PAKISTAN

Water Supply and Sanitation Sector

VOLUME I
Urban Water Supply and Sanitation

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Acronyms and Abbreviations

ADB	Asian Development Bank
ADP	Annual Development Program
AJK	Azad Jammu and Kashmir
ALC	Active Leakage Control
AusAID	Australian Government Overseas Aid Program
CBO	Community-Based Organization
CDA	Capital Development Authority
DALY	Disability-Adjusted Life Years
DBO	Design, Build and Operate
DMA	District Metering Area
ESGO	Empowerment and Self-Governance Order
FATA	Federally Administered Tribal Areas
F-WASA	Faisalabad Water and Sanitation Agency
GB	Gilgit Baltistan
GDP	Gross Domestic Product
GNP	Gross National Product
GoP	Government of Pakistan
GoS	Government of Sindh
G-WASA	Gujranwala Water and Sanitation Agency
H&PP	Housing & Physical Planning
HCMC	Ho Chi Minh City
HQ	Headquarters
HUD	Housing and Urban Development
IBNET	International Benchmarking Network for Water and Sanitation Utilities
ICT	Islamabad Capital Territory
IFGI	Infrastructure for Growth Initiative
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
JMP	Joint Monitoring Program
KP	Khyber Pakhtunkhwa
KWSB	Karachi Water Supply and Sewerage Board
LG	Local Government
LG&RDD	Local Government & Rural Development Department
LGO	Local Government Ordinance
L-WASA	Lahore Water and Sanitation Agency
MDG	Millennium Development Goal
MICS	Multiple Indicators Cluster Survey
MoE	Ministry of Environment
MoF	Ministry of Finance
M-WASA	Multan Water and Sanitation Agency
NRW	Nonrevenue Water
NSUSC	Northern Sindh Urban Services Company
O&M	Operations & Maintenance
OPP	Orangi Pilot Project
OSM	Obras Sanitarias de Mendoza
P&DD	Planning & Development Department
PATA	Provincially Administered Tribal Areas
PCRWR	Pakistan Council of Research in Water Resources
PDA	Peshawar Development Authority
PER	Public Expenditure Review
PHED	Public Health Engineering Department
PPP	Public-Private Partnership
PPWSA	Phnom Penh Water Supply Authority
PSLM	Pakistan Social and Living Standards Measurement Survey
P-WOP	Pakistan Water Operators Partnership
R-WASA	Rawalpindi Water and Sanitation Agency
SAFRON	Ministry of State and Frontier Regions
SCIP	Sindh Cities Improvement Program
SLGA	Sindh Local Government Act
SWA	Sanitation and Water for All
TMA	Tehsil Municipal Administration
UNICEF	United Nations Children's Fund
UTE	Union Transitoria de Empresas
W&S	Water & Sewerage
WASA	Water and Sanitation Agency
WHO	World Health Organization
WM	Water Meters
WSS	Water Supply and Sanitation
WSSP	Water and Sanitation Services Peshawar

Currency Equivalents

US$1 = Pakistan rupee (Rs.) 97.37 (April 2013)
Unless otherwise indicated, all dollar figures in this report are in US dollars.

Executive Summary

Study Objectives

This study assesses the provision of Pakistan's urban water supply and sanitation services, disaggregated by province and region. It is the first comprehensive study that captures both water and sanitation in both urban and rural areas across the entire country. The study takes stock of the sector across a range of technical, financial, environmental, and institutional dimensions. It identifies the key issues that are holding back the provision of safe and sustainable urban water services and draws on international experience to highlight ways in which other countries have tackled similar challenges. It is hoped that this report's publication will encourage policymakers and opinion leaders to upgrade the importance of the sector and implement the steps required to meet the needs of the entire population for safe water and adequate sanitation.

The sector work comprises three volumes. Volume I (this volume) provides an assessment of the provision of urban water supply and sanitation. Volume II provides an assessment of rural water supply and sanitation. Volume III contains the individual executive summaries of urban and rural water supply and sanitation in each of the country's four provinces and three regions.

Demographics

Pakistan is the sixth most populous country in the world, with a total population currently (2012) estimated at about 180 million. Its urban population is currently estimated at 63 million (35 percent of the total). By 2030, about 50 percent of Pakistan's population, or roughly 137 million people, will be living in urban areas, and the number of cities with more than 1 million inhabitants will increase from eight in 2012 to at least 12. According to the Planning Commission, about 40 percent of the population in the larger cities currently lives in *katchiabadis* (slums).

Water Resources

The Indus is the country's only major river system and, should current trends continue, decreasing snowfall in the Himalaya and Karakorum mountains may progressively limit this supply of fresh surface water. Underground water sources are fast being depleted due to unsustainably high withdrawals. The amount of per capita water resources has decreased from 5,300 cubic meters (m^3) in the 1950s to about 1,000 m^3 in 2011, the international definition of water stress. Irrigation accounts for 69 percent of the water used, industry for 23 percent, and municipalities for only 8 percent. Surface water supplies are increasingly threatened by wastewater pollution because only 50 percent of effluents are collected and only 10 percent of those collected are treated. Groundwater is now being over-exploited in many areas, and its quality is deteriorating.

Institutional Arrangements

The 1973 Constitution assigns policy, planning, and financing responsibility for the sector to provinces and service provision to local governments. In practice this means that operations are at the level of municipalities, since water supply and sanitation services are local in nature. The 18th Amendment (April 19, 2010) has resulted in fiscal, administrative, and functional decentralization of several sectors to the four provinces, which are yet to devise a strategy for shouldering this responsibility. Urban water supply operations are managed by Tehsil Municipal Administrations (TMAs) for small and medium-sized towns, by Water and Sanitation Agencies (WASAs) in five large cities in the Punjab and one in Balochistan, by the Karachi Water Supply and Sewerage Board (KWSB) in Karachi, and by a new utility being set up in Peshawar for water supply, sanitation, and solid waste.

The decentralization process that was triggered by the 18th Amendment and follows an earlier initiative through the Local Government Ordinance (LGO) 2001 has been incomplete and fragmented. The overall thrust of the reform can be considered positive and in line with international trends to bring service provision responsibilities closer to the people, but the implementation challenges have led to a decade of uncertainty in the

sector. This has resulted in a lack of clarity in roles and responsibilities of key agencies and weak accountability, leading to a sector with poor governance overall.

Current Water Supply and Sanitation Coverage and Service Quality

According to the Joint Monitoring Program (JMP) of UNICEF and WHO, coverage of water supply in urban areas in Pakistan is estimated to be 96 percent, of which 58 percent is through individual service connections and 38 percent through other means, such as standpipes and hand pumps. Access to improved sanitation in urban areas is estimated at 72 percent of households. These proportions have remained almost constant over the past 20 years, indicating that service provision is keeping up with urban growth but overall improvements in quality of service are not being achieved. These figures also reflect only coverage based on physical assets and not the quality of service actually delivered to the customer.

There is no city in Pakistan with a 24-hour, seven–days-a-week water supply, Lahore receives water supply 17 hours a day, Peshawar 9, and Karachi 4. This imposes a series of coping costs on consumers who have to invest in alternative arrangements and/or spend time managing their water service, time which could otherwise be used more productively.

Although there are some sewerage collection systems, typically discharging to the nearest water body, collection levels are estimated to be no greater than 50 percent nationally, with only about 10 percent of collected sewage effectively being treated. Water-, sanitation-, and hygiene-related diseases cost the Pakistani economy about Rs. 112 billion (US$1.3 billion) per year in terms of healthcare costs and lost earnings. Estimates are that diarrhea was the leading cause of loss of disability-adjusted life years (DALYs) in Pakistan. Infant mortality is high at 70 per 1,000 live births, and child mortality is still higher, at 86 deaths per 1,000 live births.

Water supply technical operation efficiency can be measured by reference to the levels of nonrevenue water (NRW). The high levels of NRW reported by the WASAs (24 to 68 percent) reflect low operational efficiency. These figures are only approximate, given the low levels of production and customer metering in the WASAs, which are essential for calculating NRW.

The operation and maintenance of water supply and sanitation (WSS) schemes for TMAs present substantial sustainability problems. As a result, the schemes soon stop functioning, largely due to lack of maintenance and nonpayment of electricity bills. It is estimated that more than 40 percent of WSS schemes managed by TMAs are either temporarily or permanently closed.

Cost Recovery

Lack of cost recovery is a major issue. The financial working ratios for WASAs range from 1.13 to 2.8, whereas as a healthy ratio is 1.0 or less, implying that no WASA collects sufficient operating revenue to pay for its cash operating costs (excluding depreciation). The collection efficiency varies from 21 percent to over 98 percent in Lahore Water and Sanitation Agency. Increasing tariffs is difficult as long as service remains intermittent and unsafe but overall cost recovery is hampered by poor billing and collection practices. The financial difficulty of water utilities is partially transferred to power utilities that do not receive full payment for supplying electric energy. Electricity costs make up a high portion of total operating costs and vary from 19 percent to 57 percent.

Unmetered service with tariffs below costs means that the connected wealthy receive the highest subsidies. The under-pricing of water creates regressive water subsidies that benefit wealthy households who are connected first and who use more water than poor households. In Karachi, for example, daily water consumption of highly subsidized water ranges from 340 liters per day per capita in high income areas to 60 liters per capita per day in slum areas. The unconnected poor depend on private tanker trucks and end up paying many times more per cubic meter than do the rich who receive water through house connections. In Faisalabad, the poor living in slums (Shamsabad UC 20) are spending an average Rs. 1,260 per month on water through tankers and donkey carts, while WASA-connected houses are billed a flat rate of Rs. 150 per month. In Karachi the average prices charged by tankers are between US$0.76/$m^3$ and US$1.00/$m^3$. A program of meter installation in both WASAs and TMAs with priority for industrial, commercial, and large domestic consumers is an essential factor in the establishment of an equitable, financially viable, tariff-restructuring program.

Capital Investment

Current targets are to provide *equitable, efficient, and sustainable water service* to 93 percent of the population, and *improved sanitation* to 90 percent by the target year 2015 and to ensure that, by 2025, 100 percent of the population will have access to safe water and improved sanitation. Only 0.11 percent of gross domestic product (GDP) had been spent on water supply sanitation each year between 2002 and 2005. Fortunately this situation has been improving and in 2011

the total capital investment and operating subsidies in WSS had reached 0.16 percent of GDP.

Investment needs are difficult to calculate since a large portion should be allocated to the rehabilitation of inoperative existing systems. These rehabilitation needs are unknown as there is no updated inventory of the reasons for the malfunctioning of the inoperative systems. It is likely, however, that investment levels as a proportion of GDP would have to rise closer to 0.5 percent to improve access levels. Latin America invested 0.4 percent of its GDP in the 1970s and managed to raise service coverage and quality substantially.[1]

Recommendations

The two decades that followed the base year for Millennium Development Goal (MDG) service coverage have been of relative stagnation in Pakistan. In contrast, the benchmark countries that are mostly in the highly urbanized Latin America region have not only adopted but also implemented deep reforms that have boosted coverage and quality of service. There is no reason why Pakistan could not emulate and adapt such reforms to its own specific situation. The sector has a wealth of highly trained staff, but their efforts are partly restrained because of institutional governance and reluctance to allow policies that would make the sector institutions financially and therefore administratively, autonomous.

The greatest challenge will arguably be to implement new policies, since this requires strong and sustained political support to overcome the legacy of perverse incentives that allow some to benefit from poor service. The steady deterioration of public service has directly benefited private vendors who will not readily give up their sources of income. By the same token, there are also those within the public sector that can benefit from being the arbiters of how scarce water shall be distributed. Similarly, keeping tariff setting within the purview of politicians confers significant political power.

There are many challenges to the successful development of the urban water supply and sanitation sector, but the weak absorptive capacity of the sector limits the number of reforms that can realistically be implemented. As a result, political will for reform is best reserved for the three key challenges of the urban water supply and sanitation sector:

- Reaching sustainable service with the existing production and distribution capacity.
- Providing equitable service to the entire urban population.
- Improving accountability and incentives among urban water supply and sanitation utilities and TMAs.

With this realistic background in the political economy of the urban water supply and sanitation sector in Pakistan, the following recommendations should be considered.

Recommendation One: Improve Institutional Autonomy and Accountability

International experience shows that better service and utility performance is contingent on greater autonomy, accountability, and service orientation of urban water and sanitation utilities. The challenges that must be addressed are not technical; they hinge on better governance and an understanding of the political economy of each province/region. Governments should support different management models that might be suitable for the province or region, such as the following:

- Creation of corporate water utilities under company law in cities where WASAs already exist and other rapidly urbanizing cities: This would require the establishment of ring-fenced accounts, staffing, and assets; the creation of a representative board of directors with required skills to provide oversight of the management; selection of a management team based on capacity and not seniority; and the flexibility for that management team to incentivize staff to deliver improved service. Such a company would be fully owned by the city and would enter into a performance agreement with the city, with achievement of performance targets being reported to the public.
- Ring fencing of the accounts, assets, and staff of service providers in the medium-sized local governments (TMAs): This would create a stronger financial and institutional focus for service delivery and greater transparency in the management and delivery of water services.
- Creation of a regional or district water utility serving multiple TMAs, owned and accountable to the participating TMAs in order to address the limited capacity. Such a regional utility would be co-owned by the districts and enter into performance agreements with each one of them.
- Improvement in the transparency and accountability of the relationship between Public Health Engineering Departments (PHEDs) and TMAs/WASAs on the basis of bi-lateral (TMA and province agency) and multilateral agreements: These agreements would clarify the obligations of all parties in terms of project development support, operational responsibilities, or financing of investments and debt service.

[1] Source: World Bank, Public Expenditure Reviews notes 2012.

To improve local accountability, governments should consider implementing a public reporting system for service providers. This system would publish a set of key performance indicators for each provider in terms of service delivery to customers and the financial strength of the entity. This will also have the effect of introducing some comparative competition into the sector.

Recommendation Two: Meter All Production and Consumption and Charge on the Basis of Metered Consumption

The key for efficient and sustainable services will be to recover the costs of operations and maintenance (O&M) from user fees. The international best practice is to bill and collect on the basis of metered consumption, because this makes consumers accountable for how much they consume and links payments to the volume of water supplied. Provincial and regional governments should therefore require all service providers to create reliable and comprehensive customer databases, meter all production and consumption, and bill and collect on the basis of water supplied and metered. These measures will free wasted water for meeting the demand of those currently unserved and will create strong incentives for service providers to convert leakage and wastage to paid consumption.

Recommendation Three: Encourage Cost Recovery from User Fees

Inadequate cost recovery is one of the critical reasons for the poor financial health of service providers. Governments should move toward recovery of O&M costs from user fees in order to create a secure source of funding to pay for operational costs and maintenance to improve operational sustainability. O&M cost recovery from user fees is international best practice and is affordable for consumers, considering the alternative of buying expensive water from private water vendors. By requiring recovery of O&M costs from user charges service, providers will also be able to pay power companies for their consumption of energy, which is currently often unpaid, creating a fiscal problem.

In parallel, governments should require all service providers to increase their commercial efficiency by creating reliable and comprehensive customer databases, achieving higher levels of billing, and improving collection efficiency. Governments should also facilitate cost recovery and affordability by requiring service providers to increase energy efficiency and reduce nonrevenue water.

Recommendation Four: Increase the Level of Public Funding of Water Supply and Sanitation, but Make It Contingent on Delivering Results

Water supply and sewerage sector investments in Pakistan are in the order of 0.1 percent of Gross National Product (GNP) or one-fifth of what benchmark countries are investing. Such low investment levels are inadequate to improve service coverage and quality, particularly in sanitation, and to rehabilitate and reverse the steady deterioration of the capital stock, which has resulted from there having been practically no preventive maintenance for decades. Governments at all levels must seek to maximize the impact of every marginal penny invested in the sector. This objective can best be achieved through creating a national or provincial sector program that clearly articulate the specific goals of performance improvements and outcomes to be achieved and laying out the conditions for access to investment funding.

Such programs should focus on broadening access to improved and sustainable water supplies (which varies widely across the country, and even within provinces and regions), providing access to improved sanitation (which currently falls significantly below the MDG targets), and supporting cost-effective rehabilitation and efficiency improvements to existing systems. A key part of these programs would be (i) the introduction of appraisal techniques that take into account and ascertain the long-term financial and institutional sustainability of proposed investments and (ii) training to complement already strong engineering skills with new skills such as strategic planning, financial management, energy efficiency, private sector participation, and working with and mobilizing communities.

As part of this process, governments should introduce elements of performance-based financing that would address the issues raised in the conclusions from this study. This might be a phased program that comprises the following steps. Participants in the program would move from one step to the next only on satisfactory completion of the earlier step.

Step 1—Getting basics in place: through financing of water and energy audits, creation of customer and asset databases, establishing improved billing and collection systems, ring fencing of accounts, preparation of five-year business plans, and support to high impact investments.

Step 2—Improving quality of service: through improved leakage management, increased collection and treatment of wastewater, and expansion of networks to low-income areas.

Step 3—Consolidation: Increasing coverage and quality of service, with all O&M costs and some capital costs recovered from user fees.

The benefits of bundling investment support into a defined national program are improved transparency of sector financing, the ability to assess overall sector investment efficiency, and the opportunity to demonstrate a concrete impact on the quality of service delivery. More ad hoc financing approaches that lack clear objectives, criteria, or rigorous evaluation tend to diffuse the effectiveness and impact of investments in the sector.

Recommendation Five: Undertake Pilot Public-Private Partnerships (PPPs) in Urban Areas

There is wide-spread interest from central and regional governments to pilot public private partnerships in the sector. Given the current wide gap between operating costs and revenue it is unrealistic to expect private sector participation to be remunerated on the basis of cash operating surpluses as would be desirable in the long run nor for the private sector to mobilize significant capital finance. Opportunities still exist to engage in PPPs, however, and these should be considered within a policy framework that is seeking to improve technical and financial performance of the sector.

