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WATER for ALL



Asia-Pacific
Water Forum

Country Paper *India*

Asian Water Development Outlook 2007



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Country Chapter – India¹

Geoff Bridges

Executive Summary

Some two billion Asians—66% of the Asian population (or nearly 75% of all those in the world without such facilities)—lack access to adequate sanitation. Many Asian countries face huge financial costs to clean up the environment because of a lack of investment in sanitation, leading to massive pollution of surface and groundwater. The cost of cleaning a river already polluted with industrial waste or sewage is far higher than the cost of the infrastructure to dispose of the pollutants properly. Water and sanitation must get top priority from political leadership everywhere; postponing action is not an option because to delay will cost a great deal more. This key message was conveyed by the Asian Development Bank (ADB) at the Stockholm World Water Week, 12–18 August 2007.²

Sector Framework

At the federal level, Ministry of Water Resources is responsible for policy guidelines, development programs and regulation of water resources, with the Central Groundwater Authority responsible for groundwater. Water supply and sanitation come under Ministry of Urban Development. State governments are responsible for policy formulation, regulation, and execution of water sector projects by Water and Sanitation Departments, etc. Under the

74th Constitutional Amendment, municipalities and corporations provide water supply and sanitation facilities in their areas. Water and sanitation are in the Concurrent List between central and state governments. Rural water supply and sanitation is a state responsibility, but the central government's Swajaldahara program that advocates decentralized service delivery and community participation contributes about 10% of investment. Most sector work is undertaken by Public Health Engineering Departments and State Water Boards.

National Water Strategy and Policies

The National Water Policy states that water is a scarce national resource to be planned, developed, conserved, and managed on an integrated and environmentally sound multisectoral basin or sub-basin basis, with water transferred to water stress areas based on national perspectives. Drinking water has priority allocation over agriculture. Water users' associations and local bodies are encouraged to manage local water facilities. The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) seeks to change the current poor situation in water supply, sanitation, and drainage, etc., with a focus on providing basic services to the urban poor. It is a reforms-driven, fast-track, planned development in 63 cities, with the focus on efficiency in urban infrastructure/services and delivery mechanisms. A mandatory requirement at

Significant rural-urban migration is placing further strain on already over-stretched services

municipal level is the commitment to implement reasonable user charges to progressively cover operating and maintenance costs. The Urban Infrastructure Development Scheme for Small and Medium Towns operates in a similar manner to JNNURM but covers cities not included in it. The Integrated Slum Development Program provides financing to improve water supply and sanitation in city slum areas. The 11th Five Year Plan—FYP (2007–2012)—emphasizes integrated development planning, the main objective being development of urban water supply and sanitation to increase the efficiency and productivity of cities.

Water Resources Management

India faces a number of water-related challenges, including increasing water scarcity and competition for water between different sectors. This is already critical in some southern and western river basins, with those in the east perceived as having surplus water and encountering recurrent flooding. The National River Linking Project proposes transferring flood water from major rivers to water scarce basins to resolve these problems, but it is a contentious issue.

Water Supply

Nearly all India's 5,161 cities or towns have piped water systems, but many are characterized by poor efficiencies, high levels of nonrevenue water (NRW), low pressures, and water available for only a few hours. Significant rural-urban migration is placing further strain on already over-stretched services daily. Many water utilities



Sundarnagar, Bangalore

have staffing levels of about 10 staff/thousand connections, exceeding best international practice of 2–4. Revenues typically fall far short of costs, the sector relying extensively on large state operating subsidies and capital grants. In rural areas, hand pumps remain inoperable for months before being repaired by state agencies. Many households, faced with inadequate water services, adopt coping mechanisms that are time-consuming, expensive, and unsafe, such as coping costs (financial, health, lost workdays) far exceeding the full cost of providing a good service. There have been several attempts to introduce private sector participation in India, but few successes in this public sector stronghold. UN Habitat's Water for Asian Cities Program has promoted several initiatives in India.

Sanitation

It is estimated that 33% of the population practice open defecation, a further 33% rely on bucket and dry privies, and the remaining 34% use toilets with sewerage or septic tank facilities. All urban areas with populations of more than 100,000 have sewerage systems, but only 700 cities treat effluent before disposal. Raw sewage often overflows into open drains due to blocked sewers or failed pumps. There are good examples of nongovernment organizations and communities collaborating to bring basic sanitation to millions using the power of communities to mobilize resources.

MDG Target Progress

World Health Organization/United Nations Children's Fund (WHO/UNICEF) data for 2004 indicate overall water supply coverage achieved was 86% (95% urban and 83% rural), with overall sanitation coverage 33% (59% urban and 22% rural). Progress on meeting the Millennium Development Goals (MDGs) by 2015 has been good, with urban water and rural water MDG targets already reached, and with urban sanitation and rural sanitation on-track to meet their targets by 2015.

Future Plans

It has been estimated that India would have to invest US\$4.4 billion annually during the 11th FYP (2007–2012), increasing to US\$5.25 billion/year in the 12th FYP on infrastructure assets to meet the water MDG targets, equivalent to 0.55% of gross domestic product (GDP) during that 10-year period. If only 40% of operating and maintenance costs are recovered

from user charges, as is thought to be the current situation, India will have to devote a further 0.25% of its GDP to supporting its water and sanitation sector. The proposed budget for the water resources component of the 11th FYP is Rs231,800 crore, plus Rs127,025 crore for urban water supply, sanitation, drainage, and solid waste.

Utility Performance

Key performance characteristics are low hours of operation, high levels of nonrevenue water, staffing ratios in the medium range, and revenue generation not covering operating and maintenance costs. The connection fee in Delhi is low, but together with the low tariff may contribute to the system's inability to meet demand. Although water coverage is very high in Bangalore, water is supplied on alternate days. Sewerage connection fees and tariff charges are typically only 10–20% of the equivalent water supply rates.

Successes/Failures and Key Issues

Water is regarded as a social good and politicians are unwilling to increase tariffs to sustainable levels for fear of losing power. Rural/urban drift and increases in the slum populations make it essential to target the poor for water and sanitation services. Although appropriate policies and legislation are in place, enforcement is lacking. Key issues and indicative actions are:

- Ring-fence revenue and expenses of water and sanitation operations.
- Increase public participation and adopt demand-responsive approaches.
- Low tariffs and public perception they should remain low to be changed.
- Aim for full operating and maintenance cost recovery by end of 11th FYP (already a JNNURM mandatory requirement)—many utilities do not cover these costs.
- Progressively aim for full cost recovery.
- Price water (and treatment of wastewater) to reflect its “true” cost.
- Remove market distortions of subsidized rural power tariffs.
- Establish state-level water regulatory entities.
- Increase proportion of municipal wastewater treated.
- Introduce targeted and transparent subsidies for the poor.
- Greater clarity and autonomy need to be introduced into the sector so that the states and municipalities are far less dependent

on central Government for local planning, infrastructure development, and funding.

