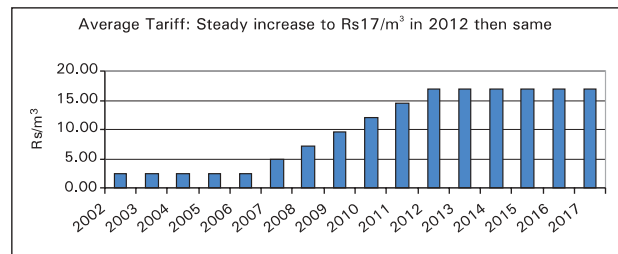
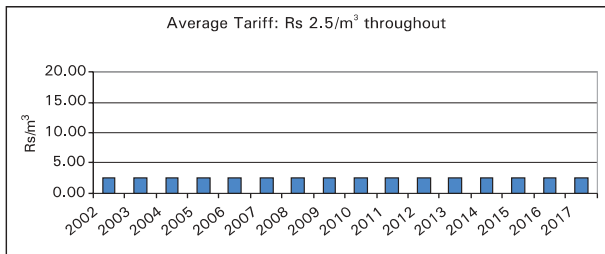
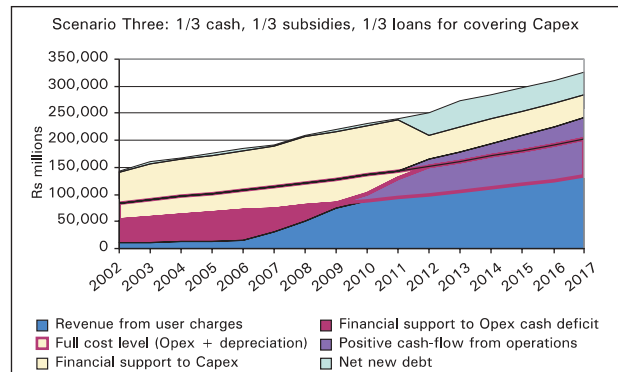
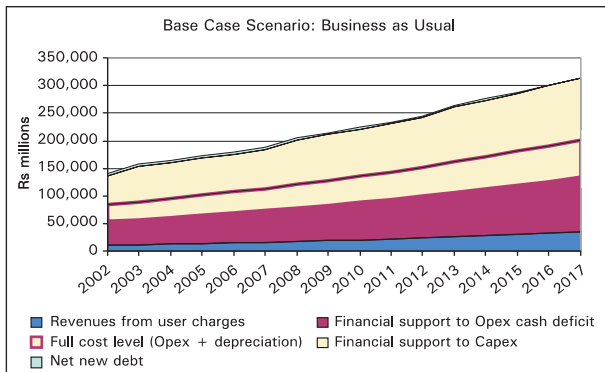
		2002	2007	2012	2017
Total Urban Population	million	290	350	420	500
Production	mio m <sup>3</sup> /year		10,700	15,000	20,500
Sales	mio m <sup>3</sup> /year		6,400	9,800	14,300
		2002-07	2007-12	2012-17	
Capex	Rs billion		540	695	875
O&M	Rs billion		295	415	575
Scenario 0: Business as usual					
Tariff	Rs/m <sup>3</sup>	2.5	2.5	2.5	2.5
Finan. Support Opex	Rs billion		250	330	430
Finan. Support Capex	Rs billion		680	910	1,190
Scenario 1: Cash costs recovered in 2017					
Tariff	Rs/m <sup>3</sup>	2.5	3.1	6.2	9.3
Finan. Support Opex	Rs billion		250	240	100
Finan. Support Capex	Rs billion		695	940	1,240