The private sector is unlikely to take any significant financial risks but they can bring their experience and knowledge through management contracts and outsourcing. In the latter case this might include projects to reduce NRW or to improve energy efficiency under performance based contracts. The use of Design Build Operate (DBO) contracts for particular water or wastewater treatment plants will bring private sector expertise to leverage public finance. At the system level it is possible to secure private operators to manage whole systems subject to availability of secure financing for their fees and performance bonuses. Such funding might come through the inclusion of PPP fees and investment funds within defined components of donor funded projects or through the provision of formal national or provincial guarantees to the operator.

Recommendation Six: Scale Up Wastewater Treatment for Lahore and Karachi and Other Urban Areas

To the extent that drinking water improves and becomes a less of a public health priority, wastewater will succeed it as the dominant health and environmental problem. This is a problem that will only become more acute as urban wastewater volumes increase substantially in the next decades due to high urbanization rates and the progressive expansion of wastewater collection networks. Current attempts at wastewater treatment are not effective, and treatment is for the time being not perceived as a priority in Pakistan.

In Lahore and other urban areas where there is abundant surface water and shallow groundwater for households to abstract for domestic use, the lack of wastewater collection and treatment adversely affects the quality of drinking supplies. As a result, wastewater treatment becomes important as a means to protect current and future use of that low-cost water source. It is understood that a wastewater treatment program is being initiated in Lahore to begin to address this issue.

Wastewater is also a dominant health and environmental problem in Karachi, due to the increase in wastewater volumes. There are three wastewater treatment plants that face operational difficulties and rising energy costs, and there are significant amounts of solid waste entering the plants. The Federal Government is providing a portion of financing to support improving the wastewater problems of Karachi.

A long-term strategy for wastewater management is needed across all urban centers. Such a strategy should focus on the use of appropriate and affordable technologies, and seek to give wastewater treatment economic value which will lead to higher levels of reuse – an important issue in many resources constrained areas. The role for the private sector will be particularly important as they will be able to leverage public sector financing/skills with their knowledge of capital and operational efficiencies.

Recommendation Seven: Improve the Knowledge Gap on Service Delivery of Urban Slums

At present some 40 percent of the urban population lives in urban slum areas. In spite of this it appears that there is limited baseline information available about the quantity and quality of services provided in the slums, nor about the institutional, social and administrative constraints that affect how best such services can be provided. Given the scale of the challenge, and the negative consequences that flow from poor access, it is recommended to undertake a focused assessment to better understand the current level of services, how services need to be improved and what approaches might best work to that effect. Such an assessment would include primary research as well as drawing on secondary data and international experiences to shape an approach that will meet the specific needs of the country.

Chapter 1: Country Context

Introduction

Pakistan is the sixth most populous country in the world with a population currently (2012) estimated at about 180 million. By 2030, about 50 percent of Pakistan's population, or roughly 137 million people, will be living in urban areas, and the number of cities with more than 1 million inhabitants will increase from 8 in 2012 to at least 12. A combination of droughts, floods, earthquakes, and insurgency in some areas has forced urban areas to absorb large numbers of internally displaced populations, provide them with land and basic infrastructure services, create employment opportunities, and meet their food security needs (State Bank of Pakistan 2011).

In May 2011, the Planning Commission produced the *Framework for Economic Growth*, which emphasizes the need for change through the identification of, and advocacy for, reforms. The framework advocates growth through rational infrastructure development, creation of better environmental conditions and addressing the physical, social, land-use, and other aspects of urban management. The focus of the strategy is to concentrate on the "software" of economic growth—issues of economic governance, institutions, incentives, and human resources.

Institutional and Administrative Setup

Pakistan is a parliamentary republic with an elected lower house (National Assembly) and upper house (Senate) and an elected prime minister and president. The country consists of four provinces—Punjab, Sindh, Khyber Pakhtunkhwa (KP), and Balochistan—and four federal territories: Islamabad Capital Territory (ICT), Azad Jammu and Kashmir (AJK), Gilgit Baltistan (GB), and the Federal Administered Tribal Areas (FATA). Each of the four provinces has a constitutional assembly, elected chief minister, and a governor who represents the President in the province.

Punjab is the most populated province, with approximately 45 percent of the country's population. Its capital, Lahore, is the country's second largest city, with a population of 7 million. Five major rivers flow through Punjab. Marked disparities in poverty and economic growth exist within the province. The economic base of the province in the past few decades has shifted from agricultural production to services and manufacturing.

Sindh is Pakistan's southernmost province. The Indus River cuts through the province from north to the south. Its course includes marked disparities in agricultural fertility and access to water. Karachi, with over 13 million inhabitants, is dominant as the economic and political powerhouse of Sindh and is the largest city in the country.

Khyber Pakhtunkhwa is in the north. Peshawar is the capital city, with a population of 1.4 million.

Balochistan is the largest province. Its capital is Quetta, with a population of 0.9 million, but Gwadar, the newest port in Pakistan, serves as the winter capital.

Islamabad Capital Territory is Pakistan's capital city, with a population of 0.7 million. Islamabad is divided into urban and rural areas.

State of Azad Jammu and Kashmir has a parliamentary form of government with its own constitution, flag, president, parliament, high court, and Supreme Court. Muzaffarabad is the capital, with an estimated population of 0.77 million.

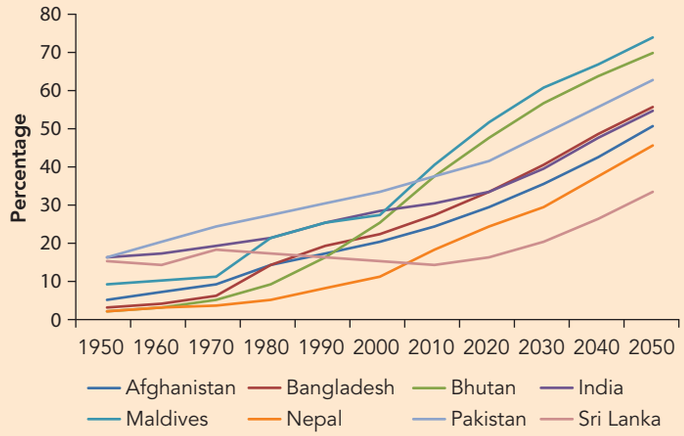
Gilgit Baltistan was created by the Gilgit Baltistan Empowerment and Self Governance Order (ESGO) in 2009. The population is approaching 1million. The administrative center is the city of Gilgit.

Federally Administered Tribal Areas area semi-autonomous tribal region comprising seven agencies that are managed by the FATA secretariat.

Urban Demographics

The 2012 total population was approaching 180 million, based on an annual growth rate of 2.7 percent, with, as noted, an urban population of about 63 million. At current growth rates the population is expected to reach about 210 million by 2020 and 360 million by

Figure 1.1: Urban Population Growth, 1950–2050



Source: World Bank 2011.

2045. As seen in table 1.1, there are large variations in urbanization among provinces and territories.

Nationally, population density has increased four times, from 42 persons per kilometer in 1951 to 166 persons in 1998 (the last population census). Since 1951 the share of the provincial urban population has increased in the Punjab by 2.5 times; in Sindh by 4.0 times; in NWFP by 1.5 times; and in Balochistan by 6.0 times. There are 20 cities with a population of more than 300,000. More than half of Pakistan's urban population lives in eight urban agglomerations: Karachi, Lahore, Faisalabad, Rawalpindi, Multan, Hyderabad, Gujranwala and Peshawar (table 1.2).

Urban poverty is high. The incidence of poverty based on a "basic needs urban poverty line" set at Rs. 850, was 28 percent (Ali 2005). Urban poverty was highest in the Punjab at 32 percent, with 26 percent in Sindh, 29 percent in FATA, and 28 percent in Balochistan. Homeless International estimates that 48 percent of the urban population lives in under or un-serviced areas.[2]

National Urban Water Supply and Sanitation Policies

The Government of Pakistan approved the National Drinking Water Policy in September 2009 and the National Sanitation Policy in September 2006. These policies cover both urban and rural subsectors.

The overall goal of the National Drinking Water Policy is to improve the quality of life by reducing the incidence of death and illness caused by water-borne diseases. The National Drinking Water Policy focuses on the following:

- The policy asserts that the country will provide safe drinking water to the entire population at an affordable cost in an impartial, efficient, and sustainable manner. It seeks to ensure reduction in the incidence of mortality and morbidity caused by water-borne diseases.
- The objective is to provide a supportive ground and legal framework that could facilitate sustainable access to and provision of safe drinking water.
- It highlights the constitutional responsibility of the provincial and local governments (towns and TMAs) to provide drinking water.
- It underlines that the right to water for drinking takes precedence over rights to water for all other uses (agriculture, industry, and so forth).

[2] http://www.homeless-international.org/our-work/where-we-work/pakistan.

Table 1.1: Population Density

Province	1998 Population Census (millions)	Population 2012 Based on Annual Growth Rate Estimate (millions)	Density Inhabitants per Square Kilometer	Urban Population (%)
Azad Jammu and Kashmir	2.97	5.33	308	10
Balochistan	6.51	9.71	26	23
FATA	3.14	4.31	155	2
Gilgit Baltistan	2.97	4.25	16	NA
Khyber Pakhtunkwa	17.60	23.28	345	17
Punjab	72.60	93.96	464	31
Sindh	30.00	35.76	254	49
Pakistan Total	136.70	178.70	–	35 (avg)

Source: 1998 Pakistan Census Data.

Table 1.2: Largest Cities or Towns of Pakistan (Thousands)

Rank	City	Province	Pop.	Rank	City	Province	Pop.
1	Karachi	Sindh	13,205	11	Sargodha	Punjab	601
2	Lahore	Punjab	7,130	12	Bahawalpur	Punjab	544
3	Faisalabad	Punjab	4,881	13	Sialkot	Punjab	511
4	Rawalpindi	Punjab	3,992	14	Sukkur	Sindh	493
5	Multan	Punjab	1,606	15	Larkana	Sindh	457
6	Hyderabad	Sindh	1,578	16	Sheikhupura	Punjab	427
7	Gujranwala	Punjab	1,569	17	Jhang	Punjab	373
8	Peshawar	Khyber Pakhtunkhwa	1,439	18	Rahim Yar Khan	Punjab	353
9	Quetta	Balochistan	896	19	Mardan	Khyber Pakhtunkhwa	352
10	Islamabad	Capital Territory	689	20	Gujrat	Punjab	337

Source: http:/en.wikipedia.org/wiki/Template: Largest cities of Pakistan 2012.

- The policy calls for existing inequalities in the provision of safe drinking water to be removed and ensures participation of the vulnerable and poor in decision making for the sector at all levels, recognizing the key role that women and communities play.
- It provides a financial framework within which the provision of water supply can be undertaken in a cost-effective, equitable, and sustainable manner and that water treatment will be an integral part of all drinking water supply schemes.
- It also provides a set of policy instruments and strategies to achieve the objectives of the policy.

The National Sanitation Policy aims at providing adequate sanitation coverage, providing an environment necessary for healthy life, and meeting the 2015 Millennium Development Goals (MDG) targets. The primary focus of sanitation is on the safe containment of excreta away from dwellings and work places by use of sanitary latrines and the creation of an open defecation-free environment. It also provides for the safe disposal of liquid and solid wastes, and promotes-good health and hygiene practices in the country:

- The prime objective of the sanitation policy is to improve the quality of life of the people and their physical environment.
- It focuses on ensuring an open defecation-free environment; safe disposal of liquid and solid waste; and the promotion of health and hygiene practices to complement the desired objective.
- The policy envisages developing guidelines for the evolution of an effective institutional and financial framework and for linking sanitation programs with environment, housing, water, and city and regional planning policies and programs.
- It encourages mobilizing local resources and discourages foreign loans.
- It supports programs that are implementable within available resources and enhanced capacities of institutions and communities.
- It supports and accepts the role that communities, NGOs, and the formal and informal sectors are stakeholders in sanitation provision.
- The policy emphasizes the development and use of technologies that are simple and cost-effective to install and maintain; it ensures the involvement in the planning of sanitation schemes of those departments/agencies responsible for operations and maintenance (O&M).
- Finally, it gives priority to the needs of women and children at all levels of planning and implementation and considers sanitation as a fundamental human right.

Provincial and Regional Policies

Many provincial policies that impact the sector have been prepared over the decades.[3] However, policies have not played a major role as drivers for reforms, possibly because of weak regional implementation capacity. Table 1.3 provides an overview of all relevant policies.

[3] Previous policies include the National Environmental Policy 2005; National Water Policy; National Drinking Water Policy 2009; National Drinking Water Quality Standards 2009; National Sanitation Policy 2006; Punjab Urban Water and Sanitation Policy 2007; Sindh Draft Sanitation Strategy 2008; Balochistan Sanitation Strategy and Action Plan 2008; Balochistan Sector Strategy for Drinking Water Supply, Sanitation and Hygiene 2006; Punjab Water policy 2011; Khyber Pakhtunkhwa draft water policy 2011; Khyber Pakhtunkhwa draft sanitation policy 2011; AJK Sanitation Policy and Strategy 2008; and Draft Northern Areas Sanitation Strategy 2008.

Table 1.3: Provincial and Regional Policies for Urban and Rural Water Supply and Sanitation

Unit/Region/Province	Policy/Strategy	Based On	Year	Lead Department	Status
AJK	Drinking Water Policy 2011–25	National Policy	2010	LG	Approved but under retro review by department in 2012 for review
FATA	FATA Drinking Water Policy	Draft KP and national policy	2012	LG	First draft approved
Balochistan	Balochistan Sanitation Strategy and Action Plan	National policies	2008	LG and PHED under a P&D committee	Approved
	Provincial Drinking Water Strategy and Action Plan		2010		
GB	Drinking Water Policy and Strategy 2011–25	National Policy	2010	LG	Approved
KP	Khyber Pakhtunkhwa Drinking Water Policy	National Policy	2011	LG and PHED under a P&D committee	Final draft with cabinet for approval
	Khyber Pakhtunkhwa Sanitation Policy	National policy	2011		
Punjab	Punjab Drinking Water Act	Global	2012	HUD & CDD	Draft
	Punjab Drinking Water Policy	National policy	2011		Approved
	Punjab Sanitation Policy	National Policy	2012		Draft
Sindh	Sindh Sanitation Strategy	National Policy	2011	LG	Approved (Rs. 1 billion allocated for rollout)

Notes: LG (Local Government); PHED (Public Health Engineering Department); P&D (Planning and Development).
Source: Data collected from national and provincial governments, 2011–12.

National Institutional Arrangements

Prior to the 18th Amendment to the Constitution that the National Assembly passed on April 8, 2010, the Ministry of Environment (MoE) of the Federal Government was responsible for policy development and guideline setting. With the passage of the 18th Amendment, the MoE was devolved to provinces and there was no federal ministry with sole responsibility for the water and sanitation sector, although the Planning Commission and the Ministry of Finance (MoF) have an indirect role. The Planning Commission holds the authority to approve provincial development programs and coordinates and approves projects prepared by the provinces that cost more than Rs. 100 million (approximately US$1 million). The MoF allocates resources to the secretariat of the National Finance Commission and transfers funds to the provinces.

Local Government, Provincial, and Regional Arrangements

The 1973 Constitution assigned responsibility for the water supply and sanitation sector to provinces and service provision to local governments. Under the Local Government Ordinance (LGO) 2001, there are three tiers of local government in each province: Districts, TMAs and Unions. Unions (depending on size and geography) form a TMA; and two or more TMAs form districts (for example, Mardan District in KP has two TMAs, and there are 18 TMAs in district Karachi). Administratively, all TMAs fall under provincial local government departments. Districts are the largest in population, followed by TMAs and Unions. There are 382 TMAs in the country, with 144 in Punjab, 104 in Sindh, 82 in Balochistan, and 52 in KP.[4] Figure 1.2 provides an example of TMA organizational structure.

[4] In KP, after passage of Local Government Act 2012 by the provincial assemblies, the urban TMAs have been replaced by Municipal Committees (in medium-size urban towns) and Municipal Corporations (in large urban towns).

Seven of the nine largest cities in the country have established district-wide water and sanitation utilities. These include five Water and Sanitation Agencies (WASAs) in five large cities in Punjab and one in Quetta, Balochistan. In Karachi, the Karachi Water and Sewerage Board (KWSB) provide water supply and sanitation. In Peshawar, the provincial government is in the process of establishing the water and sanitation utility—Water and Sanitation Services Peshawar--to be responsible for water, sanitation, and solid waste services to about 1.7 million people (see box 1.1). Islamabad, being a federal territory, has some unique features in its water and sewerage service (box 1.2).

All the urban utilities (WASAs, KWSB, and so forth) tend to have strong managers and skilled technical professionals at the top level of management. The urban utilities cooperate with each other on management issues, technical innovations, energy efficiency, O&M issues, ways to reduce arrears, and other sector issues through a network of urban utilities known as the Pakistan Water Operators Partnership (P-WOPs).

Benchmarking is well underway through the International Benchmarking Network for Water and Sanitation (IBNET). IBNET has served as a useful tool for utilities to increase accountability and obtain exposure to international standards.

Elsewhere in the provinces, water supply and sanitation operations are managed by TMAs in small and medium-sized cities. In many instances the O&M of WSS facilities is handed over to the TMAs after construction by Public Health Engineering Departments (PHEDs). These facilities managed by the TMAs have substantial sustainability problems. PHED does not consider itself the responsible party for maintenance issues of WSS facilities, despite the fact that these are implemented and constructed by them. As a result, the facilities soon stop functioning, largely due to lack of maintenance and nonpayment of electricity bills. This results in TMAs being generally reluctant to take over the operations after completion. More than 40 percent of WSS facilities are either temporarily or permanently closed.

In the regions, the PHEDs, local government departments, and the Local Government and Rural Development Department (LG&RDD) work on water supply and sanitation. AJK, GB, and FATA have separate institutional arrangement for implementation. The AJK Council plays an important role in resource allocation for all of AJK, including water supply and sanitation. The Ministry of Kashmir Affairs and Gilgit Baltistan is a federal entity that is involved in both AJK and GB. In the case of FATA, the Ministry of State and Frontier Regions (SAFRON) is the federal level entity. Its role in water supply and sanitation, however, is limited.