- Effectively implement water conservation strategies, especially irrigation.
- Recognize the role of small-scale independent providers and formalize their status.
- Establish an independent water regulator.
- Develop local capacity to progressively improve the poor technical performance and service levels in many utilities.

Future Vision

India needs to increase water sector investments to at least 1% of GDP (0.55% GDP to meet outstanding sanitation MDG and 11th FYP goals, plus 0.25% GDP to fully cover cost deficits, and the remainder to improve service levels), and must also focus on tariff reform, increased wastewater treatment capacity, and improved water conservation.



Adivasi (tribal) woman and child by a latrine built by Gram Vikas, Orissa.

Introduction

The purpose of the Asian Water and Development Outlook (AWDO) is to enable leaders and policy makers to understand their respective national situations, to appreciate their present sector performance and the key issues in their country, and, by learning from the experiences of other countries, to encourage them to take effective action to tackle those issues. Achievement of these goals has been constrained by the limited availability of data and published current status information, as well as detailed future plans.

The Indian economy has experienced dynamic economic growth, gross domestic product (GDP) growing by 9.0% in fiscal year (FY)2005, and expected to continue to grow at a rate of 9.2% in FY2006 (ending March 2007), 8.0% in FY2007, and 8.3% in FY2008.³ However, this economic surge has led to increasing demand for services and resources and created significant rural-urban migration as people seek employment in the rapidly expanding commercial and industrial sector.

The country had a Human Development Index (HDI) value of 0.611 in 2004 (0.515 in 1990), and was ranked 126th worldwide in terms of HDI. 2004 GDP per capita was US\$3,139 PPP⁴ and its Human Poverty Index was 31.3%.⁵ Urbanization is significant and increasing rapidly, with 28.7% of the population living in urban areas in 2005 (25.5% in 1990), the annual 1990/95 urban growth rate being 2.73%.⁶

India has a highly seasonal rainfall pattern, with 50% of precipitation falling in just 15 days and more than 90% of river flows in 4 months.



At the back of this Adivasi village can be seen the community water tower constructed by Gram Vikas

In rural areas hand pumps remain inoperable for months before being repaired by state agencies

Over the past 150 years, there has been heavy investment in large-scale water infrastructure, much of which delivers water to previously water-scarce areas, resulting in dramatic economic shifts. The poor have benefited considerably from this as the incidence of poverty in irrigated districts is only 33% of that where there is no irrigation. In terms of water resource availability, the per capita total actual renewable water resources (TARWR) value reduced from 1,880 cubic meters (m³)/year in 2000 to 1,750 m³/year in 2005, with total water used being 34% of TARWR.⁷ Of the 645.837 billion m³ of water withdrawn in 2000, the proportion of withdrawals by agriculture, industry and domestic users was 86%, 5%, and 8%,⁸ respectively.

Although it has 14% of the world population, India only has 4% of the total average annual river run-off. Several areas, including some of the most densely populated and economically productive, are already experiencing a water crisis. It has been estimated that by as early as 2020, India's demand for water will exceed all sources of supply.⁹ India is therefore rapidly approaching entry into the water stress league, the water stress threshold being defined as renewable water resources below 1,700 m³/person/year, with the water scarcity threshold defined as below 1,000 m³/person/year. Already, 224 million people live in water stress in river basins, and more than 67% of the country's renewable water is in areas that serve 33% of the population.¹⁰ About 70% of irrigation needs and 80% of municipal water supplies come from groundwater sources. However, depleted aquifers and lowered groundwater tables mean that this is no longer sustainable. Unclear rules governing the allocation of water rights of interstate rivers that drain 90% of India's territory do not help.

Climate change projections suggest an overall increase in rainfall for India, but an increasing proportion of it will occur during more intensive monsoon periods in the parts of the country that are already well endowed with rainfall. Modeling indicates that 67% of the country, in particular semi-arid regions, will experience more than 10% fewer rainy days, which will translate into a net loss for water security and place a premium on rainwater harvesting and water storage.¹¹ The implications of changing rainfall patterns should be compared with the total estimated economic losses due to floods and droughts between 1990 and 2002 of US\$4.6 billion.¹² The increasing gravity of the status of water resources and the water sector must not be underestimated.

Sector Status and Performance Overview

Sector Framework

Responsibility for the water sector is divided amongst the three tiers of government. At the federal level, the Ministry of Water Resources is responsible for laying down policy guidelines and programs for development and regulation of national water resources, with the Central Groundwater Authority responsible for groundwater resources. Similarly, water supply and sanitation come under the remit of the Ministry of Urban Development. At the state level, state governments are constitutionally responsible for policy formulation, regulation, and also the direct execution of various water sector projects, with various agencies involved, such as Water and Sanitation Departments, Urban Development Departments, Infrastructure Development Corporations, and Public Health Engineering Departments. At the local government level, the function of the municipalities and corporations is to provide water supply and sanitation facilities in their respective areas. Water and sanitation are included in the Concurrent List, under which concurrence is required between central and state governments over water issues. This requirement for federal and state concurrence has led to conflict in the past over the control, management, and allocation of water resources, the recent legal battles between states over rights to water in the Cauvery River, highlighting this conflict over increasing competition for dwindling resources.

Under the Schedule 12 functions of the Constitutional Amendment (74th) Act of 1992 on Municipalities, responsibility for urban water supply and sewerage provision was decentralized from the states to municipal governments, such as independent municipal corporations, smaller municipal councils under State control, or to *Zillaparisahads* (Maharashtra). They in turn may discharge their responsibility through a variety of arrangements including through a municipal department, a municipal enterprise, a contract with the reformed state utility or a contract with a private provider. However, although technical and administrative responsibility has been devolved, the necessary decentralization of development funding has not been fully implemented, despite the necessary policy and mechanisms being in place. Although they

prepare the necessary budgets, local government is therefore still reliant on the states for funding. However, it is expected that this issue of funding autonomy will be resolved in the near future.

Rural water supply and sanitation are also a State responsibility, but central Government through Swajaldahara, a program that advocates for decentralized service delivery and community participation, contributes about 10% of the investment program. However, most work is still undertaken by state engineering agencies such as Public Health Engineering Departments (PHED) and State Water Boards, and the states provide substantial operating subsidies and capital grants because cost recovery is limited.

The Ministry of Health plays an important role in setting water quality standards, and in monitoring and control of drinking water quality in urban and rural areas.

National Water Strategy and Policies

The National Water Policy was promulgated by the Ministry of Water Resources in April 2002 and states that water is a scarce and precious national resource that is to be planned, developed, conserved, and managed on an integrated and environmentally sound basis. A standardized national information system is being established with a network of databases. Water resource development and management are planned on a multisectoral drainage basin or sub-basin basis, with water made available to water stress areas by transfer from other areas, including inter-basin transfers, based on national perspectives. Water allocation priorities are, first, drinking water then irrigation, hydropower, ecology, agro-



Joe Madiath, Executive Director of Gram Vikas, inspects a newly-dug well.