Scenario 2: Opex recovered in 2017					
Tariff	Rs/m <sup>3</sup>	2.5	3.6	8.8	14.0
Finan. Support Opex	Rs billion		250	175	10
Finan. Support Capex	Rs billion		695	940	1,360
Scenario 3: Opex recovered in 2012; contribution 1/3 Capex as of 2012					
Tariff	Rs/m <sup>3</sup>	2.5	4.9	16.9	16.9
Finan. Support Opex	Rs billion		240	60	0
Finan. Support Capex	Rs billion		360	450	290

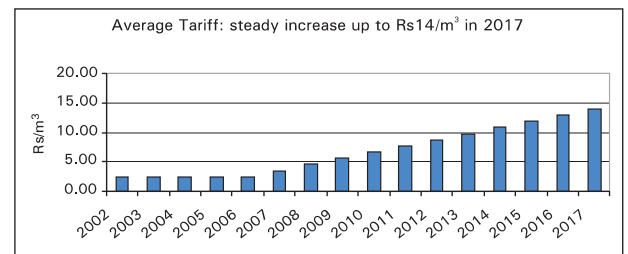
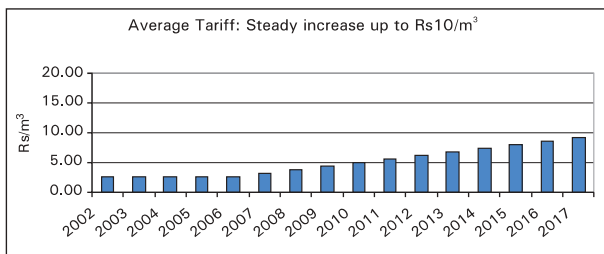
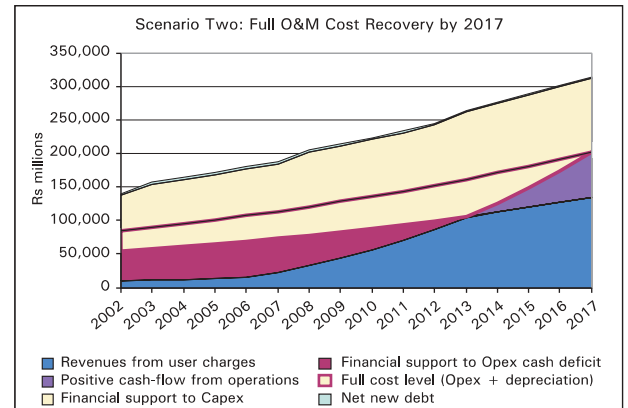
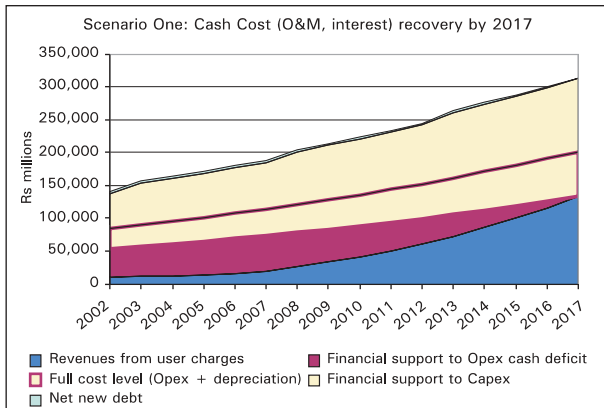
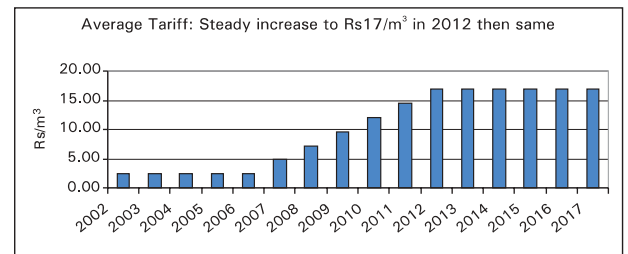
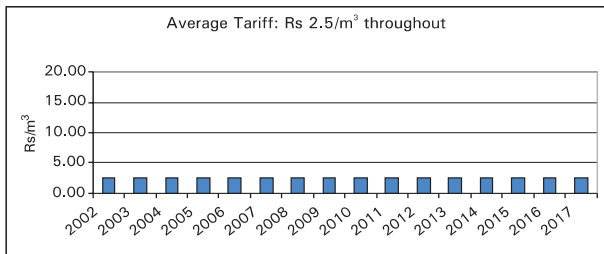
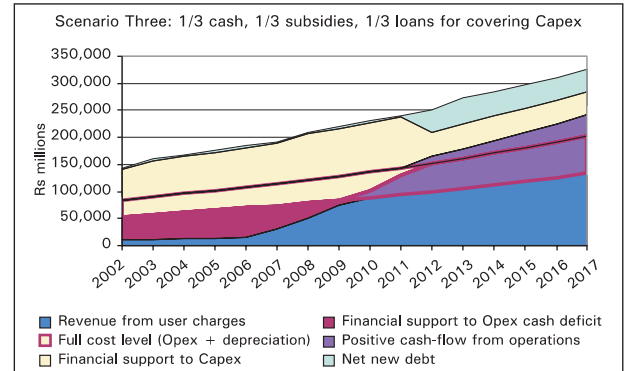
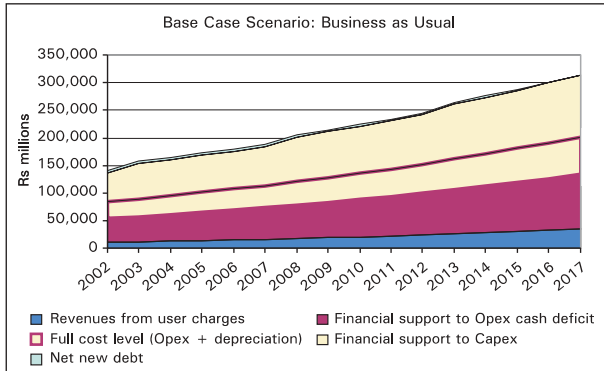
















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