Box 1.1: Peshawar Water Supply and Sanitation Utility

The Government of KP is in the process of establishing Water and Sanitation Services Peshawar (WSSP), which will be an autonomous corporation that provides and improves water and sanitation services to about 1.7 million people of Peshawar. Previously, Peshawar was the only city out of the eight large cities of Pakistan where water supply and sanitation services were provided by seven different agencies, including four TMAs, Peshawar development authority, the Cantonment Board, and the Public Health Engineering Department. WSSP will be the first corporate entity in Pakistan to provide integrated services of water supply and sanitation that included solid waste.

LG&RDD is the administrative department for local governments. In addition to designing and building some small-scale water supply and sanitation schemes, it manages local council service public sector employees, trains local governments, implements some rural development schemes, and in some provinces organizes local government elections. The capacity and authority of LG&RDDs have declined over several decades, especially after the promulgation of LGO 2001, as the functions were devolved to lower tiers, but the relevant departments were not strengthened to support the newly created tiers.

Housing and Urban Development Departments (in provinces where they exist) are responsible for master plans and some housing/land allotment schemes. In Sindh and Punjab they are the administrative departments for city/district Development Authorities. The unit in Balochistan is known as Urban Planning and Development, and in Punjab it has been merged with PHED.

Table 1.4 provides an overview of the institutional arrangements in the sector by province and region. It also includes the arrangements for rural service provision to provide a complete picture of the institutions at the provincial and regional levels.

This situation is made more complex by the Local Government Ordinance of 2001 (LGO 2001), which introduced major institutional reforms in the water and sanitation sector. The ordinance abolished the urban-rural divide and as a consequence prescribed the dissolu-

Box 1.2: Islamabad Capital Territory

The Islamabad Capital Territory (ICT) is the nation's capital city and a federal territory and is contiguous to one of Punjab's large cities, Rawalpindi. The municipal services in the urban part of ICT are managed by the Capital Development Authority (CDA), which is under the administrative control of a Cabinet division of the federal government. Japanese Bank for International Corporation (JBIC) has remained engaged with the CDA.

In FY 2012–13 CDA's budget was Rs. 28.3 million, an 18 percent increase as compared to the previous year. Municipal and sanitation receipts estimated for 2012–13 are Rs. 507 million.

It serves a population of 0.689 million people and has a 95 percent piped water supply coverage. Water is available for an average of two to three hours in a day. Current water demand is 80 million gallons per day (mgd) and actual water production is 68 mgd. Nonrevenue water, at 40 percent, is higher than that reported for Multan, Faisalabad, and Rawalpindi. CDA also operates a tanker service with 36 tankers to augment supply. CDA has approximately 58,000 consumers, of which 93 percent are domestic consumers.

According to the Pakistan Social and Living Standards Measurement Survey (PSLM, 2010–11), 74 percent of households in urban ICT and 35 percent in rural ICT had access to tap water. In urban areas, after piped water, motor pumps were the next greatest source of water (12 percent). In urban Islamabad, 98 percent of households had flush toilets and in rural areas 92 percent of households had flush toilets. Nonflush toilets were the second source of access in rural areas, at 5 percent. Two percent of urban households and 3 percent of rural households had no toilets.

Major constraints to water and sanitation services that have been identified in earlier studies and projects include inefficient distribution network, land acquisition and development, and inadequate source development.

The CDA is implementing three government-funded water supply projects with a total cost of Rs.210 million. All three projects are addressing source development through the construction of overhead tanks and tube wells and also include the construction of water supply lines.

Unlike other WASAs and municipalities, in the country nearly 50 to 60 percent of bulk water supply is metered, although metering of consumers has not been initiated. This provides an opportunity to focus on water conservancy and financial efficiency.

Source: JICA 2009; CDA website, www.cda.gov.pk.

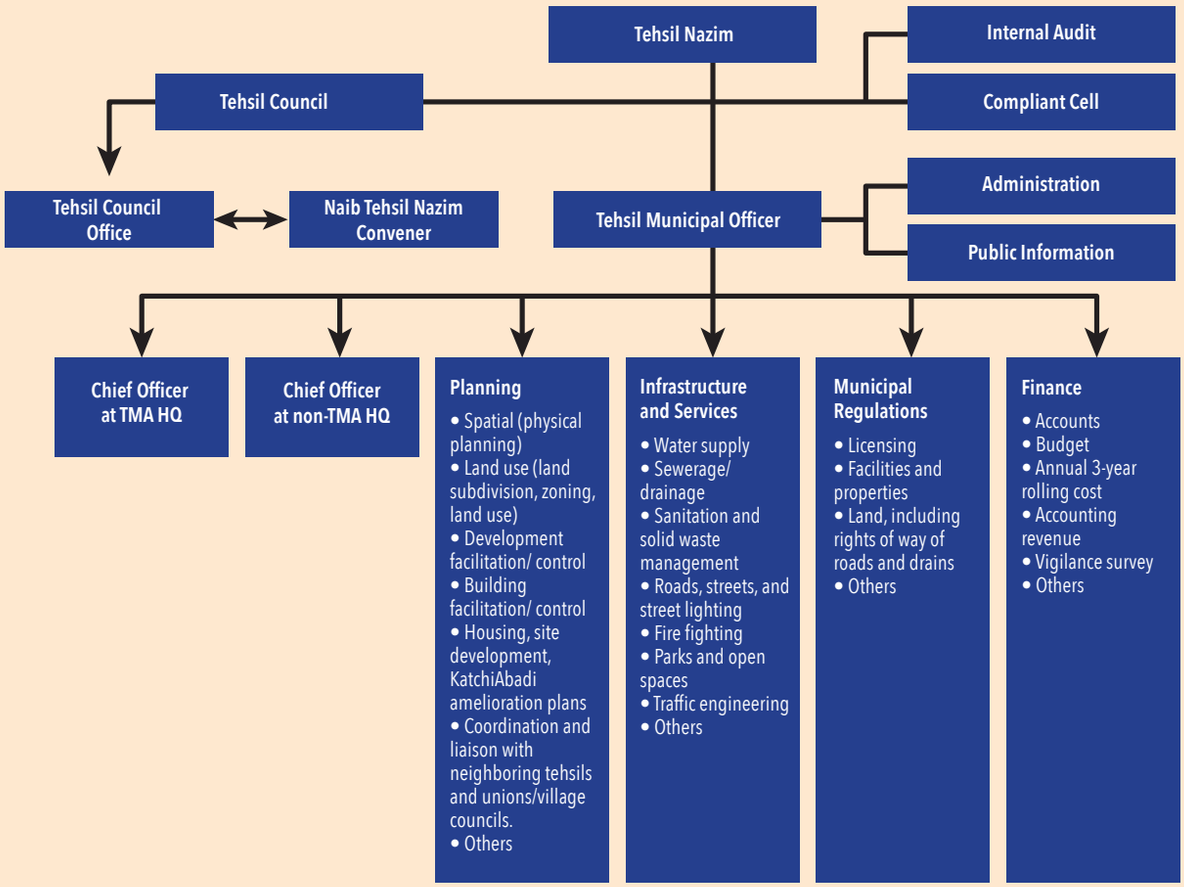
tion of rural water and sanitation institutions (PHEDs) at all levels. Instead, LGO 2001 established TMAs to operate systems in both urban and rural areas. Unfortunately, certain sections of LGO 2001 relevant to PHED and TMAs are not implemented and hence a completely different situation prevailed on ground than what was prescribed in the law.

Since there was no PHED operating at any level in the province, staffs merged with LG departments and were posted in TMAs. All water and sanitation functions in both urban and rural areas became a TMA function. TMAs were supposed to plan, prepare engineering feasibility studies for, design, implement, and operate and maintain all water and sanitation infrastructure in the jurisdiction. The elected tehsil council was vested with full powers to allocate financial resources to sector utilizing own sources and provincial grants (transferred to TMAs under a block grant).

The provinces interpreted the PHED dissolution clause differently. Punjab reduced PHED staff by more than 50 percent at the headquarters (HQ) office and transferred all field staff from PHED field offices to TMAs in early 2001 and 2002. Sindh transferred all PHED staff from HQ and field offices to the TMAs LG department. KP merged PHED with the Communication and Works Department rather than LG department. In Punjab, PHED was subsequently reestablished in 2003, in KP in 2009, and in Sindh in 2010.

The lack of clarity as to which agency is responsible in rural and urban situations has led to unclear institutional responsibilities. As a result PHEDs are actually operating in rural areas whilst TMAs ended up operating in urban pockets. Even though TMAs are legally responsible for the sector, they face capacity and resources issues. PHEDs have qualified and skilled engineering staff whereas the TMAs have insufficient skilled staff

Figure 1.2: Tehsil Municipal Administration Organizational Chart



Note: Tehsil Nazim is the elected mayor of Tehsil; Tehsil Naib Nazim is the deputy mayor of Tehsil.
Source: LGO 2001, http://www.nrb.gov.pk/local_government/tehsil_mucipal_admin.htm1.

to help them manage their responsibility. TMAs were entrusted with many responsibilities with limited financial allocation.

To address this issue, around 2005 policy makers came up with the option of utilizing PHEDs to provide support entity to TMAs. Since PHEDs had the capacity, it was given responsibility for infrastructure development in urban TMA areas (especially for technical aspects, for example, complex tube-well-piped water supply schemes and waste treatment plants). TMAs were supposed to take over infrastructure commissioned by the PHEDs for operation and maintenance. Many TMAs, however, are reluctant to take over the completed schemes. One major reason is due to their lack of involvement in the planning and designing stage as well as a lack of operation and maintenance capacity. These challenges are compounded by insufficient financial resources for operational and capital expenditure. As a result, many completed schemes are yet to be taken over by TMAs.

In December 2009 the law protecting the LGO 2001 expired. After expiration of the law the provincial governments have been authorized to create legislation on new LG systems. The post-December 2009 institutional set up of TMAs, districts, and unions is indeterminate but will continue until new local government systems are introduced and elections are held. All cities and towns are without elected councilors and mayors since 2010, and the powers of the councils and mayors have been vested in administrators being appointed by provincial government in place of elected *nazims* to run the municipal affairs. So far, only Khyber Pakhtunkhwa province has adopted the new LG system—Local Government Act 2012—and replaced the urban TMAs by municipal committees and municipal corporations while rural TMAs are replaced by district councils.

International studies have shown that well run water service providers have the following characteristics:

Table 1.4: Institutions at the Provincial and Regional Levels

Province	Urban		Rural		Large Cities	
	Development	O&M	Development	O&M	Development	O&M
AJK	PHED	PHED	LG (policy, planning, allocation)	CBOs	None	AJK
Balochistan	LG&RDD (policy, planning, allocation etc.) PHED undertakes construction	TMA	PHED	PHED/CBOs	LG&RDD	WASAs
FATA	LG Directorate	Town Committees	PHED wing under the Works and Services Directorate	PHED/CBOs	None	FATA
GB	PHED wing in Works and Services Department	PHED wing	LG/CBOs	CBOs	None	GB
Khyber Pakhtunkhawa	LG&RDD (policy, planning, allocation etc.) PHED undertakes construction	TMA	PHED	PHED	LG&RDD	Peshawar Municipal Corporation; Peshawar Water Company being established
Punjab	HUD & PHED (policy, planning, allocation) PHED undertakes construction	TMA	HUD & PHED (special PHED wing)	CBOs	HUD & PHED	WASAs
Sindh	LG&RDD (policy, planning, allocation, etc.) PHED undertakes construction	TMA	PHED and LG&RDD	PHED/CBOs	LG	KWSB

Notes: Per the 2001 Local Government Ordinance, there are eight large cities in Pakistan. The Sindh TMA is the Tauluka Municipal Administration. The institutional arrangement in AJK and GB are different from all the provinces.

- Autonomy—financial and managerial—to operate the provider without undue interference on a day-to-day basis and in the long-term interests of the community.
- Accountability—to a range of stakeholders to demonstrate that they provide the services and performance expected of them, whether that performance be technical or financial.
- Customer orientation—to ensure that the provision of service to customers is the focus of management and staff (Weak service providers, reliant on governments for financing, will often focus their attention on satisfying their government at the expense of the customer).
- Market orientation—to ensure that the service is provided as efficiently as possible and thus minimizes costs to both customers and government (as a sector financier).

The urban water sector in Pakistan, as presently constituted, falls short against most of these criteria, indicating a need to review the governance of the sector to align it with these characteristics. This will require a move toward putting the local government service provider at the heart of the sector, ring fencing their activities, and building their capacity. At the same time, existing sector entities will have to evolve and provide support to the local governments in a more accountable manner. This will also improve the integration of the sector, which is currently bifurcated between central agencies with a strong engineering capacity and local government agencies, which are responsible for operations but are weak and lack capacity.

Whilst the larger cities will be able to establish viable service providers in their own right, smaller cities will struggle for two reasons. First, they will not have a suffi-

cient revenue base to afford and attract good employees, and second, they will lack the economies of scale that are prevalent in the sector.

International experience has shown that these challenges have typically been solved in one of two ways.

- By providing a centralized technical support facility that can provide specialist services to a large number of municipal-level service providers, thus removing the need for individual providers to each hire a particular expertise.
- By grouping a number of smaller service providers together into a larger entity through which economies of scale can be achieved, allowing for the hiring of a full range of specialist skills needed to operate a modern utility.

An example from Estonia of both points is presented in box 1.3.

Private Sector Participation

There have been several attempts to introduce private sector participation in water supply and sanitation, though almost none were successful. The failure is understandable, as the operations are losing money and there is doubt about how the remuneration to the private operator would be financed. The most visible case was that of Karachi, where both labor unions and elements of the public sector were successful in convincing the public and decision makers that water was a national strategic asset that should not be handed over to the private sector. Partial private sector involvement attempts were also made in Lahore, Islamabad, Sialkot, and Hyderabad, but with limited results.

Well-designed PPP arrangements can provide the public sector with ways in which to improve efficiency and service delivery. The city of Barranquilla in Colombia offers a good example how a capable operator can use the existing capacity better to serve more population and at the same time strengthen financial operations (box 1.4).

While the large-scale PPP in Colombia has not been adopted in Pakistan, the local, small-scale, private sector is very active. There is a significant amount of funds in the water sector in the informal economy through private tankers. In all cities, many of the poor depend to a large degree on private tanker trucks and end up paying 10 or more times per cubic meter than do the rich who receive the subsidized services through house connections.

Water Resources

Efficient management of water resources is a major challenge for the country. The Indus is Pakistan's only major river system, and should current trends continue, decreasing snowfall in the Himalaya and Karakorum Mountains may progressively limit its role as the main source of fresh water. Sub-surface sources of water are fast being depleted due to unsustainably high withdrawals by various users. The amount of per

Box 1.3: Estonia – Providing Technical Support to Smaller Service Providers

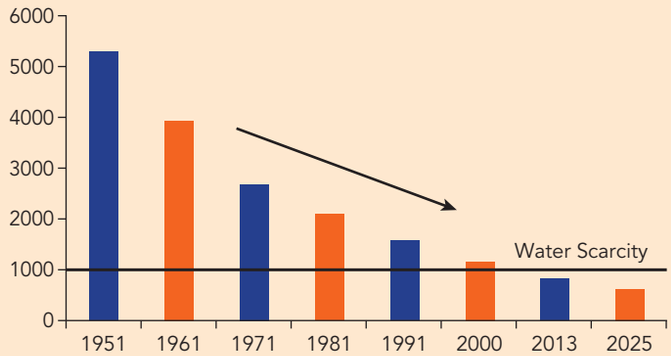
The three Baltic countries (Latvia, Lithuania, and Estonia) faced the challenge of how to reform their water supply and wastewater sector after they had regained independence in 1991. Estonia, with a population of 1.4 million, embarked on a process that illustrates how the transformation was achieved.

First, the centralized water supply and wastewater state enterprise, EestiVesi, was liquidated in 1995. The country's many small municipalities created corporate water and wastewater companies to operate their systems, but many of them could not afford to employ specialized staff needed to modernize their systems to meet European standards. In order to fill the gap, a new private company, EestiVeevärk, was established in 1993 to serve as an apex institution for its municipal owners. It housed professional services related to investment activities and operations and maintenance. The objective was a division of responsibility, in which routine operations and maintenance would be managed by municipalities but specialized expertise would be housed in EestiVeevärk. Municipalities would jointly own EestiVeevärk but would buy its professional services on conditions that would permit EestiVeevärk to attain financial and legal autonomy. EestiVeevärk has proven important as a professional partner in accessing the financial and technical assistance that Estonia sought. It has served as an investment agent for smaller municipalities and was responsible for planning, designing, and implementing an investment project on behalf of the municipality and transferring the assets upon completion to the municipal water supply and wastewater share corporation for operation and maintenance.

Box 1.4: Colombia Shows the Way in Better Use of Existing Capacity

Water service in Barranquilla, a city of 1.5 million on the Caribbean coast, was under private operation from 1925 to 1960. Universal coverage and good service quality made the city's water supply the best in Colombia. However, the municipal government took over operations in 1961, and in three decades operations and service quality deteriorated to rival the worst in the country. The crisis reached a climax in 1991, when the World Bank suspended disbursements under an existing loan. The central government and civic organizations in the city rallied around reform that resulted in the creation of a new company. A Spanish private operator, AGBAR, assumed operational control in 1996, to be followed in 2002 by another Spanish operator, Canal Isabel II. A capable manager was successful in boosting water coverage from 78 percent to 97 percent in five years and sewerage coverage from 68 percent to 88 percent. Service quality improved rapidly. The positive achievements were possible mainly through a better use of existing facilities and firm management that sharply reduced undocumented connections and unmetered consumption. Annual water production actually dropped from 17 million to 15 million cubic meters although annual consumption rose by a third, from 7 million to 10 million cubic meters, and the number of connections grew by 44 percent, from 180,000 to 260,000. As a result, the percentage of unaccounted-for water decreased from 55 percent to 38 percent in five years.