The Integrated Slum Development Program provides financing to improve water supply and sanitation in city slum areas

industries and nonagricultural industries, and finally navigation and other uses. Water resource development projects are as far as possible planned and developed as multipurpose projects, with provision for drinking water a primary consideration. In the planning, implementation, and operation of a project, preservation of the environmental quality and ecological balance is a primary consideration. An integrated and multidisciplinary approach is required for the planning, formulation, and implementation of projects, including catchment area treatment and management, environmental and ecological aspects, and the rehabilitation of affected people. The participation of beneficiaries and stakeholders is encouraged from the project planning stage.

Groundwater potential is periodically reassessed, taking into consideration the quality of water available and the economic viability of its extraction. Exploitation of groundwater resources is regulated so as not to exceed recharge capacities, and also to ensure social equity. The detrimental environmental consequences of over-exploitation of groundwater are effectively prevented by central and state governments. Groundwater recharge projects are developed and implemented for improving both the quality and availability of groundwater resources. Integrated and coordinated development of surface water and groundwater resources and their conjunctive use are envisaged from the project planning stage to form an integral part of project implementa-

tion. Over-exploitation of groundwater is to be avoided, especially near the coast to prevent saline intrusion into aquifers. Both surface water and groundwater should be regularly monitored for quality, a phased program being undertaken for improvements in water quality, with effluents treated to acceptable levels and standards before discharge into natural streams. Minimum flow should be ensured in perennial streams to maintain ecology and social considerations. The "polluter pays" principle should be applied.

Adequate safe drinking water facilities should be provided to the entire population, both in urban and rural areas. Irrigation and multipurpose projects should invariably include a drinking water component wherever there is no alternative source of drinking water. Management of water resources for diverse uses should incorporate a participatory approach by involving the various government agencies, users, and other stakeholders in an effective manner, in the planning, design, development, and management of water resource schemes. Legal and institutional changes are to be made at various levels for this purpose, ensuring an appropriate role for women. Water users' associations and local bodies, such as municipalities and *gram panchayats*, should particularly be involved in the operation, maintenance, and management of water infrastructure and facilities at appropriate levels progressively, with a view to eventual transfer of their management to user groups/local bodies. Private sector participation is encouraged in planning, development, and management of water resources projects, wherever feasible.

Water conservation measures should be optimized and an awareness of water as a scarce resource promoted through education, regulation, disincentives and incentives. Resources availability should be augmented by maximizing retention, eliminating pollution, and minimizing losses through such measures as selective linings in conveyance systems, rehabilitation of existing systems, recycling and re-use of treated effluents, etc. There should be a master plan for flood control and management for each flood prone basin, with an adequate flood-cushion provided in water storage projects, wherever feasible, to facilitate better flood management.

Drought-prone areas should be made less vulnerable to drought-associated problems through soil-moisture conservation measures, water harvesting practices, minimization of evaporation losses, development of groundwater potential, including recharging, and the transfer



Latrine and wash facilities constructed by Gram Vikas for this household in an Adivasi village in Orissa.

of surface water from surplus areas, where feasible and appropriate. There should be a system to monitor and evaluate the performance and socioeconomic impact of the project. Water sharing amongst states should be guided by national perspectives with due regard to water resources availability and needs within the river basin. The Inter-State Water Disputes Act of 1956, amended where necessary, will adjudicate water disputes referred to the Tribunal. There is an urgent need for a paradigm shift in management of the water resources sector from the present emphasis on the creation and expansion of water resources infrastructure to improvement of existing water resource facilities' performance.¹³

Under the 11th Five Year Plan—FYP (2007–2012)—the main objectives of water resource developments are to create an additional potential 16 million hectares of irrigated land, reduce the gap between potential and utilized areas of irrigated land, mitigate flood damage, and promote mass awareness of water related issues.¹⁴ Key areas covered by the plan are:

- incentives to create more storage,
- irrigation maintenance fund and flood protection fund for infrastructure operation and maintenance,
- night irrigation to be popularized and made policy in irrigation management,
- state governments to institute water regulatory authorities to fix water rates,
- establishment of National Flood Management Commission/Board to oversee flood management,
- water resource planning models to be changed from zonal planning to basin planning and river basin organizations established, and
- promotion of turn-key contracts to speed up completion of projects.

The strategy recently adopted by the Government to deal effectively with deteriorating urban services has two tracks: the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) which was launched in December 2005 for 63 identified cities, and the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) based on the 2001 census. JNNURM seeks to effectively change the current poor situation in water supply, sanitation, drainage, solid waste management, and urban transportation, with a specific focus on provision of basic services to the urban poor. It is a “reforms driven, fast track, planned



Signboard in a village in Orissa detailing the water supply developed there by Gram Vikas

development of identified cities with the focus on efficiency in urban infrastructure/services delivery mechanisms, community participation and accountability of Urban Local Bodies (ULB)/Parastatals towards citizens.”¹⁵

JNNURM is being implemented over seven years, and commenced in early 2006. Central government support will total approximately US\$12 billion (Rs50,000 crores)¹⁶ disbursed under two submissions over the 7 years for each of the eligible cities. The proportion of funding contributions from central, state and ULB will vary, but for category A cities (>4 million) will be 35:15:50, for category B cities (1–4 million) 50:20:30.¹⁷ For category C cities (<1 million), central Government will fund at least 80%, with state governments funding 10% and ULBs the remainder. Five percent of the central funds will be allocated for preparation of city development plans and detailed project reports, capacity building, and community participation, with a further 5% or actual costs for administrative and other expenses. Each city will enter into an agreement with the central Government and its parent state, committing to a range of mandatory and optional reforms related to urban governance. Funds will only be released when work and any reforms stipulated for completion at that stage in the agreement have been complied with.

City development plans (CDPs), visionary documents defining where the city wishes to go and by what alternative routes, will be developed reflecting each city's unique needs in an integrated and participatory manner, and prioritizing investments that need to be made during the Mission period and beyond. Based on the prioritization in the CDPs, detailed project reports (DPRs) will be prepared by the cities for the investments seeking JNNURM funding. Central



Gram Vikas constructed latrines

and state government funding will be directed to the State Level Nodal Agency (SLNA) designated by the state as grants-in-aid, with the SLNA in turn disbursing funds to the ULB/parastatal agency as a soft loan, grant or grant-cum-loan. The SLNA/ULBs will in turn leverage additional resources from other sources. A mandatory requirement of the JNNURM reform agenda at the municipal level is the commitment to implement reasonable user charges to ensure that within 7 years there is full recovery of operation and maintenance (O&M) costs. An optional reform is the encouragement of public-private partnerships. As part of JNNURM, 30 Indian water utilities will take part in a benchmarking program.¹⁸

UIDSSMT subsumes the existing schemes of Integrated Development of Small and Medium Towns (IDSMT) and the Accelerated Urban Water Supply Program (AUWSP). UIDSSMT operates along the same lines and reforms as those of JNNURM, with the scheme lasting for 7 years commencing in 2005/6. However, preparation of CDPs is not a prerequisite for accessing UIDSSMT funds, which are allocated between states based on the state's urban population relative to the national urban population (both excluding JNNURM cities). Within states, funds are not allocated city-wise, but funds can only be allocated to towns where elected bodies are in position. Central funding is released to the SLNA in two installments, with priority given to water supply, sanitation, sewerage, solid waste, roads and drainage. Funding is 80% central Government, 10% state government, with the remainder raised by the SLNA from financial institutions.¹⁹

India faces a number of water-related challenges, including increasing water scarcity and competition for water between different sectors

The Integrated Slum Development Program provides additional financing resources to improve water supply and sanitation coverage and service levels in city slum areas.

For urban development, the emphasis in the 11th FYP is placed on the concept of integrated development planning, with the main objectives being development of urban water supply and sanitation to increase the efficiency and productivity of cities (including creating autonomous regulatory bodies, encouraging private sector investment in urban economic infrastructure), reduction of the incidence of poverty and deprivation, and development of cities/towns in an orderly and environmentally sustainable way. A National Urban Infrastructure Development Fund (NUIF), together with a Pooled Finance Development Fund (PFDF) approved in September 2006 under the 11th FYP, is to be set up.²⁰

Water Resources Management

India faces a number of water-related challenges, including increasing water scarcity and competition for water between different sectors. This is already critical in some of the river basins in the southern and western states, with basins in the east of the country often being perceived as having surplus water and encountering recurrent flooding. The National River Linking Project (NRLP), which envisages transferring flood water from the Ganga, Brahmaputra and Meghna rivers to the water-scarce basins in the south and west, has been proposed to resolve these water-related problems. However, the NRLP is a contentious issue in Indian society as well as with academics and the media.²¹ Continuing legal disputes between states and the central Government, which could also have major implications on neighboring countries—particularly Bangladesh and Pakistan—highlight the urgent need to develop and enforce effective conservation measures and water distribution allocations in the very near future.

The line ministry for water resources is the Ministry of Water Resources, with the Central Groundwater Authority responsible for all groundwater resources.

Water Supply

Nearly all of India's 5,161 cities and towns have piped water systems, but these are characterized by poor efficiencies, high levels of nonrevenue

water (typically averaging 40–50% of water produced), low pressures, and water availability for only a few hours daily. Significant rural-urban migration is placing further strain on these already over-stretched services. Many water utilities have staffing levels that exceed best international practice of 2–4 staff/thousand connections, a figure of around 10 being typical for Indian utilities. Revenues typically fall far short of costs, with average operating costs of US\$0.15/m³ compared to average revenue from user charges of only US\$0.06/m³. Notable exceptions are Chennai and Mumbai, which recover the full cost of services from user charges. The sector relies extensively on large state operating subsidies and capital grants, supplemented by loans to develop new water sector infrastructure from the Housing and Urban Development Corporation (HUDCO) and which are guaranteed by the states. This lack of financial sustainability means it is difficult for municipalities to establish creditworthiness to obtain commercial loans from banks that consider them too risky. The situation is complicated by the lack of good operational data beyond the rated capacity of infrastructure assets. Such information is essential in order to monitor progress towards reliability, sustainability, and affordability of sector services.²²

Reliability of water supplies in India appears to be deteriorating, as evidenced by the decreasing number of hours that water is available. Even in large cities, piped water is never distributed for more than a few hours a day, e.g., Delhi (4 hours) and Mumbai (5 hours). In rural areas, hand pumps remain inoperable for months before being repaired by state agencies.

Most cities compete with the agricultural sector to secure surface water rights, and tend to deplete local aquifers used as substitute sources. Villages in rural areas rely mainly on groundwater but water mining for agriculture purposes, aggravated by highly subsidized electricity tariffs, has led to major aquifer depletion and the ingress of pollutants, primarily from inadequate collection and treatment of wastewater.

Many households, faced with inadequate water service provision, are forced to adopt coping mechanisms that are time-consuming, expensive, and sometimes unsafe in terms of waterborne diseases. Although user charges may be low, when the cost (financial, health, workdays lost, etc.) of these coping mechanisms is added to them it far exceeds the full cost of providing good quality service. For instance, the cost of coping mechanisms in Delhi is thought to be 6 times

higher than the average payment to the utility.²³

There have been several attempts to introduce private sector participation in India. Although the private sector is thriving, it has proven difficult to become involved in a significant way in what have historically been public sector services, such as power and water. Reasons for this are many, but two predominate. First, there is a strong public perception that water is a gift from God that falls freely and should, therefore, be classified as a social good and not be used to make a profit, however small. Second, utility services have been politicized to the extent that tariffs have been kept unrealistically low in order to attract political support. Such low revenue generation gives the impression that water has little “value” when in fact the opposite is true, and the real value of water will increase significantly as climate change and increased water demands reduce its availability.

Heavy central and state government subsidies are a feature of the water sector simply in order to keep systems functioning on a daily operational basis. This has led to poor service levels, particularly high levels of NRW, and little financial incentive for the private sector to play an active role. These contributory factors have created a downward spiral in water service provision—inadequate revenue generation reduces available investment, leading to deterioration in service levels and an unwillingness for consumers to pay more (or even anything) for a poor service. Inadequate financial resources mean that an increasing proportion of expenditure is spent on supporting the administrative machinery of local government rather than improving infrastructure asset condition and performance.

There have, however, been some private sector successes. The 30-year Tirupur Water

There have been several attempts to introduce private sector participation in India, but few successes



Dr Shantana Jha, Chairman, Kalyani Municipality

Supply BOT Project in Tamil Nadu was the first successful private sector activity in the water sector; the second was the Visakhapatnam BOOT Project, part of the growth plan for Visakhapatnam under Vision 2020 of the Government of Andhra Pradesh and serving Visakhapatnam city and a developing industrial and economic development area in the region.²⁴ However, Visakhapatnam came into commercial operation on December 2004, before Tirupur. In addition, several fast-track private sector participatory projects have been undertaken for the charitable sector, an example being the various water supply projects constructed, operated, and maintained for the Sri Sathya Sai Central Trust.²⁵ Generally, the private sector is only involved in the design and construction of schemes, an exception being the UFW Reduction Project for the Bangalore Water Supply and Sewage Board. Elsewhere, such projects have met with strong opposition, for example the Ondo Degremont BOO contract with the Delhi JAL Board.