Figure 1.3: Per Capita Water Availability in Pakistan (cubic meters)



Source: World Bank Presentation, February 2013.

capita water resources has decreased from 5,300 cubic meters (m^3) in the 1950s to about 1,000 m^3 in 2011 (figure 1.3), the international threshold for water stress. Irrigation accounts for 69 percent of the water used in the country, industry for 23 percent, and municipalities for only 8 percent. Surface water supplies are threatened by wastewater pollution, since only 50 percent of the wastewater is collected and only 10 percent treated.

Groundwater is now being overexploited in many areas, and its quality is deteriorating. About 80 percent of Punjab has fresh groundwater, but in Sindh, less than 30 percent of groundwater is fresh. In KP, increasing extraction has resulted in wells now reaching into the saline layers. Balochistan has saline groundwater.

Over the past 40 years, the exploitation of groundwater, mostly by private farmers, has brought enormous economic and environmental benefits. Groundwater now accounts for almost half of all irrigation requirements. However, while there is clear evidence that groundwater is being overexploited, it is estimated that tens of thousands of additional wells are being put into service every year. Furthermore, there are serious and growing problems with groundwater quality, a reality that is likely to get worse, because there are 20 million tons of salt accumulating in the system every year. Salinity is least extensive in northern, subhumid parts and most extensive in the southern arid parts of the country (Briscoe 2005).

At the same time, there is uncontrolled pollution of surface and groundwater from the pesticides and fertilizers from irrigation and by runoff from cities and industries. Major cities have inadequate wastewater treatment plants (see Chapter 2, section on Quality and Efficiency of Sanitation Services). Most wastewater treatment plants, if they exist, are not in operation.

Perhaps most detrimental is the limited amount of investment spent on building the knowledge base of the Indus Basin. The Indus Basin is a single complex and huge interconnected ecosystem. In such a complex and large system, the use of knowledge is a vital aspect of adaptive management. Over the past 20 years, far more could have been done to build the knowledge bases, especially given Pakistan's well known previous history of water planning capacity.

Chapter 2: Sector Analysis

National and South Asian Comparisons of Water Supply and Sanitation Coverage

According to the Joint Monitoring Program (JMP) of WHO and UNICEF, Pakistan is on track to achieve the national water supply Millennium Development Goal (MDG) target—reaching 92 percent of the population as compared to the targeted 91 percent—but off track with respect to the national sanitation MDG target (48 percent versus targeted 63 percent). The Pakistan Social and Living Standards Measurement Survey (PSLM) of 2010 estimates access to improved water supply at 91 percent and to improved sanitation access at 78 percent. Open defecation has diminished to 22 percent. The JMP relies on secondary sources to assess countries' progress toward the water supply and sanitation targets. In Pakistan, these sources include the PSLM surveys. The different JMP sources are averaged through a regression/correlation method. Differences between the JMP data and the PSLM, particularly relating to sanitation, highlight possible definitional inconsistencies between the two. As will be seen, these coverage statistics refer to the infrastructure built rather than to the services actually provided.

In the urban subsector the water coverage in 2010 is just below the 2015 target of 97 percent; sanitation is well below with 2010 coverage of 72 percent versus a 2015 target of 86 percent. In both water supply and sanitation, the coverage (in total and by type of service), as a percentage of urban population, has hardly changed for 20 years, indicating that providers are keeping up with urban growth but making little improvement. The only real change has been in the level of open defecation in urban areas, which has halved from 8 percent in 1990 to 4 percent in 2010, although only by moving to "other unimproved" rather than to "improved" status. See tables 2.1 and 2.2.

A comparison of JMP coverage data for 2012 between Pakistan and other South Asian countries is provided in table 2.3.

This JMP data show that all the five South Asian countries are making progress toward reaching the 2015 water supply targets. A comparison of Pakistan WSS performance with other countries in the region for the period 1990–2010 shows that its performance was in line with the region's general trend. The country's level of access to urban piped water increased by 2 percent to reach 58 percent, and total access to improved water increased by 1 percent to reach 96 percent during this period. The 2010 levels of service in India were piped water 48 percent and total access 97 percent. In terms of ranking among the five nations, Pakistan has slipped in the urban water sector from first to second position for piped supplies and from second to third position for total improved supplies.

Table 2.1: JMP-Estimated Trends of Water Supply Coverage

Pakistan	Water Supply Coverage Estimates								
	Urban (%)			Rural (%)			Total (%)		
	1990	2008	2010	1990	2008	2010	1990	2008	2010
Improved water	95	96	96	81	88	89	85	91	92
Piped on premises	56	57	58	8	21	23	23	34	36
Other unimproved	39	39	38	73	67	66	63	57	56
Unimproved	5	4	4	8	7	6	6	6	5

Source: UNICEF and WHO 2012.

Table 2.2: JMP-Estimated Trends of Sanitation Coverage

Pakistan	Sanitation Coverage Estimates								
	Urban (%)			Rural (%)			Total (%)		
	1990	2008	2010	1990	2008	2010	1990	2008	2010
Improved facilities	72	72	72	7	31	34	27	45	48
Shared facilities	6	6	6	1	5	6	3	5	6
Other unimproved	14	18	18	20	26	26	18	24	23
Open defecation	8	4	4	72	38	34	52	26	23

Source: UNICEF and WHO 2012.

However, its statistics were better than the average of the five nations in every aspect of water supply but only for urban provision in sanitation.

It is interesting to note that the urban coverage of piped water *declined* from 1990 to 2008 in Bangladesh and India, which indicates that service providers are unable to keep pace with urban growth in terms of providing house connections to their rapidly growing urban populations. Pakistan has been able keep pace with the rapid urban growth and to make some marginal increase over the past 20 years, moving from 56 percent to 58 percent with piped connections. All of the South Asian countries are off-track in meeting the 2015 MDG target for urban sanitation with the exception of Sri Lanka.

Table 2.3: Access to Water and Sanitation in the South Asia Region

		Water				Sanitation			
		Urban		Rural	National	Urban	Rural	National	
		Improved		Improved	Improved	Improved	Improved	Improved	Unimproved
Country	Year	Total Improved (%)	Piped on Premises (%)	Total Improved (%)	Total Improved (%)	Improved (%)	Improved (%)	Improved (%)	Open Defecation (%)
Bangladesh	1990	87	26	75	77	58	34	39	33
	2008	85	20	79	81	57	52	53	7
	2010	85	20	80	81	57	55	56	4
India	1990	88	49	63	69	51	7	18	75
	2008	96	48	87	90	57	21	32	53
	2010	97	48	90	92	58	23	34	51
Nepal	1990	96	43	74	76	37	7	10	80
	2008	93	52	87	88	46	25	29	52
	2010	93	53	88	89	48	27	31	49
Pakistan	**1990**	**95**	**56**	**81**	**85**	**72**	**7**	**27**	**52**
	2008	**96**	**57**	**88**	**91**	**72**	**31**	**45**	**26**
	2010	**96**	**58**	**89**	**92**	**72**	**34**	**48**	**23**
Sri Lanka	1990	91	37	62	67	85	67	70	14
	2008	98	65	88	89	88	92	91	1
	2010	99	67	90	91	88	93	92	0
Average of Five Nations	1990	91	42	71	75	61	24	33	51
	2008	94	48	86	88	64	44	50	28
	2010	94	49	87	89	65	46	52	25

Source: UNICEF and WHO 2012.

Table 2.4: Level of Water Service in Provinces and Regions

	PSLM 2010–11 (Population in 2010 = 173.5 million)						JMP 2012 update (Population in 2012 = 183.5 million)
	Punjab % (million)	KP % (million)	Sindh % (million)	Balochistan % (million)	AJK % (million)	FATA % (million)	Total % (million)
No access to improved water (urban)	9 (4.1)	8 (0.3)	4 (1.0)	4 (0.1)	15 (1.0)	NA	4% (6.0)

Source: GoP 2011.

Water Supply Coverage by Province and Region

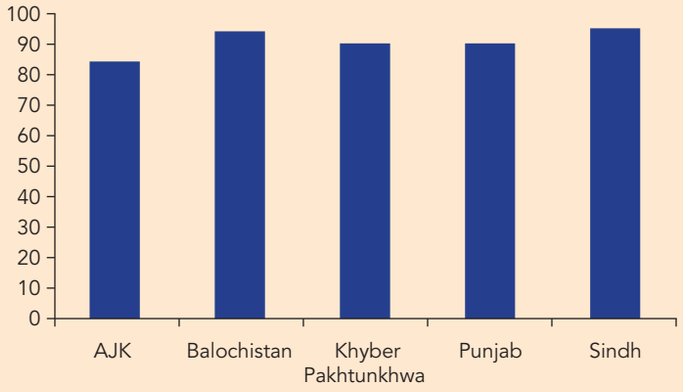
The national average of 96 percent access to improved water supply hides substantial provincial and regional variations. A survey of the level of service in urban water and sanitation in four provinces and regions of Pakistan was undertaken in 2010 (table 2.4 and figure 2.1). The portion of the population without access to improved urban water service ranged from 4 percent in Sindh and Balochistan to 15 percent in AJK. The rate in KP and Punjab was high at 8 percent and 9 percent, respectively; while data were not available for FATA. The total population of the cities without access to improved water supplies was 6.5 million in 2010–11 and fell slightly to 6.0 million in 2012.

The method of providing drinking water to urban residents varies considerably within the provinces. For example, in Punjab about 46 percent of the population has access to tap water through pipe networks, 8 percent by hand pumps, 37 percent by motor pumps, and 8 percent other. Figures for the other provinces and regions are shown in figure 2.2.

While provincial and regional coverage with improved water supplies ranges from around 85 to 95 percent, the situation with regard to piped house connections at the city level shows much more variation (table 2.5). Coverage in Gujranwala is just 32 percent, while Karachi and Rawalpindi report 90 percent. UNICEF's Multiple Indicator Cluster Survey (UNICEF 2007) also shows variations in urban service (figure 2.3). In addition, it shows piped house connections for a number of districts, but it indicates a much lower level of service in the districts that appears to be more in line to what is seen in urban areas.

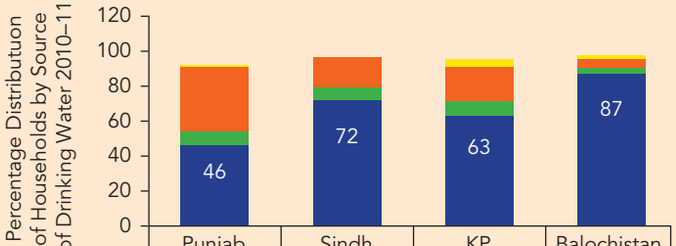
The urban poor live in city areas, urban ghettos, and urban peripheries with very poor or nonexistent water supply and sanitation facilities and in an undesirable environment. WASAs have not historically recognized

Figure 2.1: Urban Water Supply and Coverage by Province and Region



Source: GoP 2011.

Figure 2.2: Urban Level of Water Supply Service



	Punjab	Sindh	KP	Balochistan
Dug Well	1	0	4	2
Motor Pump	37	17	20	5
Handpump	8	7	8	3
Tap Water	46	72	63	87

Source: GoP 2011.

Table 2.5: Piped Water Connections in Cities Served by Utilities

	KWSB	L-WASA	F-WASA	G-WASA	R-WASA	M-WASA	PDA (Hayatabad Town)	Q-WASA
Water connections (million)	1.050	0.587	0.110	0.290	0.920	0.410	0.150	0.670
Water coverage (%)	90	89	50	32	90	60	100	70

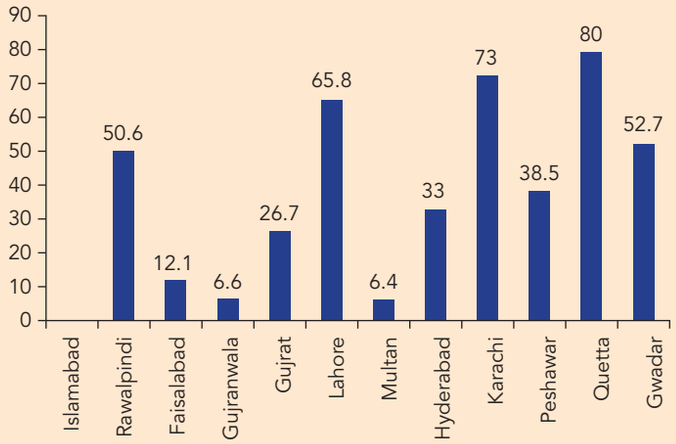
Notes: KWSB (Karachi Water and Sewerage Board); L-WASA (Lahore Water and Sanitation Agency); F-WASA (Faisalabad Water and Sanitation Agency); G-WASA (Gujranwala Water and Sanitation Agency); R-WASA (Rawalpindi Water and Sanitation Agency); M-WASA (Multan Water and Sanitation Agency); PDA (Peshawar Development Authority).
Source: Data collected by Pakistan Water Operators Partnership, 2012.

households in these areas as legitimate clients, even where governments have transferred public land there to low-income families. There is an urgent need to collect information on service levels in poor areas without legal tenure and to identify coping measures and the costs that households are paying to access water and sanitation services. Coverage is highly definitional as the statistics relating to coverage do not clearly identify a service provider's service level. For example, "house on pipe" or "tap in house" could be a small private sector provider bringing water to a groundwater tank connected with a tap, or a pump linked to a pipe linked to a pump.

A survey of 334 *katchiabadis* in Karachi indicated that at least 50 percent of the population would have had no piped water infrastructure at the household level without community mobilization (table 2.6).

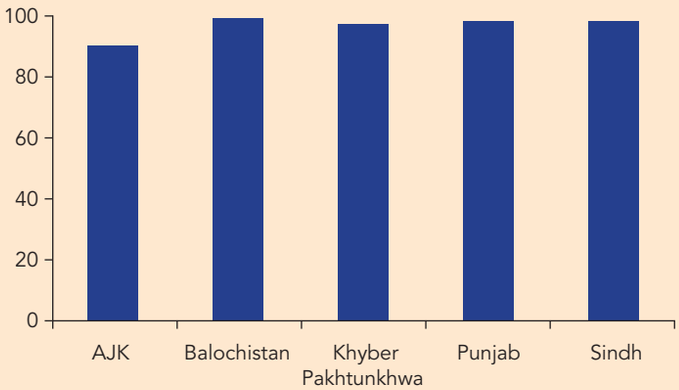
Paying insufficient attention to the poor and slum dwellers only increases inequity of service provision, loses potential customers, and adds coping costs onto those least able to bear them. This doesn't have to be the case. Phnom Penh Water Supply Authority (PPWSA) in Phnom Penh, Cambodia, implemented a program that focused on connecting poor households to address these issues. Box 2.1 provides the details of the design and success of the program.

Figure 2.3: In-House Pipe Dwellings in Urban Districts



Source: Data from UNICEF.

Figure 2.4: Urban Sanitation Coverage by Province and Region



Source: GoP 2011.

Urban Sanitation Coverage by Province and Region

The aggregate sanitation coverage reported by the PSLM 2010–11 for the provinces, ranging from 90 percent in AJK to over 98 percent in the other four provinces (figure 2.4), is higher than what the JMP reports, pointing to possible definitional differences.

Significant improvements in the availability of flush toilets were achieved during the nine-year period ending in 2010–11, when the nationwide availability in urban areas increased from 89 percent to 96 percent. In addition, the non-availability of toilets decreased from 5 percent to 2 percent. These improvements were reflected across the four provinces. A survey of open defecation in the urban areas showed a range from 10 percent in AJK to 1 percent in Sindh. Punjab and Balochistan had 2 percent. The figures for the two latter provinces indicate an improvement in service since 2010 (see table 2.7).

Table 2.6: Public Sector Water Services in Underserviced/Poor Areas

Total lanes	Lane water lines			Main/sec lines laid by		Investment (Rs. million)		
	People	Govt	Total	People	Govt	People	Govt	Total
19,463	6,991	6,900	13,891	70	986	154.53	195.76	350.29

Note: A lane water line runs across the lane/street connecting the house.
Source: Rahman 2004.

Table 2.7: Open Urban Defecation by Province and Region

	PSLM 2010–11 (Population in 2010 = 173.5)						JMP 2012 update (Population in 2012 = 183.5M)
	Punjab % (million)	KP % (million)	Sindh % (million)	Balochistan % (million)	AJK % (million)	FATA % (million)	
Open defecation (urban)	2 (0.90)	3 (0.10)	1 (0.20)	2 (0.05)	10 (0.05)	4 (3.00)	

Source: GoP 2011; UNICEF and WHO 2012.

Table 2.8 shows the high level of sewerage coverage in almost all the cities served by WASAs, despite the poor conditions in urban slums and *katchiabadis*. Although data on coverage by wealth quintile in urban districts is not yet available, there is great inequity in access to a primarily urban service (flush toilet connected to a public sewer).

There have been some positive sanitation innovations at the grassroots level in Pakistan, such as the Orangi Pilot Project in Karachi. The project has successfully mobilized the community and built self-financed, self-maintained sewers for over a million people in Karachi under a successful model that is now being followed in other parts of Pakistan and internationally in Brazil, Ghana, and Uganda (see box 2.2).

Box 2.1: Cambodia – Phnom Penh Water Supply Authority's Program of Connecting the Poor

Phnom Penh Water Supply Authority (PPWSA) launched its program for connecting the poor in 1999. The program provided deferred payment schemes for connection fees (of about $100) in installment payments of 10, 15, and 20 months. In 2005, the program for the poor was expanded to provide pro-rated subsidies of 30 percent, 50 percent, 70 percent, and 100 percent on the cost of connection. This program was supported by the World Bank under the Provincial and Peri-urban Water Supply and Sanitation Project. The identification of the poor follows a process that is community based. First, PPWSA compiled an initial list of poor households by business district; then, neighbors and village chiefs validated the classification of poor households, after which PPWSA made the final evaluation. To date, PPWSA has connected 19,000 poor households, equivalent to almost 100,000 persons.