The Water for Asian Cities Program of UN Habitat has promoted various initiatives in India, Nepal and elsewhere in Asia. In India, community-managed water supply schemes have provided piped house connections on a fast-track basis to nearly 4,000 households in three project cities by successfully using a revolving fund. Another initiative covered development of water demand management strategies to reduce nonrevenue water from the present level of 50% down to 15%. Other innovations in India have been related to capacity building in water demand management, water auditing, financial management, geographic information system applications for infrastructure management, development of a gender mainstreaming strategy,

It is estimated that 33% of the population practice open defecation



Low cost latrine, fully funded by the benefiting household, Kolkatta

and the establishment of human-values-based water, sanitation, and hygiene classes involving thousands of school teachers and children in project city schools. Advocacy and awareness campaigns run through the Parliamentary and Legislators' Forums for political mobilization were also developed that would be suitable for replication.²⁶

Sanitation

It has been estimated that 33% of the population practice open defecation, a further 33% rely on bucket and dry privies, and the remaining 34% have access to toilets with sewerage or septic tank facilities. Only 232 of 4,700 towns have partial sewerage systems. Solid waste collection efficiency ranges from 40% to 90% but solid waste treatment in metro cities is only 7%.²⁷

All "class 1" urban areas (population more than 100,000) have sewerage systems, but only 700 cities treat their effluent before disposal to the environment. Furthermore, when disposing of sewage and wastewater, few cities deal with the issue effectively, raw sewage often overflowing into open drains because the sewers are blocked or the pumps have failed. In rural areas, latrines may be used for purposes for which they were never intended, for example for storage, continuing the widespread practice of open defecation.

However, there have been excellent examples in India (for example, the many pit flush toilets and community built and maintained toilets run on a pay-and-use basis by the NGO Sulabh International Social Service Organisation and serving 10 million people daily) of grass roots achievements by nongovernment organizations (NGOs) and communities collaborating to bring sanitation to millions of people using the power of communities to mobilize resources. The National Slum Dwellers Federation in India has shown what is possible through practical action.²⁸

Under the Water for Asian Cities Program of UN Habitat, the Slum Environmental Sanitation Initiative in four cities in Madhya Pradesh provided sanitation to about 100,000 people through micro finance by using a revolving Sanitation Fund, resulting in open defecation free slums.

India has made enormous strides in sanitation coverage, with urban coverage increasing from 45% in 1990 to 59% in 2004, and the equivalent figures for rural sanitation being even more impressive at 3% in 1990 increasing to 22% in 2004.²⁹

MDG Target Progress

World Health Organization/United Nations Children's Fund (WHO/UNICEF) data for 2004 indicate that overall water supply coverage achieved was 86% (95% urban and 83% rural), with overall sanitation coverage 33% (59% urban and 22% rural).³⁰ Of the 95% urban water supply coverage, 47% was through house connections, the equivalent figure for rural water supply being 8%. Coverage by public standpipes was 24.4% urban and 24.5% rural (2003 data). For the 59% urban sanitation coverage, 25% was due to sewerage connections, while for rural sanitation sewerage connections were only 2%.³¹ Progress on meeting the Millennium Development Goals (MDGs) by 2015 has been good, with urban water and rural water MDG targets already reached, and with urban sanitation and rural sanitation on-track to meet their targets by 2015.³² Under the 11th FYP, urban water and urban sewerage/sanitation are to have 100% coverage by 2012 (urban sewerage and sewage treatment 70% and urban sanitation 30% using low-cost sanitation, septic tanks, etc.).³³ However, coverage by itself as a monitoring indicator without an assurance that existing facilities continue to give appropriate service, in particular the quality of water delivered at the customers premises or the need to effectively treat sewage, becomes less meaningful. Coverage figures are, therefore, likely to over-estimate the true provision of acceptable improved facilities for both water and sanitation.

Future Plans

It has been estimated that India would have to invest US\$4.4 billion annually during the 11th FYP (2007–2012), increasing to US\$.25 billion/year in the 12th FYP (2012–2017) in capital expenditure on infrastructure assets to meet the outstanding urban sanitation and rural sanitation MDG targets, as well as the enhanced urban water and sanitation targets proposed in the 11th FYP, equivalent to 0.55% of GDP during that 10-year period (this should be compared with 0.64% of GDP invested in the 10th FYP. If only 40% of operating and maintenance costs are recovered from user charges, as is thought to be the current situation, India will have to devote a further 0.25% of its GDP to supporting its water and sanitation sector.³⁴

The proposed budget for the water resources component of the 11th FYP is Rs231,800 crore



Brick-walled latrine, fully funded by the benefiting household, Kolkatta

(Rs182,050 crore state funding plus Rs182,050 crore federal funding).³⁵ In addition, the investment recommended to achieve 100% coverage targets in urban areas with water supply, sanitation, drainage and solid waste management under the 11th FYP are estimated at Rs127,025 crore at 2006 levels, with central funding for JNNURM and UIDSSMT increased to Rs70,000 crore, state funding increased to Rs35,000 crore, institutional financing Rs10,000 crore, assistance from external support agencies Rs10,000 crore, and foreign direct investment and the private sector Rs2,025 crore.³⁶ However, finances have yet to be allocated.

Governance

Governance can be considered in several ways, ranging from the transparency of government and business dealings, the efficiency of the business process (delays in project implementation), to the implementation of regulations and sector performance, e.g., nonrevenue water. Such assessments are necessarily subjective and so to provide an overall indication, the corruption perceptions index (CPI) produced by Transparency International will be used as a proxy indicator. In 2006, the CPI score for India was 3.3, making it 70th in the overall ranking and 12th in the regional ranking.³⁷ Only Australia, People's Republic of China, Indonesia, Mongolia, and Sri Lanka in Asia and the Pacific region had ratified the UN Convention against Corruption, suggesting a lack of government determination in the region to tackle corruption.

Progress on meeting the Millennium Development Goals by 2015 has been good, with urban water and rural water MDG targets already reached

Table 1: Utility Performance

Indicator	Delhi JAL ³⁸	Mumbai ³⁹	Kolkata	Bangalore ⁴⁰	Hyderabad ⁴¹	Chennai ⁴²
Public/private sector	public	Public	public	public	public	public/private
Main water source	river	Surface	river	river	—	91% River+lake
Population in area of responsibility	13,782,976	13,000,000	4,998,000	~6 million	5,050,000	5,320,000
Coverage:						
water (%)	68	—	—	91	95	98
sewerage (%)	60	—	—	79	51	80
No. of connections	1,374,622	400,000	262,839	361,120	—	344,079
No. of public taps	—	—	—	—	—	9,399
Supply Continuity (hours of supply)	1% (24 hrs)	—	—	2.5 (supply alt. days)	2	3
Volume produced/distributed (m ³)	1,043,972,700 / 489,731,757	2,895,000/day* ⁴³	365,000,000*	945,000/day ⁴⁴	970,000/day	571,000/day
Per capita consumption (liters/day)	110	—	—	—	92	n/a
Overall nonrevenue water (%)	53	—	—	~48	49.5	20.0
Staffing ratio / thousand connections	19.9	—	—	~6	7.9	7.9
Revenue collected (US\$ million/month)	3.0	—	—	—	5.635	5.024 (2005)
Collection efficiency	70%	—	—	—	96.7%	—
Operating and maintenance costs (US\$ million/month)	7.4	—	—	(0.98 ops. ratio)	6.561	6.797 (2005)
Connection fee (\$)	2.08	—	24.26	33.97 (6.06 sewerage)	—	—
Typical domestic tariff based on 20 m ³ /month (excludes any fixed charge)	US\$0.62 (flat rate)	—	US\$2.42* ⁴⁵	US\$3.78 (+ US\$0.36 sewage if connected) ⁴⁶	—	US\$ 3.64
Annual capex (US\$ million)	107.2	—	—	60.15 ⁴⁷	—	84.156
Independent sector regulator?	No	No	No	No	No	No