Quality and Efficiency of Water Services

There is no city in Pakistan with a continuous 24/7 water supply. Representative supply times are presented in table 2.9. Intermittent supply is the rule. Coping mechanisms by users range from installing ground or roof tanks for collecting water when it is available and hoarding it, buying water from tankers, or using shallow wells and/or river water. Some private tankers are licensed by water utilities, but all tanker owners benefit from the intermittent water supply. There are many reasons for the intermittent supplies. One may be power blackouts because of insufficient power system capacity or targeted load shedding by power utilities given slow payment by water utilities. More likely is an evolution of intermittent service delivery to combat high levels of leakage and to ration supplies.

Water supply technical operations efficiency can be measured by reference to the levels of nonrevenue water

Table 2.8: Sewerage Connections in Cities Served by Utilities

	KWSB	L-WASA	F-WASA	G-WASA	R-WASA	M-WASA	PDA (Hayatabad Town)	Q-WASA
Population (million)	20.00	6.15	3.10	1.70	1.30	1.80	0.55	2.80
Sewerage connection (million)	0.840	0.583	0.200	0.970	0.340	0.160	0.150	0.100
Sewerage coverage (%)	80	87	70	65	35	90	100	12.5

Source: Data collected by Pakistan Water Operators Partnership, 2012.

(NRW). The high levels of NRW reported by the WASAs (24–68 percent) reflect low operational efficiency (figure 2.5). These figures are only approximate, given the low levels of production and customer metering in the WASAs, both of which are essential for calculating NRW. In contrast, Singapore has NRW of 4 percent. The NRW average for privatized UK companies is 19 percent, for Japan 8 percent, and for Chile 33 percent. NRW reduction is an area in which there is potential to partner with the private sector under some form of performance-based contract. It is an area of system operation where current capacity is weak, incentives to

Box 2.2: The Orangi Pilot Project: International Success Story on Urban Sanitation

The Orangi Pilot Project (OPP) started in the katchiabadis of the Orangi area (population 1.2 million) in 1980 in Karachi. It was established with the objective of overcoming constraints faced by the Government in improving these poor areas. The project started by seeking to understand the problems of Orangi and their causes.

After an initial period of action research and extension education, sanitation was selected as the area of intervention. The "component-sharing model," as it came to be known, placed the responsibility for building household and lane-level sanitation infrastructure on the residents, while the Government was responsible for building and maintaining secondary infrastructure: mains, disposal, and treatment.

This model was adopted rapidly by the communities, and in a short period of time the stinking, open sewers that crisscrossed the settlement and posed considerable hazards to health and property of residents were gone. Direct assistance to communities in Orangi and the demonstration effect of its work benefited more than 108,000 households (more than 865,000 people) representing almost 90 percent of the entire settlement of Orangi. Collectively, communities invested nearly US$1.7 million of their own money in their sewerage system.

Besides the other social and economic benefits attendant to improvements in sewerage and drainage systems, the infant mortality rate in Orangi fell dramatically, faster than in the rest of Karachi and Pakistan. The long period of engagement with the issue of storm water and sewerage drains revealed the political economy of local and city-wide development and opened up further areas of related work. Subsequently, the OPP expanded to cover programs for health, credit, low-cost housing, and education.

The OPP model was a simple one based on community mobilization. The founder, Dr. Akthar Hameed Khan, emphasized that for the project to be successful, it had to be low cost and austere. The project overhead had to be kept to a minimum, and the salary structure had to be linked to the program content, which revolved primarily around self-help and technical assistance. The OPP, interestingly, did not accomplish anything remarkable in terms of implementation, intervention, or invention. What it has done, however, is to evolve a low-cost and contextually appropriate system of managing and implementing local-level development. The main pillars of the OPP's approach are (1) research and extension, (2) demonstration of work on the ground, (3) mapping and documentation, and (4) relationship-building through work with the government, communities, and civic groups.

Table 2.9: Hours of Water Supply Per Day in Major Cities

Faisalabad	Karachi	Lahore	Multan	Peshawar	Rawalpindi
8	4	17	8	9	8

Source: Pakistan Water Operators Partnerships urban utilities directory 2012.

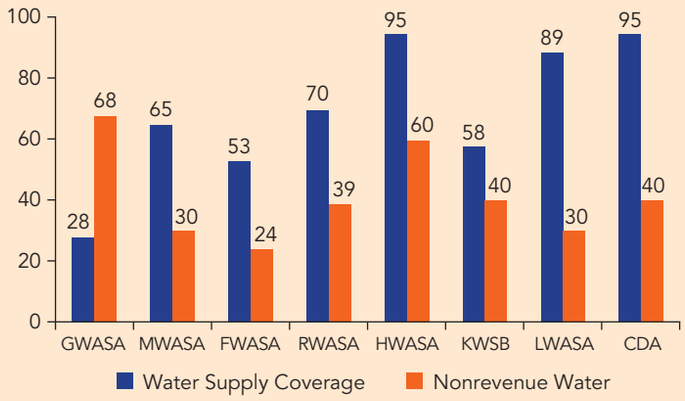
improve are poor, and yet the payback can be significant both financially and in terms of service. The performance-based NRW reduction contract in Ho Chi Minh City in Vietnam provides a good example of how such contracts can be structured (box 2.3).

The functional status of water supply schemes in urban areas of different districts of Punjab shows that (excluding Hafizabad's poor situation) on average 91 percent of the WSSs are functional (figure 2.6). Sindh is cause for serious concern, because about 63 percent of existing systems are inoperative (figure 2.7). The functional systems range from 91 percent in the Jamshoro district to 9 percent in the Larkana and Kashmore districts. The capacity of urban Punjab appears to be better, supported by larger budgets and institutions with more capacity than Sindh.

Quality and Efficiency of Sanitation Services

The 2006 World Bank Environmental Assessment Report states that most surface water pollution is associated with urban centers. Typically, nullahs and stormwater drains collect and carry untreated sewage, which then flows into streams, rivers, and irrigation canals, resulting in widespread bacteriological and other contamination. It has been estimated that around 2,000 million gallons of sewage is being discharged to surface-water bodies every day. This lack of adequate sanitation comes at a cost. Water, sanitation, and hygiene-related diseases cost the Pakistani economy about Rs. 112 billion (US$1.3 billion) per year in terms of healthcare costs and lost earnings. Estimates are that diarrhea was the leading cause of loss of disability-adjusted life years (DALYs) in Pakistan. Infant mortality is high at 70 per 1,000 live births, and child mortality is still higher at 86 deaths per 1,000 live births.

Figure 2.5: Coverage and Nonrevenue Water in Large Cities



Source: Data collected during preparation of the Punjab Water Supply and Sanitation Study, Vol III. 3, April 2012.

Box 2.3: Use of Performance-Based Leakage Reduction in Ho Chi Minh City (HCMC), Vietnam

HCMC is the capital city of Vietnam, with a population of more than 6 million people. With a water production capacity at the time of project design (2004) of 1,250,000 cubic meters per day (m^3/day) some 365,000 m^3/day was being lost through leakage. The World Bank supported HCMC in designing and implementing a performance-based leakage reduction contract to lower leakage in one zone in the city using a PPP model. The contract comprises the design and construction of district metering area, on a traditional unit cost basis, followed by leakage reduction paid on a fixed fee and performance basis. The fixed fee was set at a maximum of around 30 percent (70% of contractor remuneration is contingent on demonstrated water savings) with the performance payment made for every cubic meter of water saved. Independent verification was used to confirm the leakage reductions. The results have been impressive. The contract was awarded to Manila Water Company in mid 2008. Within three years almost 40,000m^3/day of water were being saved, against a target of 20,000 m^3/day. This is sufficient water to provide service to an additional 200,000 people. Further, hydraulic pressures in the network have increased, and additional income of over $3million has resulted.

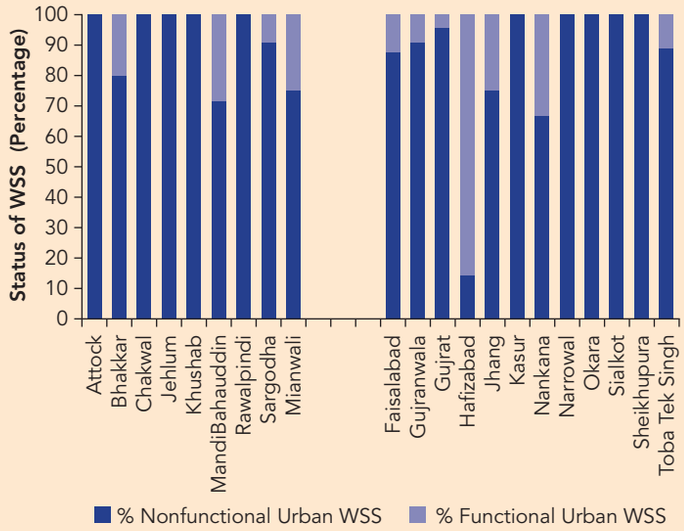
As reported by the WASAs in 2011, two of the countries nine major cities, Islamabad and Peshawar, had 100 percent sewerage coverage. These were followed by Lahore with 87 percent coverage and Karachi with 80 percent. The five remaining cities had coverage ranging from 12 percent (Quetta) to 70 percent (Faisalabad). The apparently high urban coverage likely hides the fact that the proportion of urban households with individual connections to piped sewerage trails aspirations by a good deal.

Coverage of public sewerage has hardly increased over the past decade, and as a result, the share of the sewage generated that reaches the wastewater treatment plants has increased only slightly. Although some sewerage collection systems exist, typically discharging to the nearest water body, collection levels are estimated to be no greater than 50 percent nationally, with only about 10 percent of collected sewage being treated effectively.

Although treatment facilities exist in about a dozen major cities, some have been built without the completion of associated sewerage networks, and the plants are often either underloaded or abandoned. In effect, only a few percent of the total wastewater generated receives adequate treatment before discharge to the waterways. Three of the smaller cities, Rawalpindi, Multan, and Gujranwala, have no treatment facilities whatsoever. Peshawar has four plants, none of which are operating, due to a lack of sufficient operational and maintenance resources and high energy costs. Quetta has a plant under construction. Faisalabad has a primary and secondary treatment plant with a capacity of 33 m^3/year but this is insufficient providing treatment for just 6 percent of the total collected wastewater of 587 million m^3/year. Islamabad with four plants providing primary and secondary treatment is the only city with adequate treatment capacity. Lahore has facilities enough only to provide primary screening. Karachi has three plants providing primary and secondary treatment that treat only about 2.5 percent of the sewage generated.

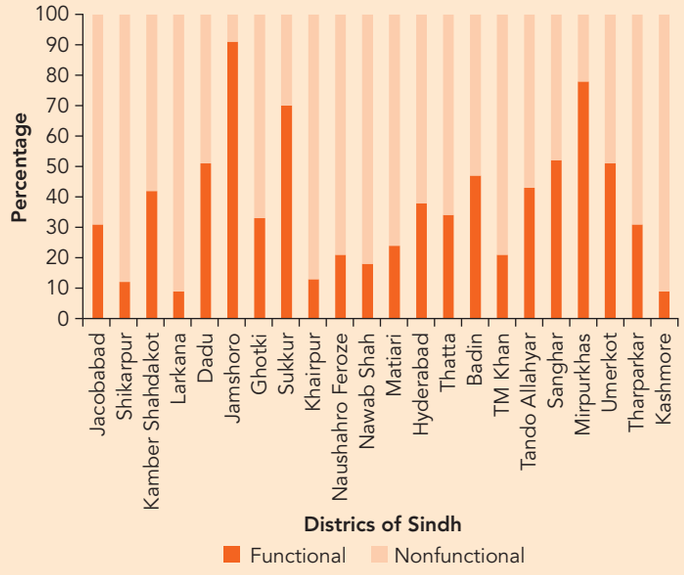
Low levels of wastewater treatment and inoperable plants are not unusual in South Asia. They reflect the prevailing mindset among state engineering entities emphasizing asset creation rather than service provision as well as the weak financial condition of all the service providers. Unfortunately, there is no simple solution to the challenge. There is increasing pressure to collect and treat waste, in order to avoid the obvious environmental pollution that currently exists, yet the service providers suffer from a weak governance environment and have no financial capacity—and limited technical capacity—to operate the facilities once completed. In areas where there is abundant surface water for households to extract (such as in parts of Punjab), the lack of treatment adversely affects the quality of those supplies. Hence, wastewater treatment becomes much more important as a means to protect a low-cost water source in these areas, as opposed to other areas where water supplies are more costly and have lower pollution levels.

Figure 2.6: Functional and Nonfunctional Water Supply Schemes in Urban Punjab



Source: Data collected during preparation of the Punjab Water Supply and Sanitation Study, Vol III. 3, April 2012.

Figure 2.7: Functional and Nonfunctional Water Supply Schemes in Urban Sindh



Source: Data collected during preparation of the Sindh Water Supply and Sanitation Study, Vol III. 3, June 2012.

Effort should be made to refocus engineering attention on solutions that have minimal operating costs—through energy recovery systems or simple systems—which might at least ensure that the systems are operated once built. At the same time there may be opportunities to reuse treated wastewater in areas where resources are particularly constrained. A long-term strategy for wastewater management is needed, one that focuses on the use of appropriate and affordable technologies and that seeks to give wastewater treatment economic value through reuse. International best practices, such as those seen in Argentina, Israel, Jordan, and Tunisia, show that as countries develop economically, wastewater treatment takes on greater priority and reuse becomes increasingly feasible (box 2.4).

In addition, examples can be found to partially illustrate the economic importance of wastewater in irrigation. For instance, in Pakistan 26 percent of the vegetables produced nationally are grown using urban wastewater (Ensink et al. 2004a). The value of wastewater in Pakistan is reflected in the land rents. In Haroonabad, agricultural land rents were on average 3.5 times higher for fields that receive irrigation water with a high proportion of wastewater in it compared to those without any wastewater (Hussain et al. 2001). In Quetta, land rents were double and in some cases up to six times higher for land with access to wastewater compared to land without access, and farmers paid 2.5 times more for the right to use wastewater than for regular irrigation water (Ensinket al. 2004b).

Box 2.4: Mendoza, Argentina – Making Treated Wastewater a Valuable Commodity

The greater Mendoza metropolitan area had a population of 1 million in 2010 and a projected coverage of 95 percent sewer connections (Idelovitch and Ringskog 1997). Mendoza is located in an arid region in the foothills of the Andes in the western part of Argentina. The city's wastewaters have traditionally been used indirectly for irrigation, as is often the case in countries with water scarcity. During the dry season, untreated wastewater represented 40 percent of the resources available for irrigation in the Mendoza River Basin, raising serious concern about health risks (Zuleta 2011).

As part of the modernization of the water sector in the Province of Mendoza in the early 1990s, a number of reforms were put in place that helped introduce planned reuse of treated wastewater. One such case was the upgrading of the Campo Espejo waste stabilization ponds in 1993 and the introduction of microbiological standards. Farmers with properties within the special area received treated effluent free of charge but were obliged to follow the irrigation safety regulations established. About one-quarter of the irrigated area is devoted to the production of grapes, another quarter to the cultivation of tomatoes and squash, and the remaining area to the cultivation of alfalfa, artichokes, garlic, peaches, pears, and poplar biomass (Barbeito 2001). The soil is slightly saline, and treated water is also used to wash salts from it (Jimenez 2008).

The upgrade was carried out under a 20-year BOOT concession from the metropolitan water and sewerage company, Obras Sanitarias de Mendoza (OSM), to the private operator Union Transitoria de Empresas (UTE) to operate and maintain the existing installations, as well as to design, construct, and operate the 12 new modules (Idelovitch and Ringskog 1997). The bidding documents specified criteria for the quality of effluent, such as a maximum of 1,000 fecal coliforms per 100 milliliters, a maximum of one helminth egg per liter, removal of at least 70 percent of biochemical oxygen demand, and removal of at least 30 percent of suspended solids. Under the concession agreement, signed in 1993, UTE committed to an initial investment of US$15 million. The new plant was inaugurated in 1996. Under the BOOT agreement, UTE charges OSM US$0.05 per m^3 of wastewater treated. OSM guaranteed a minimum of 3 million m^3/month. Based on the average treated effluent flow, UTE's initial investment had an expected payback period of seven years. The quality of the agricultural produce and the health of the agricultural workers are monitored by a special office of the DGI. The benefits of the reuse are (i) a reliable and steady supply of water, (ii) reduced cost of treatment, (iii) management of microbial health risks, (iv) reduced soil and aquifer pollution, and (v) natural fertilization of soils.

Source: "Wastewater Treatment in Latin America: Old and New Options," Directions in Development, World Bank, 1997.

Financial Performance: Operating Costs

TMAs as designed under the LGO 2001 were made responsible exclusively for municipal services. Municipal services were redefined to include only water, sanitation, solid waste, and some limited aspects of building regulation. The accounts of each municipality area are separately maintained and yearly budgets and plans are prepared, allowing for assessment of the costs and revenues associated with water and sanitation services, although their accuracy may be questionable given that separation of accounts is not critical to the functioning of the TMA. In the case of WASAs, the costs and revenues of water services are, however, well accounted for; table 2.10 provides financial performance indicators for the WASAs in Pakistan.

For a utility to be financially viable from an operational perspective, the revenue collected should be at least equal to its cash operation costs or, in accounting terms, have a working ratio of not more than 1.0. Otherwise subsidies, which are uncertain in terms of amount and unreliable in terms of timing, are required to meet its expenses. What is considered good international practice is for a working ratio of considerably less than 1.0, so that funds generated can finance cash operating expenses, provide for depreciation on fixed assets, and make a contribution to future capital investment. The working ratios as calculated by the WASAs ranged from 1.13 in Karachi to 2.8 in Multan, with a simple average of the six working ratios of 1.81. The other four WASAs providing working ratios were Rawalpindi 1.14, Faisalabad 1.6, Gujranwala 2.1, and Lahore 2.11. All these ratios are higher than one and thus all these utilities require subsidies to meet their operating expenses. If sufficient subsidy funds are not available, the operation of the utility deteriorates as maintenance is deferred, breakdowns remain unattended, and suppliers withhold goods and services in response to slow payment.

High levels of NRW, high energy consumption costs, and other operating inefficiencies contribute to these unsatisfactory results. Other major factors are the utilities poor collection performance and inadequate tariffs. The collection performances ranged from 21 percent in Quetta to 98 percent in Lahore, with an overall average of 64 percent. If Karachi, Gujranwala, and Rawalpindi had achieved reasonable collection ratios of about 97 percent, they would have achieved working ratios of less than one. In the case of Karachi, a 97 percent collection performance would have yielded a working ratio of about 0.6, which would allow it to make a substantial contribution to capital costs while maintaining an adequate financial performance. Lahore and Multan would have to increase their tariffs substantially in addition to a having a 97 percent collection performance to achieve an operating ratio of 1.0. To meet the cash shortfall resulting from these inadequate working ratios, the utilities have depended on government grants and, to a lesser extent, nonpayment of suppliers.

Table 2.10: Water Supply and Sanitation in Major Cities, 2010–11

	KWSB	L-WASA	F-WASA	G-WASA	R-WASA	M-WASA	Q-WASA
Population (million)	20	6.15	3.10	1.70	1.30	1.80	2.80
Staff ratio/1,000 connection	12	11	6	6	12	5	28
Total Revenue (Rs. million)	4,000	1,970	73	276	494	298	344
Total expenditure (Rs. million)	5,400	5,770	1,700	284	565	1,300	652
Working ratio	1.13	2.11	1.60	2.10	1.14	2.80	–
Electricity costs (Rs. million)	3,100	2,100	330	127	201	N/A	256
Electricity as % of O&M costs	57	36	19	45	36	N/A	39
Avg. monthly water consumption per connection	20.25/m^3	54.07/m^3	25.85/m^3	–	78.00/m^3	46.00/m^3	49.60/m^3
Average water bill/connection per month (Rs.)	499	287	291	100	135	60	129
Average unit production cost (Rs.)	7.690/m^3	6.730m^3	4.710/m^3	0.019/m^3	5.970m^3	4.140/m^3	–
Billing efficiency (%)	70	90	92	25	100	30	60
Collection efficiency (%)	43	98	51	40	75	88	21

Source: Pakistan Water Operators Partnership Directory of Urban Utilities, 2012.

Power costs are a significant component of most WASA's operating costs, ranging from 19 percent to 57 percent. High levels of leakage mean that water is being treated and pumped around the transmission and distribution systems, only to end up recharging groundwater. The energy cost savings resulting from reduced leakage can, therefore, be substantial, and this explains why reducing leakage is an important part of any strategy to improve the financial performance of a utility. Reduced leakage will also make more water available for sale to customers, further improving revenues.

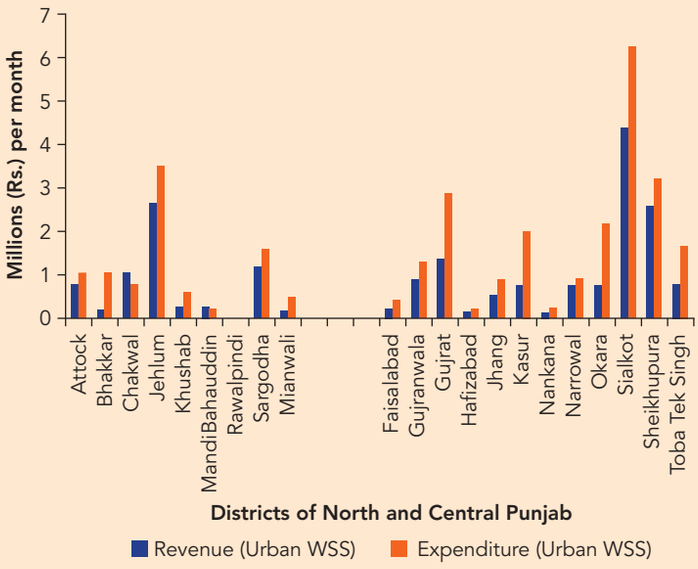
Charging for water in Pakistan is generally done by flat rate, as very few of the connections are metered. Lahore meters only about 7 percent of water sales and Faisalabad 2 percent. The other WASAs have no customer meters. Flat rate household water bills vary with the plot size. The nine urban utilities reported average monthly household water bills ranging from a low of Rs. 60 (US$0.64) in Multan to a high of Rs. 449 (US$4.78) for Karachi, for a simple average of Rs. 202 (US$2.15). The higher tariff in Karachi explains the comparatively better working ratio, even though the collection efficiency is low. On the other hand, Multan, with a relatively high collection efficiency of 89 percent, had a poor financial working ratio of 2.8 due in part to its low tariff. The average urban water flat-rate tariff is equivalent to between US$0.16/$m^3$ and US$0.30/$m^3$ in Karachi and US$0.25 per m^3 in Lahore. In October, 2011, the tariffs in Karachi were revised and increased by 82 percent—an unprecedented one-time increase. The misconception that the public will resist increase in tariffs has been proven wrong. Findings of recent surveys indicate that consumers are both willing to pay higher tariffs and are also aware of the *much higher* expenses they incur when accessing alternative water supply options.

The WASAs also have a very high staff level per 1,000 connections, ranging from 28 in Quetta to 5 in Multan with an overall average of about 12. International best practice is about two staff per 1,000 water accounts for utilities in developed countries. Tynan and Kingdom (2002) propose a best practice target of five employees per 1,000 connections in developing countries.

The financial situation of the urban schemes that are managed by TMAs is also largely not sustainable. The revenue and expenditure of urban water supply schemes in Punjab indicates that most schemes do not generate enough revenue to pay for cash O&M costs (figure 2.8). In addition, they are unable to make a contribution to depreciation charges or capital expenditure.

Only two of Punjab's districts, Chakwal and Mandi-Bahauddin, have a working ratio of of less than 1.0. In the other 18 districts the operating expenditures exceed revenue collected, with an average working ratio of 1.6.

Figure 2.8: Urban WSS Expenditure in North and Central Punjab



Source: Pakistan Council of Research in Water Resources, urban areas revenue and expenditure data, 2008–09.

This means that about 37 percent of operating expenses have to be financed from sources other than revenue. Poor collection performance and inadequate tariff are also main problems in these smaller urban areas. In the districts of the Punjab the collection ratios range from 40 percent to 80 percent. There is also a flat tariff per household connected ranging from Rs. 70 to Rs. 200 per month.

In Sindh, revenue collection ranges from 25 percent to 50 percent. In KP, as the result of a recent Government-backed operation, collection performance was increased from 11 percent in 2009-10 to 19 percent in 2010-11. In Balochistan, AJK, and GB, revenue collection performance is low and ranges from 10 percent to 30 percent. In FATA there is no tariffs and water is provided free of charge.

Water and Sanitation Tariffs

As very few water meters are installed in the water supply systems, the WASAs apply stepped tariff systems based on the area of the consumer's plots. The lowest step is usually for homes "up to 2500m^2." The steps increase by 1000m^2 to 2500m^2. The first step tariff ranges from Rs. 35 (US$0.38) per month in Multan to Rs. 377 (US$4.00) per month in Lahore. The price of 1000m^2 ranges from Rs. 250 (US$2.26) in Multan to Rs. 833 (US$8.86) per month in Rawalpindi. Quetta has a tariff system based on the size of the connection pipe,

with prices ranging from Rs. 125 per month for a one-half-inch connection to Rs. 250 for a one-inch connection. All the WASAs have a separate monthly sewerage charge, which is invariably less than the water charge. For example, Rawalpindi has a monthly sewerage charge of Rs. 49 for up to 2500m^2 to Rs. 441 for 1000m^2.

Pakistan might wish to learn and apply the best practices from other countries such as Chile, which is well known for its efficient and sustainable pricing policies (box 2.5).

Unmetered service with tariffs below cost, as seen across the country, means that the connected wealthy receive the highest subsidies. The underpricing of water creates regressive water subsidies that benefit wealthy households who are connected first and who use more water than poor households. In Karachi, for example, daily water consumption of highly subsidized water ranges from 340 liters per day per capita in high income areas to 60 liters per capita per day in slum areas. There is no standard tariff methodology in urban areas, and the flat-rate tariffs vary only with the size of the plot for domestic consumers; there is a different tariff for commercial consumers. The unconnected poor depend on private tanker trucks and end up paying many times more per cubic meter than do the rich, who receive water through house connections. In Karachi, for instance, the average prices charged by tankers are between US$0.76/m^3 and US$1.00/m^3 A program of meter installation in both WASAs and TMAs with priority for industrial, commercial, and large domestic consumers is an essential factor in the establishment of an equitable, financially viable tariff restructuring program.

Although the situation facing urban service providers in Pakistan is grim, it is not hopeless. International experience shows that service providers can be turned around successfully, and box 2.6 describes the transformation of PPWSA, the Phnom Penh water utility, along principles of equity, efficiency, and sustainability. There are also examples of potential improvement in Pakistan, itself, as illustrated in box 2.7.

The Phnom Penh transformation is interesting because the utility was established as a corporation, most of shares of which are owned by the government ministry and in which minority positions are owned by the utility employees and private investors. Such a corporate structure supports the development of the Phnom Penh stock exchange and creates incentives for the utility employees to stay and increase the efficiency of operations. A publicly owned share corporation utility also makes it easier to gradually involve private investors and operators in the utility, since the Government can elect to sell blocks of its shares to strategic private investors with operating know-how. This is how privatization of the Chile water supply and sanitation companies was

Box 2.5: Chile Represents Best Practices in Pricing Policies

A special Tariff Law from 1988 obliges all service providers to charge tariffs that reflect long-run marginal cost of an efficient operation. Tariffs should also enable service providers to cover their financial costs, a trade-off that signals the importance Chile assigns to having financially sound utilities. This criterion is generally satisfied as long as consumers pay the average incremental cost for their consumption, since future costs are invariably above the historical costs that constitute financial costs. This is true even though only the average incremental cost for efficient producers is allowed.

Consumers who cost the same to serve must pay the same tariffs, and cross-subsidies are eliminated. Subsidies are for low-income households, as defined by central government guidelines. Local governments are responsible for identifying these households. Subsidies are defined yearly and paid by the central government, via local governments, to the utility, which sends an invoice for the total subsidy to the municipality. The tariff structure is kept simple to make payments administratively simple and to increase transparency. The two-part tariff has a fixed monthly component and a constant unit rate for each cubic meter consumed.

Subsidies cover part of the bill, up to 20 m^3/month for a maximum subsidy of 85 percent of the full cost-based bill. The bill to the consumer indicates the full cost of the services provided, the amount of the subsidy the consumer is entitled to, and the difference to be paid by the consumer. About 18 percent of households receive at least some level of subsidy. The total cost of the targeted subsidies corresponds to about 5 percent of the turnover of the utilities and is financed entirely by the central government via the municipalities that are obliged to determine low-income households through socioeconomic surveys undertaken every three years. The surveys of low-income household's serve multiple purposes, since a series of subsidies are based on them.

Box 2.6: Cambodia – Transformation of PPWSA into a Benchmark Water Utility

Upon its creation in 1996, a mission-vision was crafted for Phnom Penh Water Supply Authority (PPWSA) aimed at providing affordable services to all residents of Phnom Penh. The organizational structure was streamlined; priority was accorded to the development of a young, dynamic, and fully trained staff; and inefficient legacy staff was relegated to dormant roles. Promotions were a collective decision and based on performance, managers were encouraged to be role models to their subordinates, and teamwork was fostered. The policies promoted the principles of interdependence and provided due care to the staff, which meant providing higher salaries and incentives and the setting up of a pension fund. These policies were applied across the organization without favor.

Managers and frontline staff were prioritized for training in 1994. In 1997, a training program was developed that was tailor fit to the requirements of actual daily work. In 2000, the process of developing a staff quality assessment was started, and by 2005 an annual, performance-based staff evaluation was fully implemented.

Improving operational efficiency focused on improving billing and collection, addressing nonrevenue water, and pursuing full-scale operations. Prior to 1993, collection efficiency was 50 percent, nonrevenue water was 72 percent, water supply service was between 8 and 10 hours a day, network coverage was 40percent of the city area, and connections covered only 20 percent of the city residents. The customer database was purged and updated, cutting in half the 26,000 recorded customers, of which 13,000 never received water and about 14,000 real customers who were not registered. By 1994, a new customer file was set up listing 26,881 customers.

Purging the system of illegal activities started within PPWSA including developing standard procedures for billing and collection. In parallel an incentive/penalty system was applied—rewarding staff for generating good results while penalizing those who do not perform. By 1996, a fully operational computerized billing system was in place.

In 1998, PPWSA launched the "Regain the Public Trust" program, which introduced convenient payment schemes: payments could be made through cashiers, through ATMs, by bank checks, and so forth. The program also included village-to-village information dissemination and the setting up of an information desk to deal solely with customer complaints. A task force was on standby to respond to customer requests on water quality checks and water meter control. A system for responding to customer calls was developed with four categories of response: one hour, one day, three days, and one week.

A nonrevenue water reduction program was launched. First, old pipes were replaced by 1999, with the administration using the latest state-of-the-art materials. A campaign for 100 percent metering was launched. While in 1993, only 3,400 out of 27,000 households were metered, by 2001 almost 75,000 connections were metered, which accounted for 100 percent of the connections. By 2010, 192,000 households were metered using more accurate water meters (WM Class C). Operating standards for water meter management were likewise put in place. Second, a 24/7 standby team was formed solely to address leaks. One team, composed of four unskilled staff, was formed in 1993 and trained by an expatriate expert in 1996. By 1997, the standby team was expanded to four teams with 48 skilled staff. By 2012, any reported leak was to be responded to within an hour. Third, to eliminate illegal connections, an inspection bureau was created, strictly disciplining staff caught doing illegal activities, granting bonuses for customer information found to be real and accurate, and strictly applying penalties to households found with illegal connections. Fourth, a district metering area (DMA) program was implemented in 2003 under Japanese assistance. By 2004, two zones were completed in the downtown area, and a contractual arrangement for a decentralized management set-up was piloted. By 2005, eight DMAs were created, covering 66 subzones and applying the decentralized management scheme. Also, a distribution control office was established with 62 staff organized into four teams.

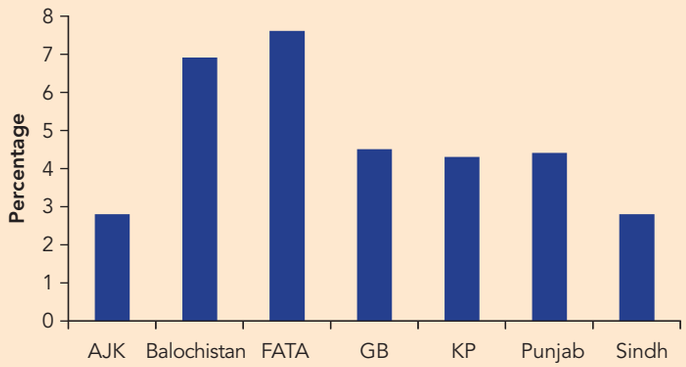
Continued on next page

Box 2.6: *Continued*

To achieve full-scale operation, the PPWSA embarked on expanding the service area, starting in 2000 with the extension of the distribution network to potentially high-growth areas in the service area. It also extended coverage to the poor. Production capacity was significantly increased to meet demand. The tariff was revised to cover costs, and its implementation was to be done in three installments, the first in 1997 and the second in 2001. A third installment was not implemented, as PPWSA realized savings from improved operational efficiency that were sufficient to cover remaining costs. The latest tariff adjustment was made only in 2010.

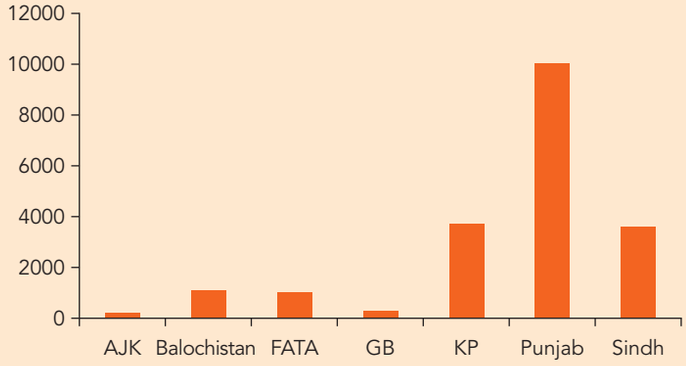
possible over a period of about 10 years. The sale of shares in well-managed utilities is certain to be at higher prices for the Government than distress sales of shares in poorly managed utilities.

Figure 2.9: Drinking Water and Sanitation Allocations as Proportion of Provincial ADPs, 2011–12



Source: UNICEF 2012.

Figure 2.10: Provincial Allocations for Drinking Water and Sanitation in ADPs, 2011–12 (Rs. million)



Source: UNICEF 2012.

Operating Subsidies and Capital Investment

There is no central organization at either the federal or province/region level that is monitoring the financial aspects of these organizations. Given the high working ratios of a substantial number of the WSS organizations, it is likely that a significant amount of local funds are secured to finance these operations. Substantial government and donor funding has been spent on rehabilitation of WSS systems as a result of the 2005 earthquake and major flooding. In addition, community-mobilized funds, such as those expended on providing WSS services for *katchiabadis* areas of Karachi, may not be identified in ad hoc surveys. Under these circumstances, the level of subsidies and, to a lesser extent, capital investment in the following analysis may be understated.