Note: Exchange rate used, US\$1 = Rs41.215 as at 1 May 2007.

In the context of water supply and sanitation, governance may also be considered to include tariff setting, cost recovery, autonomy of utilities, and political interference in utility operations, etc. Reference has already been made to the fact that revenues typically fall far short of operating and maintenance costs, the sector having to rely extensively on large state operating subsidies and capital grants. Not only is there a need to establish affordable but sustainable tariffs, but also to ensure that utilities have autonomy and are not subject to external pressures as a result of financial reliance on subsidies. There is still some way to go to achieve good water sector governance in India.

Utility Performance

The key performance characteristics of the Indian water utilities evaluated are the low hours of operation (typically no more than 10 hours per day), high levels of NRW in excess of 50%, staffing ratios in the medium range, and revenue generation insufficient to cover O&M costs. In Delhi, coverage is low, staffing levels are very high, and revenue collection efficiency is poor. In contrast, Hyderabad has a very high collection efficiency. However, the connection fee in Delhi is pleasingly low, although this may contribute to the inadequacy of the system to meet the demands placed upon it. Water coverage is very high in Bangalore, Hyderabad and Chennai. However, in Bangalore, water is supplied to consumers on alternate days, and sewerage connection fees and tariff charges are very low (20% and 10% respectively) compared to water supply service provision.

Table 1 summarizes recent utility performance data.

Selected national indicators are summarized below:

Water availability (per capita)	1,750 m ³ /year
Water quality	poor in heavily populated areas
Improved water supply coverage	86%
Improved sanitation coverage	33%
Wastewater treatment	very poor
Governance Transparency Index (CPI)	3.3

Successes, Failures and Issues

One of the main problems in India is that culturally, water is regarded as a social good provided by God. Politicians are unwilling to increase tariffs to sustainable levels for fear of antagonizing voters. With the rural/urban drift and the increase in the slum populations in the mega cities, however, it is essential to target the poor for water and sanitation services. Until such time as tariff reform is introduced and public water utilities are commercialized and their revenue ring-fenced, private sector participation is only likely to be feasible in industrial areas where sustainable tariffs are affordable. It is essential to consider water supply and sanitation on a regional and not a national basis because national statistics can mask inequalities in service provision throughout the country.

Although the intention to effectively address key issues in the larger cities and towns in India is admirable, it remains to be seen how effective the JNNURM initiative will be when it has been running for several years. Even then the approach adopted needs to be extended to other urban centers. The key issues have been introduced above but are summarized below (key messages raised in the main AWDO text are highlighted in bold), together with an indication of action that should be considered to remedy them.

- Reliability
 - Ring-fence revenue and expenses of water and sanitation operations from other local government activities.
 - Transform beneficiaries of a low-cost poor service into paying customers with rights and remedies.
 - Consider private sector participation if efficiencies can be obtained (already a policy but needs effective implementation).
 - Increase public participation and adopt demand-responsive approaches.
 - Collect good data and develop monitoring and evaluation indicators.
- Financial Sustainability
 - **Low tariffs and the public perception that they should remain low because of cultural norms, needs to be changed urgently.**
 - **Aim for full operating and maintenance cost recovery by end of 11th FYP (already a JNNURM mandatory municipal requirement). This is a core constraint, leading to under-investment**

Water is regarded as a social good and politicians are unwilling to increase tariffs to sustainable levels for fear of losing power

and undermining development of the whole sector. For many water service providers, revenue does not even cover recurrent costs, let alone contribute to the accumulation of sufficient reserves to fund new capital investment. The situation is worse in the sanitation and solid waste sectors.

- Reduce capital and operational costs; **include private sector where beneficial.** This is an issue because there has been inadequate investment in the past and tariffs are unsustainable and unattractive to the private sector. The public perception of the private sector is extremely negative.
- **Progressively aim for full cost recovery (inclusive of debt servicing or to finance future capital works program).**
- Environmental Sustainability
 - **Price water (and treatment of wastewater) to reflect its “true” cost.**
 - Develop and strengthen water rights market (preferential allocation to more efficient users).
 - Recharge aquifers and remove market distortions caused by heavily subsidized rural power tariffs.
 - Establish state-level water regulatory entities (already a policy but needs effective implementation).
 - **Increase proportion of municipal**

wastewater treated; industrial wastes to be at least given primary treatment at source for indirect disposal to sewer and full treatment for direct discharge to water courses (already a policy but needs effective implementation).

- Affordability
 - Introduce well-targeted and transparent subsidies for the poor, e.g., affordable connection fee, payment by installments, lifeline tariff.
- Greater clarity and autonomy needs to be introduced into the sector so that the states and municipalities are far less dependent on central Government for local planning, infrastructure development, and funding. The commencement of the JNNURM should greatly assist in progressively developing this philosophy throughout the major urban centers and then progressively into all urban areas (already a policy but needs effective implementation).
- Increasing pollution and depletion of water resources necessitates the effective implementation of water conservation strategies, in all sectors but especially in the irrigation sector, and treatment to at least primary level initially of all municipal and industrial wastewater discharges.
- **Many people are provided with water sector services by small-scale independent providers (SSIPs), particularly in major cities and large towns, so there needs to be greater recognition of their role, with their status formalized until such time as the formal utility is able to provide services to SSIP customers.**
- There is a real need for an independent regulator to be established to oversee the sector, ensure sustainable tariffs are set, monitor performance, and support all sector players and stakeholders.
- **The development of local capacity, both technical and financial, is essential to progressively improve the poor technical performance and service levels in many utilities (nonrevenue water, low coverage, intermittent supplies, etc.).**

Box 1: From Open Field Defecation to Appropriate Sanitation

In Kalyani, one of the 40 municipalities of Kolkata, exemplary progress has been made on a total sanitation program, which is based on making people aware of the consequences of open defecation and asking them what they want to do about it. If they want cheap toilets, the municipality will show them how. There is no subsidy of sanitation infrastructure; costs must be borne by householders, but there is the incentive that if the slum is certified open-defecation free (ODF), other grant assistance will be provided to the community, which can decide how to spend the development funds, for example for solar-powered street lighting. The Chairman of the Kalyani Municipality, Dr. Shantana Jha, has a card system for all the Ward Councillors in the Municipality which is displayed in the Board Room. A green card means all slums in that ward are ODF, a yellow card means some slums are ODF, and a red card means no slums are ODF. Resistance to ODF comes from a long-term hand-out mentality and seeing subsidized sanitation being implemented in neighboring communities.