Most water supply and sanitation agencies have financial working ratios well over unity (1.0), which makes them dependent on subsidies to close the operational deficit and to finance capital investment. The principal source of funding is federal funding and the provincial Annual Development Programs (ADP), with additional funding from the Public Sector Development Program and donor financing. Provincial and regional governments allocate funds through ADP each fiscal year. The ADP finances 34 sectors including roads, buildings, irrigation, WSS, health, education, agriculture, social welfare, and others. Capital expenditure for water supply and sanitation are not separate, but funding for both the PHED and the LG&RDD is included under the Physical Planning and Housing Sector allocation. The percentage of the province/regional allocation of ADP funds for 2011–12 range from 7.6 percent in FATA to about 2.8 percent in AJK and Sindh (figure 2.9). The overall average for the nine provinces/regions is about 5.5 percent. This is a low proportion given the backlog in urgent rehabilitation and needed expansion of the water supply and sanitation systems. Given the finite and limited amount of resources the Government has to spend on social sec-

Box 2.7: Northern Sindh Urban Services Company (NSUSC)

Under the Sindh Cities Improvement Program (SCIP) Multitranche Financing Facility, the Asian Development Bank (ADB) will provide US$300 million equivalent over a 10-year period (2010–2018) to support the Government of Sindh's (GoS's) ongoing program in the water and sewerage (W&S) sector in over 20 secondary cities. The Northern Cluster will include districts like Sukkur, New Sukkur, Rohri, Khairpur, Shikarpur, Larkana, Jacobabad, and Ghotki; the Central Cluster districts will include Mirpurkhas, Sanghar, Tando Adam, Shahdadpur, Umerkot, and TandoAllahyar; and towns in the Southern Cluster will include districts (apart from Karachi and Hyderabad) which will be identified later. SCIP's sectoral scope includes water supply, wastewater treatment, and solid waste management services. The following governance and institutional reforms are the backbone of the project: (i) establishment of local government-owned, professionally managed regional utility companies; (ii) priority investment in water supply, wastewater, and solid waste management infrastructure; and (iii) provincial level urban sector reforms and capacity development, including an urban policy and strategic planning unit/directorate.

The project has led to the establishment of Pakistan's first utility company, in small and medium towns, in the W&S sector registered with the Securities and Exchange Commission: the Northern Sindh Urban Services Company (NSUSC). Two more utilities are going to be established in Central and Southern Sindh. USAID is supporting the Central Sindh Urban Services Company and is a partner with respect to one city, Jacobabad, in the Northern Sindh cluster.

The original design of the three utilities was regional in nature: their mandate extended to some but not all towns in a given cluster, and the towns included were spread over several districts. The new Sindh Local Government Act (SLGA) 2012 was approved recently, with local government elections expected to be held by mid 2013. SLGA 2012 implementation will result in some significant changes in the local government institutional arrangements and operations. The GoS and ADB have agreed to undertake an institutional review to look at the alignment of the companies vis-à-vis the new local government structure. In addition, the review will be able to incorporate lessons learned from the NSUSC's experience in the design of subsequent utilities (for example, greater consultation and engagement with consumers, communities, municipal staff, and local government politicians).

Tranche one of the ADB loan, of US$38 million equivalent, was approved in December 2008. It supports a US$50 million GoS initiative to develop operations and infrastructure for NSUSC. NSUSC implements the investments in its coverage area comprising six towns: Sukkur, New Sukkur, Rohri, Khairpur, Shikarpur, and Larkana. The Planning and Development Department (P&DD) is SCIP's executing agency with overall responsibility for the MFF. P&DD, working through the Program Support Unit, implements investments in urban planning and sector reforms, including the rollout of a regional utility corporation model to central Sindh. The GoS is finalizing approval for a Performance for Results 2 for the second tranche of the SCIP.

tors, it will be important for the Government to prioritize with other critical sectors such as education and health.

The actual amounts of funds allocated ranged from Rs. 10 billion in Punjab to about Rs. 200 million in AJK (figure 2.10). This is equivalent to a per capita amount of Rs. 106 (US$1.13) and Rs. 38 (US$0.40), respectively. The total allocation is about Rs. 20 billion, or on a per capita basis, Rs. 112 (US$1.19).

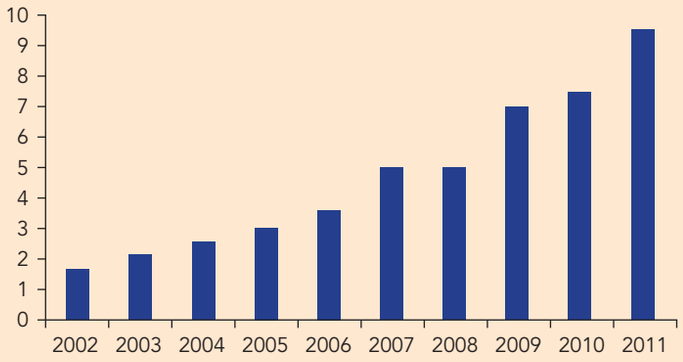
During the 10-year period ending in 2011, the WSS sector has received substantial increases in both nominal and real terms to subsidize its operations and to undertake new capital investment. The funds expended on subsiding operations increased by Rs. 1.7 billion in 2002 to Rs. 9.5 billion in 2011 (figure 2.11). This represents an increase of 460 percent in nominal terms and 250 percent in real terms adjusted by the Consumer Price index over the 10-year period. The 2011 figure of Rs. 9.5 billion is equivalent to 0.05 percent of GDP of that year.

The funds for capital investment also increased in both nominal and real terms during this decade. The capital investment increased from Rs. 2.9 billion to Rs. 19.0 billion in 2011 (figure 2.12). This was an increase of 555 percent in nominal terms and about 300 percent in real terms. The 2011 investment was equivalent to about

0.11 percent of GDP in that year. Analysis of the capital investment between urban and rural or between water supply and sanitation is not available. A best estimated of the division of investment between water and sanitation during the period is about 3:1.

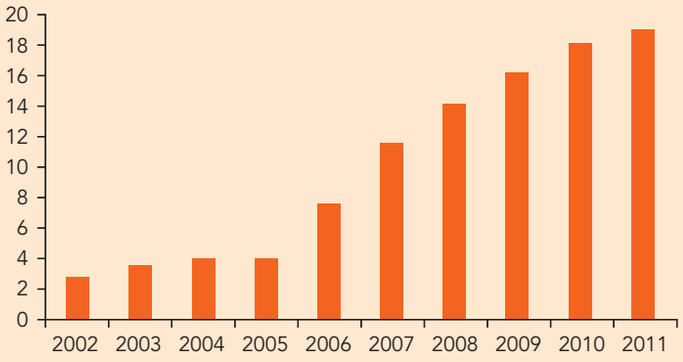
The total funds for operational subsidies and capital investment increased by 520 percent, from Rs. 4.6 billion to Rs. 28.5 billion during the decade. This represents an increase of 520 percent in nominal terms or 280 percent in real terms. The Rs. 28.5 billion represents 0.16 percent of GDP for 2011.

Figure 2.11: Funds for Operational Subsidies, 2002–11 (Rs. billion)



Source: UNICEF 2012.

Figure 2.12: Funds for Capital Investment, 2002–11 (Rs. billion)



Source: UNICEF 2012.

Future Investment Needs

UNICEF's Sanitation and Water for All (SWA) 2012 report estimated the investment needed for the years 2013 to 2015 in order to achieve the Pakistan's MDG of 100 percent access to water supply and 67 percent access to improved sanitation by 2015. The estimate was adjusted to provide for the provinces and regions of FATA, AJK, and Gilgit Baltistan, which were not included in the original assessment due to lack of data at the time. The calculations were based on a per capita investment cost of Rs. 4,000 (US$42) for water supply and Rs. 4,000 (US$42) for sanitation. The urban water investment was estimated at Rs. 15.46 billion and urban sanitation at Rs. 1.35 billion; giving a total urban requirement of Rs. 16.81 billion (table 2.11).

This is equivalent to about 0.03 percent of annual GDP over the three year period. While this is a significant sum it should be manageable. However, this only represents 10 percent of the total WSS sector requirement. The estimated investment requirement for the rural WSS during the period is substantial at Rs 146.3 billion.

A financing plan for both urban and rural WSS for the period 2013–15 is shown in table 2.12. On the assumption that the Government maintains the current level of capital funds at Rs. 19 billion, there would be a three-year financial gap of about Rs. 106 billion—about Rs. 35 billion, or 0.19 percent of GDP, per annum. This would represent an increase of about 120 percent over the present funding level of Rs. 28.5 billion provided to the sector for both subsidies and capital investment. The projected investment requirement would represent funding of about 0.35 percent of GDP. This high level of funding emphasizes the urgency of ensuring that the present operations should be self-financed so that funds presently used for operations could be utilized to meet the urgent investment requirements.

While the level of investment requirement is very substantial, it is useful to compare it with that of other countries. Pakistan has invested some 0.16 percent of GDP in the sector in recent years. The Latin America region invested 0.4 percent of their regional GDP annually during the 1970s, a decade of rapid progress in the water supply and sanitation sector in that region. In the next decade, the 1980s, the regional investment rate for water supply and sanitation dropped to 0.2 percent of regional GDP. Globally, average expenditure in the WSS sector is 0.3 to 0.5 percent of GDP. (See figure 2.14 for expenditures by various countries.) It has been estimated that between 2000 and 2008 Mexico, Lebanon, and Jordan, for example, spent 0.5–0.6 percent of GDP on the WSS sector (including irrigation and water resources management). This compares with the 1 percent of GDP

Table 2.11: Projected Capital Investment to Meet the WSS MDG 2015 (Rs. billion)

	2013	2014	2015	Total	Percentage
Urban water	5.05	5.15	5.26	15.46	9
Urban sanitation	0.44	0.45	0.46	1.35	1
Total urban WSS	**5.49**	**5.60**	**5.72**	**16.81**	**10**
Rural water	17.66	18.03	18.40	54.09	33
Rural sanitation	30.11	30.72	31.38	92.21	57
Total rural WSS	**47.77**	**48.75**	**49.78**	**146.30**	**90**
Total WSS	**53.26**	**54.35**	**55.50**	**163.11**	**100**

Source: UNICEF 2012.

Table 2.12: Projected Financing Plan to Meet the MDG 2015 (Rs. billion)

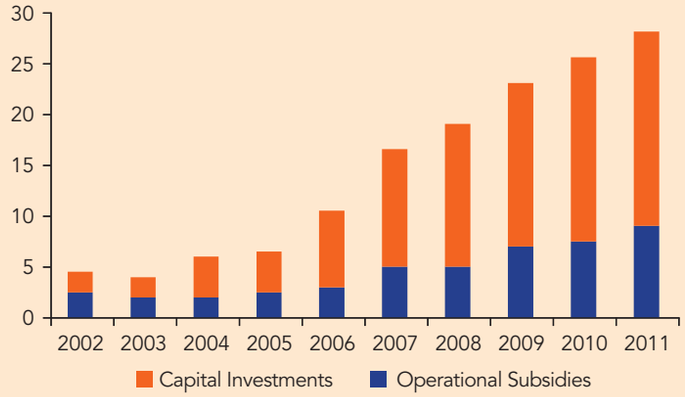
	2013	2014	2015	Total	Percentage
Urban WSS investment	5.49	5.60	5.72	16.81	10
Rural WSS investment	47.77	48.75	49.78	146.3	90
Total WSS investment	**53.26**	**54.35**	**55.50**	**163.11**	**100**
Current investment level	19.00	19.00	19.00	57.00	35
Additional resources required	34.26	35.35	36.50	106.11	65
Additional resources as percentage of GDP (2010)	0.19	0.20	0.21		

Source: UNICEF 2012.

suggested by the Human Development Report, 2006, and the estimated 2.6 percent of GDP required annually by SSA countries to meet water MDGs (Briceño-Garmendia, Smits, and Foster 2010).

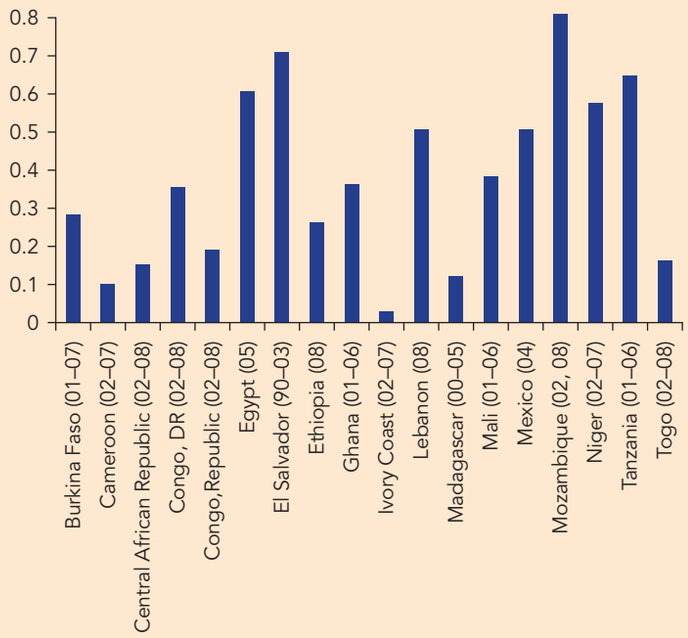
An alternative is to compare the investment versus projected benefits. The Water and Sanitation Program report on the Economics of Sanitation (2012) indicates that the country loses 3.8 percent of GDP as a result of inadequate sanitation. The current level of investment of 0.16 percent of GDP seems on the low side and the projected level of 0.35 percent would appear to be justified.

Figure 2.13: Funds for Operational Subsidies and Capital Investment, 2002–11 (Rs. billion)



Source: UNICEF 2012.

Figure 2.14: WSS Expenditures (% of GDP)



Source: World Bank, Public Expenditure Reviews (PERs). Figures are from available years within PER data.

Chapter 3: Conclusions and Recommendations

Conclusions of the Sector Analysis

This assessment of the urban water supply and sanitation situation in Pakistan shows that the sector suffers from poor technical, financial, and environmental performance. This leads to high coping costs for urban residents through the need to secure alternative supplies of water or in the costs of dealing with unreliable and unsafe service.

It is well accepted that reform in the sector is necessary and will require bold action on the part of authorities, with a clear departure from current attitudes and practices and a clear commitment to reform as well as a significant change in investment strategies. Implementing reform will likely meet opposing forces that are the legacy of many decades of poor service. Such opposition must be identified and possibly given a role in the reform process. Sector experts know full well what is needed to improve sector performance but implementation remains a challenge in the face of insufficient financial resources and poor governance. Implementation of reforms requires long-term, strong, and sustained political support and a priority focus on operation and maintenance and new investments. Regulatory regimes will need to be established.

There is also a need to scale up investment in the sector, which currently stands at around 0.16 percent of GDP versus international comparators in the region of 0.2 percent to 0.4 percent. The major benefits arising from this increased WSS expenditure would be achieved in the public health field, particularly in the area of child mortality, which is high at 86 per 1,000 live births. The benefits of higher convenience, quality, and reliability of service will also be large and will over time reduce or make unnecessary the huge investments in alternative services that consumers incur. Better service will also free time that is now used for drawing water from often unsafe sources.

The conclusions to be drawn from this assessment can be collected under the following broad headings:

- Partial Decentralization Process
- Sector Governance
- Service Delivery and Efficiency
- Financial Performance
- Investment
- Sector Financing
- Human Capacity and Professionalization
- Water Resources

Partial Decentralization Process

The LGO 2001 appears to have been a genuine attempt to transfer responsibility for WSS service delivery to the TMA level of local government—following an international trend toward decentralization to lower levels of government that would be more responsive and accountable to citizens. The LGO was, however, only partially implemented, or not implemented, or implemented and then reversed, with different provinces implementing it in different ways. This resulted in a lack of clarity about which entity was responsible for what. In addition, because capacity resided primarily in the province-level institutions, there was an inevitable flow of responsibility back to those institutions regardless of what was set out in the LGO: the need to provide water services trumped an uncertain decentralization process.

Assuming that decentralization of service delivery to the local governments is the correct direction for the country, then the LGO process highlighted a number of issues with regard to the urban WSS sector—in particular, the pace at which decentralization takes place and the way in which it can be implemented in the sector, given the weak financial, technical, and managerial capacity in many of the TMAs, especially the smaller ones. A number of decentralization approaches might then be considered:

- **Big Bang:** Transfer responsibility for urban WSS to local governments, but at the same time provides financing, capacity, and capacity building to the local governments to take on that new responsibility.

- **Enhanced Status Quo:** Keep provincial entities as the service provider, but under performance agreements with the TMAs, thus introducing greater accountability of the provincial entity and putting the local government in the driver's seat.
- **Hybrid:** Transfer responsibilities in a phased manner to those local governments that are willing and have sufficient capacity to take on urban WSS service provision, with the remainder being served by existing provincial entities under a performance agreement.

The LGO set out to follow the Big Bang approach, but, without adequate support mechanisms in place (whether financial or capacity wise), the sector ended up going back to its earlier, unreformed state. This has resulted in more than a decade of uncertainty in the sector. Any future decentralization approach will have to be carefully considered, with more nuances and greater consensus on exactly how to proceed.

Sector Governance

Whether as a result of the above imperfect decentralization process, or an inheritance from the past, the current sector governance is weak. There is a lack of clarity as to which entity is responsible for what. Autonomy, accountability, customer orientation, or market orientation of service providers have been demonstrated as the key characteristics of well-run water utilities internationally. Unfortunately, there is a clear lack of these qualities in WSS services in Pakistan, whether at the local government or provincial level. Addressing the governance issue is at the heart of improving the viability and performance of the urban water supply and sanitation sector in Pakistan.

This weak governance is revealed by the high level of nonfunctioning service schemes across the country, the poor financial performance of service providers, high levels of nonrevenue water (NRW), and poor service, with no city having a continuous water supply. These factors all result in higher costs to consumers, whether in terms of accessing alternative water supplies or dealing with the consequences of inadequate sanitation.

While no one model of improved governance exists, there is a need to refocus attention on the local governments who are responsible for service provision. They need to be put in the driver's seat, with state entities evolving to provide a facilitative and supportive environment. In this respect, some of the provisions of the LGO, and their partial implementation, with regards to decentralization to local bodies are, or were, a move in the right direction.