Source: Dr. Shantana Jha, Chairman of the Kalyani Municipality, Kolkata.

The true challenge in the short to medium term is not to provide full coverage but to effectively implement and enforce policies to increase access to reliable, sustainable, and affordable services through appropriate

policies, institutional arrangements, and financing incentives and mechanisms. It is simply unacceptable to have intermittent water supplies in major conurbations in a country whose pace of economic development has been remarkable in recent years. An association of water service providers could play a key role in disseminating best practice and implementing full-scale benchmarking to promote improved service levels.

In the rural sanitation sector the strategy adopted has produced good results and has greatly helped in moving toward an Open-Defecation-Free Policy. Maintaining the momentum of the various sanitation programs will, however, be a key task in the future.

Recent champions tackling key issues in India are profiled in Box 1 and Box 2.

Health authorities in most countries in Asia and the Pacific region do not have direct responsibility for developing water supply and sanitation systems, focusing primarily on hygiene promotion and water quality surveillance, although the benefits of such development accrue to the health sector in terms of health gains. To optimize such gains, health authorities can play a key role in relation to water, sanitation, and hygiene, including (i) establishment of science-based evidence, (ii) advocacy to nonhealth sectors, (iii) normative guidance role to legislative and policy planners, (iv) hygiene promotion, (v) monitoring and surveillance; and (vi) emergencies and natural disasters. Consideration should be given to health authorities taking a more active role in sector development and management to maximize such benefits.

Key Sector Players

Central Government

- Ministry of Urban Development
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Maulana Azad Road,
New Delhi 110011
T: 23063495 F: 23061446 / 23061379
- Ministry of Water Resources
Joint Secretary (Admin)
Room No. 403, Sharam Shakti Bhawan,
Rafi Marg,
New Delhi 110001
T: 011-23710343(O) F: 011-23710343 E: jsadm-mowr@nic.in

Box 2: Making Piped Water Supply Accessible to the Poor

The Bangalore Water Supply & Sewerage Board (BWSSB) has a Social Development Unit that focuses on connecting households in slum areas to piped water. The Unit is managed and helped by Ms Salma Sadika who has, in some cases, used NGOs as intermediaries between the utility and the community and, in one case, interacted directly and very successfully with a local plumber for installation of as many as 3,000 new connections in one large slum. The Unit also implements key policies, such as reduced connection fees (fee reduced from Rs8,000 to Rs800), greatly simplified connection procedures, and “proof of occupancy” in lieu of land tenure. Residents in slums are being motivated to take up the opportunity to legally connect to the BWSSB water supply system, actively discouraging them from resorting to illegal means. Connection cost varies on the basis of house area from Rs550 (less than 150 square feet [ft²]) to Rs800 (150–600 ft²) to the regular rate (over 600 ft²). Slum dwellers are allowed to pay the connection charges in two instalments.

Source: Ms Salma Sadika, Social Development Unit Manager, BWSSB, Bangalore.

- Ministry of Health and Family Welfare
Nirman Bhavan,
Maulana Azad Road
New Delhi 110011
E: resp-health@hub.nic.in
W: <http://mohfw.nic.in/>

Utilities and Local Government

- Delhi JAL Board
Varunalaya Phase II, Jhandewalan, Karol
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New Delhi 110005
T: (91-11) 354-4794 F: (91-11) 355-8940
E: djb@delhijalboard.com
- Kolkata Municipal Corporation (Water Supply)
Deputy Chief Engineer (Water Supply)
T: 22861239(direct), 22861000, Extension 2539
- Municipal Corporation of Greater Mumbai (Hydraulic Engineering Department)
Municipal Corporation Offices, Ground Floor, Annex Building, Maharlika Marg, Mumbai 400 001
T: (91-22) 262-0025 F: (91-22) 262-6435
- Bangalore Water Supply & Sewerage Board
The Chairman, BWSSB,
Bangalore
T: 22945100 E: webmaster@bwssb.org
W: <http://www.bwssb.org>

Table 2: Donors Active in India's Water Sector

<i>Donor</i>	<i>Sector/Area of Support</i>	<i>Sample ADB Projects</i>	<i>Status</i>
Asian Development Bank (ADB)	Urban, Rural and Basin Water Development and Management	Urban Water Supply and Environmental Improvement in Madhya Pradesh	Loan approved in 2003, closing date in 2009.
		Water Users Association Empowerment for Improved Irrigation Management in Chhattisgarh	Technical assistance (TA) approved in 2005.
		Orissa Integrated Irrigated Agriculture and Water Management Project	TA approved and loan proposed in 2006.
		Chhattisgarh Irrigation Development Project	Loan approved in 2005. Project implementation commenced in September 2006. Policy and institutional reforms in progress and will be monitored.
		MFF-North East States Integrated Flood Control and River Erosion Mitigation Project (Facility Concept)	Loan proposed.
World Bank	Water resources, irrigation, water supply and sanitation	Northeastern Integrated Flood and Riverbank Erosion Management Project	TA approved in 2006.
			Active/ongoing irrigation, water supply and sewerage/sanitation projects.
		Japan Bank for International Cooperation	Water resources, irrigation, flood management, water supply and sewerage
		Australian Agency for International Development	Water supply and sanitation
		United States Agency for International Development	Environment (including water supply and sanitation)
		United Nations Development Programme	Environment
		German Agency for Technical Cooperation (GTZ)	Environmental policy/ conservation and sustainable use of natural resources, irrigation and rural water supply

- Chennai Metropolitan Water Supply & Sewerage Board
No. 1 Pumping Station Road
Chintadripet
Chennai - 2
T: 91 44 28845 1300/22
F: 91 44 2845 8181
E: cmwssb@md2.vsnl.net.in

Donors active in the sector are summarized in the Table below, which also provides an indication of the current status of key projects funded by the Asian Development Bank.

Future Vision

Progress toward achieving the MDG targets in Asia and the Pacific region has been less rapid than anticipated such that, at current rates of progress, the sanitation MDGs will not be met in many Asian countries. As a result, the ‘Vision 2020’ document on “Delivery of the MDGs for water and sanitation in the Asia-Pacific Region” was prepared to point the way forward, and was unanimously endorsed by Ministers from 38 countries at the Asia Pacific Ministerial Conference in December 2006 held in New Delhi. The overarching framework is principled governance, together with a move from policy as intention to policy as practice. To achieve the objectives, partnerships will be essential. The 2020 vision can be achieved by:

- a concerted campaign over the next five years to raise awareness and generate momentum to change policies and governance practices and build sector capacity,
- multistakeholder approach in each country to achieve synergies and a united effort, and
- active sharing of information and experience across the region as part of a region-wide initiative.

The future vision for the water sector in India should focus on effective implementation of existing policies and legislation and should, in no particular order of priority, include the following:

- Urgently make effective provision to avoid future shortages in water resources and supplies, taking into account the needs of downstream country future needs, implementation of effective conservation measures, and sensitization and education

- of consumers and the general population, supported by public awareness campaigns.
- Find and effectively support more champions in government to drive sector development and efficiencies forward.
- Recognize the important role of small-scale independent providers (SSIPs) and formalize their status and contractual status with formal utilities. The private sector should be encouraged to make a major impact in the sector by setting tariffs at sustainable and attractive levels. Progressively, public perception of the private sector should improve.
- Enforce environmental legislation to halt and reverse the decline in the quality and quantity of water resources and provide adequate funding to do so.
- Strengthen the institutional and regulatory framework and fully implement devolution of responsibility to Municipal Corporations Municipal Councils and ULBs in accordance with the 74th Constitutional Amendment, with services demand-driven, and the planning process simplified and strengthened to ensure clear prioritization and coordinated development. Capacity development will make an important contribution to this.
- Establish an independent regulator to resolve key issues.
- Treat all significant wastewater discharges to at least primary level within 5–10 years.



This community pipeline also provides water for water vendors, Kolkata

- Set sustainable and affordable tariffs to progressively move toward full cost recovery of both water supply and sanitation service functions.
- Progressively improve service standards (nonrevenue water, hours of supply, etc.).

The cost of achieving the water sector MDGs worldwide has been estimated at US\$10 billion/year, a seemingly large sum but one that only equates to 5 days' worth of global military spending or less than half of what rich countries spend on mineral water.⁴⁸ In reality, it is a small price to pay for improved quality of life, millions of young lives saved, increased productivity, and for generating an economic return to boost prosperity. Governments should generally aim for a minimum of 1% GDP spending on the water sector.

India needs to increase water sector investments to at least 1% of GDP (0.55% of GDP to meet outstanding sanitation MDG and 11th FYP goals, plus a further 0.25% GDP to fully cover operating and maintenance cost deficits, and the remainder to improve service levels, such as hours of supply), and must also focus on tariff reform, increased wastewater treatment capacity, and greater water conservation.

The Index of Drinking Water Adequacy (IDWA) value for India (see Table 3) is 60, ranking it 13th of the 23 countries evaluated in the IDWA background paper for AWDO.⁴⁹ The component value for "access" (82) is good, with values for "resource" (60) and "quality" (57) and "use" (56) being fair. However, the "capacity" (46) component value is poor and drags down the overall IDWA value for India.

The "capacity" component is a measure of the population's capacity to purchase water based on per capita GDP in PPP US\$. Its value is obviously linked to the general economic situation in the country and is, therefore, much harder to influence, but the buoyant economy of India should automatically be reflected progressively in an increased "capacity" value. Increasing the domestic per capita consumption IDWA "use" component value could be achieved through increasing the number of people connected to

pipled networks, but this raises the question of water availability and system capacity (in several major Indian cities, water demand already significantly exceeds production capacity). The progressive provision of more connections, with connection fees made affordably small or free and the excess funded through the tariff, together with the development of a sustainable tariff structure and unit charges, would have a major impact on the "use" value. Increasing the "use" component value to 65, and increasing the "capacity" value to 64 (the same as for the People's Republic of China with which it has an almost identical IDWA value), would increase the IDWA value for India to almost 66, making it 10th in the IDWA rankings.

This AWDO country chapter is a dynamic document that should be updated and expanded periodically to reflect changes, issues, and proposed remedial strategies in the national water sector. It is recommended that in the next update there should be a specific focus on (i) water resources and environmental management, (ii) wastewater treatment, and (iii) tariff reform.

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Table 3: Index of Drinking Water Adequacy (IDWA)

Resource	Access	Capacity	Use	Quality	IDWA
60	82	46	56	57	60

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This community pipeline also provides water for water vendors, Kolkatta

Asian Water Development Outlook (AWDO) 2007

AWDO is a new publication commissioned by the Asian Development Bank (ADB) in view of the increasing importance of water in the future development scenarios of the Asia and Pacific region. In recent years, water has steadily gravitated toward the top of the national agendas of ADB's developing member countries. This is a desirable development because water is an essential requirement for human and ecosystems survival. In addition, water is a critical component for most development needs. Without adequate quantity and quality of water, it will not be possible to ensure food, energy, or environmental security of nations.

AWDO is aimed at Asian and Pacific leaders and policy makers and those interested in understanding the complexities and dimensions of the current and the future water problems, and how these can be addressed successfully in policy terms. Its main objective is to raise awareness of water-related issues and to stimulate an informed debate on how best to manage Asia's water future. These are important and complex issues, and their timely management can contribute to the achievement of all the water-associated Millennium Development Goals and beyond.

AWDO 2007 is ADB's first attempt to make a forward-looking assessment of the possible water future for the most populous region of the world. It is now increasingly being recognized that water is likely to be a major critical resource issue of the world, and that the social, economic, and environmental future of Asia is likely to depend on how efficiently and equitably this resource will be managed in the coming years.

About the Asian Development Bank

ADB aims to improve the welfare of the people in the Asia and Pacific region, particularly the nearly 1.9 billion who live on less than \$2 a day. Despite many success stories, the region remains home to two thirds of the world's poor. ADB is a multilateral development finance institution owned by 67 members, 48 from the region and 19 from other parts of the globe. ADB's vision is a region free of poverty. Its mission is to help its developing member countries reduce poverty and improve their quality of life.

ADB's main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance. ADB's annual lending volume is typically about \$6 billion, with technical assistance usually totaling about \$180 million a year.

ADB's headquarters is in Manila. It has 26 offices around the world and more than 2,000 employees from over 50 countries.

About the Asia-Pacific Water Forum

The Asia-Pacific Water Forum (APWF) provides countries and organisations in the region with a common platform and voice to accelerate the process of effective integration of water resource management into the socioeconomic development process of Asia and the Pacific. The APWF is an independent, not-for-profit, non-partisan, non-political network.

The APWF's goal is to contribute to sustainable water management in order to achieve the targets of the MDGs in Asia and the Pacific by capitalizing on the region's diversity and rich history of experience in dealing with water as a fundamental part of human existence. Specifically, the APWF seeks to champion efforts aimed at boosting investments, building capacity, and enhancing cooperation in the water sector at the regional level and beyond.

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