The precise form of local government service provision is situation specific, but the characteristics identified in the paragraphs above are key to improving the likelihood of a successful outcome. In this respect it is important to consider market segmentation. Larger local governments are able to establish stand-alone service providers, which as a minimum should be ring fenced in terms of staffing, assets, and finances. The precise corporate nature of the entity can vary but international experience points toward the creation of corporatized entities under company law as offering the most opportunities for improved governance and higher levels of performance. Smaller local governments also face a choice as to the most appropriate governance model to follow. Ring fencing of assets, staffing, and accounts is an important first step, but beyond that there are options of aggregation to build economies of scale. Alternatively, state entities could be created out of existing organizations and enter into contracts with the smaller local governments to provide full water supply and sanitation services. Such entities are unlikely to provide sufficient local accountability if they are not structured on a geographic basis, for example, by creating sub province-level PHEDs.

To support this reform agenda, it will be important to strengthen the policy direction and oversight of the sector to guide it toward a better future and to monitor progress to that goal. In each province or region, the Government should therefore enhance the oversight and policy-making arrangements for the sector. In the short term this might mean the creation of a province-level change management unit for the sector, which would focus on compiling and reporting performance statistics for each provider and assessing requests for capital investment to confirm its efficiency and sustainability. In the longer term this might evolve into some form of more independent regulatory body that would also look at tariffs, cost recovery, and efficiency.

Improving accountability of service providers through benchmarking will also help improve governance and provide the Government and civil society with ways to monitor progress and reward good performance. It is encouraging that Punjab's WASAs were first to send data to the International Benchmarking Network for Water and Sanitation Utilities (IBNET), followed by the KWSB. In Punjab the data is also shared by the utilities with provincial departments and policy makers. The utilities have been trained to analyze the data and identify gaps. So far, only KWSB has established a dedicated cell for working on supply- and demand-side data and developing a real picture of services on the ground.

Service Delivery and Efficiency

The data compiled for this study show a sector that has essentially maintained the status quo since the early 1990s. There has been minimal net improvement in service delivery. Urban dwellers expect higher standards of service over time, yet the proportion of the urban population with access to a house connection (which could be taken as an expectation of a modern urban household) has improved only 1 percent per decade and currently stands at 58 percent. At the same time, water supplies are not continuous, which results in high coping costs for households (whether in sourcing water supplies or dealing with effects of polluted water supplies) and adversely impacts the structural integrity of the networks, as they are subject to hydraulic surges on a daily basis. The latter weakens the pipe systems and leads to higher levels of leakage.

In light of increasingly obvious environmental pollution and the economic impact of poor sanitation causing losses of US$5.7 billion (Rs. 343.7 billion) each year, equivalent to 3.8 percent of the country's GDP, it is clear that some action is needed. In parts of Punjab (and likely elsewhere in the country), poor collection and treatment of human waste is adversely impacting access to readily available, low cost, shallow groundwater.

High levels of NRW indicate both a deterioration of the networks and poor efforts at active leakage control (ALC). ALC requires modern network design principles to be applied, improved levels of metering at bulk and consumer levels (both missing in Pakistan), and the adoption of ALC management techniques, many of which are best carried out under continuous supply situations. At the present time there are few, if any, standard internationally accepted water balances available at the service provider level that can provide management with insights into the different components of water usage.

Energy costs make up some 36 percent to 57 percent of WASAs total expenditures and should be a focus of attention. Tackling energy efficiency, however, means tackling NRW and undertaking energy audits to understand what the opportunities are to reduce energy consumption and hence operating costs.

In many of the *katchiabadis* it is well recognized that services are poor and the result is a health hazard. The urban poor live in crowded areas with very poor or nonexisting water supply and sanitation facilities and in a hazardous health environment. What the World Bank's report *Poverty in Pakistan in the 1990s: an Interim Assessment* noted in 2002 is still true today: "Notably, since the Pakistan Integrated Household Survey data does not cover the urban informal sector and slum settlements where most of urban poverty exists, obtaining such data should be a priority for the future." In other words, there is insufficient data and understanding about water and sanitation service delivery in the slums in Pakistan.

Financial Performance

The study was unable to find an urban service provider that recovered its current O&M costs from user fees, even though these costs are already suboptimal as a result of deferral of standard maintenance activities. Recovering O&M costs from user fees provides the service provider with greater autonomy and increasing customer accountability. There are some cases, such as the Lahore WASA, with collection rates as high as 98 percent, but this is rare. As noted in the main text, increasing the billing and collection of what is owed to service providers would have a material impact on the financial performance of the provider.

The lack of metering doesn't help in improving cost recovery, and addressing the currently low levels of metering in a phased manner, starting with commercial and industrial customers and high end domestic consumers, would improve revenues to the provider. At the same time there are likely to be a proportion of customers who are not reconciled in the customer databases of the utility. A thorough update of the customer database would also likely result in improved revenues to the provider.

One other result of the lack of metering is the socially inequitable distribution of subsidies that flow into the sector. Per capita water consumption rises with household income levels since wealthier households can afford more water-consuming appliances. When households are unmetered, wealthier consumers will then tend to consume many times as much water per capita, since the marginal tariff will be zero and will not constitute any incentive to economize on water. When water is priced below cost as is the case in Pakistan, those households consuming the most water—the wealthy—will therefore receive the highest absolute subsidies. In contrast, the poorest households are the last to be connected and are shut out from receiving subsidies. Instead, the unconnected will often be forced to buy water from private vendors, at tariffs that may be up to 10 times as high as the utility tariffs.

The goal of achieving O&M cost recovery through user fees may be achievable without raising tariffs but by improving technical and commercial efficiency.

Investment

The sector relies on grant financing from provincial and national governments and will continue to do so for many years, although the goal is to gradually increase the proportion of capital costs financed out of user fees.

Investment that is being made is not being made effectively. The high number of nonfunctioning schemes is one indicator of this. Another is the fact that TMAs are not willing to take on assets created by PHEDs about which they have not been adequately consulted, for which O&M cost recovery has not been identified, and for which the maintenance capacity of the TMA is inadequate. In the future, investments need to be prioritized and assessed in terms of their capital efficiency (particularly in regards to size, timing of investment, and assessment of options), sources of O&M costs identified, and capacity for their subsequent operation determined.

Sector Financing

Current targets are to provide *equitable, efficient, and sustainable water service* to 93 percent of the population, and *improved sanitation* to 90 percent by the target year 2015 and to ensure that, by 2025, 100 percent of the population will have access to safe water and improved sanitation. Only 0.11 percent of gross domestic product (GDP) had been spent on water supply sanitation each year between 2002 and 2005. Fortunately this situation has been improving and in 2011 the total capital investment and operating subsidies in WSS had reached 0.16 percent of GDP.

Investment needs are difficult to calculate since a large portion should be allocated to the rehabilitation of inoperative existing systems. These rehabilitation needs are unknown as there is no updated inventory of the reasons for the malfunctioning of the inoperative systems. It is likely, however, that investment levels as a proportion of GDP would have to rise closer to 0.5 percent to improve access levels. Latin America invested 0.4 percent of its GDP in the 1970s and managed to raise service coverage and quality substantially.

Whether financing gaps in O&M, cost recovery or the creation of new assets, the role of the Government is crucial. However the Government does not appear to demand much in return for this support: there appear to be few demands for increased service performance or efficiency in return for this funding. The poor governance in the sector serves only to perpetuate this situation. If service providers have limited autonomy and accountability, then their focus is simply on securing adequate resources to keep things going, rather than investing as part of a long-term vision for the sector.

Revised institutional governance arrangements, as outlined above, need to be complemented by a revised approach to sector financing. Improved institutional governance without predictable and incentive-based financing will not provide the results that urban dwellers should expect. In this regard it is important that provincial, regional, and national government, the financiers of the sector, link their financial support to delivery of outcomes in terms of financial performance and service to customers.

Human Capacity and Professionalization

Lack of capacity of TMAs to manage new assets has been highlighted in this report and is confirmed by the high numbers of nonfunctioning schemes, high levels of NRW, and poor cost recovery. Historically, the emphasis has been on creation of assets and not on delivery of service. As a result, there is a need to rebalance the excellent engineering skills in the country toward excellence in the management and operation of modern water utilities. This will require a new direction that builds operational management capacity over engineering capacity (as in the design and construction of new assets) and a focus on asset management over asset creation (as in making the maximum use of existing assets before building new ones).

This will require investment in training facilities and possibly in the creation of some form of certification or accreditation for staff working in the sector. There will be a role for professional associations in the sector to play an increasingly prominent role in making this change.

Water Resources

The low levels of collection and treatment of sewage have been highlighted in this report. These are leading to increasingly polluted rivers and shallow groundwater. The latter issue has an immediate impact on households that rely on such water for an inexpensive source of supply. Groundwater is now being overexploited in many areas, and its quality is deteriorating.

UNICEF's Multiple Indicators Cluster Survey (MICS) dataset shows a high dependence on groundwater and surface water sources, particularly for the poor. In AJK the *protected spring* is the second most prevalent source of water,[5] at 13.6 percent. In FATA the second most prevalent source is the *protected well* at 8.3 percent; in urban

[5] Where the second most prevalent sources is noted, the most prevalent source in the data set is piped water. Since this does not identify source but only points to service levels, the text has highlighted the data related to the source of water.

Punjab the *motorized pump* at 43.2 percent and in rural Punjab the *in-house hand pump* at 42.3 percent are the most prevalent sources of water; in Sindh the second most prevalent source is the *in-house hand pump,* at 9 percent for urban and 53 percent for rural areas; in KP the *motorized pump* at 25.7 percent is the second most prevalent source of water; and in *Balochistan* the second most prevalent source in urban areas is the public tap/standpost, while in rural areas 11 percent draw from *protected wells*.

The Indus is the country's only major river system, and, should current trends continue, decreasing snowfall in the Himalaya and Karakorum mountains may progressively limit this supply of fresh surface water. The conclusion is that action is needed to improve the quantity and quality of water resources in the country.

Recommendations

The two decades that followed the base year for MDG service coverage have been of relative stagnation in Pakistan. In contrast, the benchmark countries that are mostly in the highly urbanized Latin America region have not only adopted but also implemented deep reforms that have boosted coverage and quality of service. There is no reason why Pakistan could not emulate and adapt such reforms to its own specific situation. The sector has a wealth of highly trained staff, but their efforts are partly restrained because of institutional governance and reluctance to allow policies that would make the sector institutions financially, and therefore administratively, autonomous.

The greatest challenge will arguably be to implement new policies, since this requires strong and sustained political support to overcome the legacy of perverse incentives that allow some to benefit from poor service. The steady deterioration of public service has directly benefited private vendors who will not readily give up their sources of income. By the same token, there are also those within the public sector that can benefit from being the arbiters of how scarce water shall be distributed. Similarly, keeping tariff setting within the purview of politicians confers large political power.

There are many challenges to the successful development of the urban water supply and sanitation sector, but the weak absorptive capacity of the sector limits the number of reforms that can realistically be implemented. As a result, political will for reform is best reserved for the three key challenges of the urban water supply and sanitation sector:

- Reaching sustainable service with the existing production and distribution capacity.
- Providing equitable service to the entire urban population.
- Improving accountability and incentives among urban water supply and sanitation utilities and TMAs.

With this realistic background in the political economy of the urban water supply and sanitation sector in Pakistan, the following recommendations should be considered.

Recommendation One: Improve Institutional Autonomy and Accountability

International experience shows that better service and utility performance is contingent on greater autonomy, accountability, and service orientation of urban water and sanitation utilities. The challenges that must be addressed are not technical; they hinge on better governance and an understanding of the political economy of each province/region. Governments should support different management models that might be suitable for the province or region, such as the following:

- Creation of corporate water utilities under company law in cities where WASAs already exist and other rapidly urbanizing cities: This would require the establishment of ring-fenced accounts, staffing, and assets; the creation of a representative board of directors with required skills to provide oversight of the management; selection of a management team based on capacity and not seniority; and the flexibility for that management team to incentivize staff to deliver improved service. Such a company would be fully owned by the city and would enter into a performance agreement with the city, with achievement of performance targets being reported to the public.
- Ring fencing of the accounts, assets, and staff of service providers in the medium-sized local governments (TMAs): This would create a stronger financial and institutional focus for service delivery and greater transparency in the management and delivery of water services.
- Creation of a regional or district water utility serving multiple TMAs, owned and accountable to the participating TMAs in order to address the limited capacity. Such a regional utility would be co-owned by the districts and enter into performance agreements with each one of them.
- Improvement in the transparency and accountability of the relationship between Public Health Engineering Departments (PHEDs) and TMAs/WASAs on the basis of bi-lateral (TMA and province agency) and multilateral agreements: These agreements would clarify the obligations of all parties in terms of project

development support, operational responsibilities, or financing of investments and debt service.

To improve local accountability, governments should consider implementing a public reporting system for service providers. This system would publish a set of key performance indicators for each provider in terms of service delivery to customers and the financial strength of the entity. This will also have the effect of introducing some comparative competition into the sector.

Recommendation Two: Meter All Production and Consumption and Charge on the Basis of Metered Consumption

The key for efficient and sustainable services will be to recover the costs of operations and maintenance (O&M) from user fees. The international best practice is to bill and collect on the basis of metered consumption, because this makes consumers accountable for how much they consume and links payments to the volume of water supplied. Provincial and regional governments should therefore require all service providers to create reliable and comprehensive customer databases, meter all production and consumption, and bill and collect on the basis of water supplied and metered. These measures will free wasted water for meeting the demand of those currently unserved and will create strong incentives for service providers to convert leakage and wastage to paid consumption.

Recommendation Three: Encourage Cost Recovery from User Fees

Inadequate cost recovery is one of the critical reasons for the poor financial health of service providers. Governments should move toward recovery of O&M costs from user fees in order to create a secure source of funding to pay for operational costs and maintenance to improve operational sustainability. O&M cost recovery from user fees is international best practice and is affordable for consumers, considering the alternative of buying expensive water from private water vendors. By requiring recovery of O&M costs from user charges service, providers will also be able to pay power companies for their consumption of energy, which is currently often unpaid, creating a fiscal problem.

In parallel, governments should require all service providers to increase their commercial efficiency by creating reliable and comprehensive customer databases, achieving higher levels of billing, and improving collection efficiency. Governments should also facilitate cost recovery and affordability by requiring service providers to increase energy efficiency and reduce nonrevenue water.

Recommendation Four: Increase the Level of Public Funding of Water Supply and Sanitation, but Make It Contingent on Delivering Results

Water supply and sewerage sector investments in Pakistan are in the order of 0.1 percent of Gross National Product (GNP) or one-fifth of what benchmark countries are investing. Such low investment levels are inadequate to improve service coverage and quality, particularly in sanitation, and to rehabilitate and reverse the steady deterioration of the capital stock, which has resulted from there having been practically no preventive maintenance for decades. Governments at all levels must seek to maximize the impact of every marginal penny invested in the sector. This objective can best be achieved through creating a national or provincial sector program that clearly articulate the specific goals of performance improvements and outcomes to be achieved and laying out the conditions for access to investment funding.

Such programs should focus on broadening access to improved and sustainable water supplies (which varies widely across the country, and even within provinces and regions), providing access to improved sanitation (which currently falls significantly below the MDG targets), and supporting cost-effective rehabilitation and efficiency improvements to existing systems. A key part of these programs would be (i) the introduction of appraisal techniques that take into account and ascertain the long-term financial and institutional sustainability of proposed investments and (ii) training to complement already strong engineering skills with new skills such as strategic planning, financial management, energy efficiency, private sector participation, and working with and mobilizing communities.

As part of this process, governments should introduce elements of performance-based financing that would address the issues raised in the conclusions from this study. This might be a phased program that comprises the following steps. Participants in the program would move from one step to the next only on satisfactory completion of the earlier step.

Step 1—Getting basics in place: through financing of water and energy audits, creation of customer and asset databases, establishing improved billing and collection systems, ring fencing of accounts, preparation of five-year business plans, and support to high impact investments.

Step 2—Improving quality of service: through improved leakage management, increased collection and treatment of wastewater, and expansion of networks to low-income areas.

Step 3—Consolidation: Increasing coverage and quality of service, with all O&M costs and some capital costs recovered from user fees.

The benefits of bundling investment support into a defined national program are improved transparency of sector financing, the ability to assess overall sector investment efficiency, and the opportunity to demonstrate a concrete impact on the quality of service delivery. More ad hoc financing approaches that lack clear objectives, criteria, or rigorous evaluation tend to diffuse the effectiveness and impact of investments in the sector.

Recommendation Five: Undertake Pilot Public-Private Partnerships (PPPs) in Urban Areas

There is wide-spread interest from central and regional governments to pilot public private partnerships in the sector. Given the current wide gap between operating costs and revenue it is unrealistic to expect private sector participation to be remuneration neither on the basis of cash operating surpluses as would be desirable in the long run nor for the private sector to mobilize significant capital finance. Opportunities still exist to engage in PPPs, however, and these should be considered within a policy framework that is seeking to improve technical and financial performance of the sector.

The private sector is unlikely to take any significant financial risks but they can bring their experience and knowledge through management contracts and outsourcing. In the latter case this might include projects to reduce NRW or to improve energy efficiency under performance based contracts. The use of Design Build Operate (DBO) contracts for particular water or wastewater treatment plants will bring private sector expertise to leverage public finance. At the system level it is possible to secure private operators to manage whole systems subject to availability of secure financing for their fees and performance bonuses. Such funding might come through the inclusion of PPP fees and investment funds within defined components of donor funded projects or through the provision of formal national or provincial guarantees to the operator.

Recommendation Six: Scale Up Wastewater Treatment for Lahore and Karachi and Other Urban Areas

To the extent that drinking water improves and becomes a less of a public health priority, wastewater will succeed it as the dominant health and environmental problem. This is a problem that will only become more acute as urban wastewater volumes increase substantially in the next decades due to high urbanization rates and the progressive expansion of wastewater collection networks. Current attempts at wastewater treatment are not effective, and treatment is for the time being not perceived as a priority in Pakistan.

In Lahore and other urban areas where there is abundant surface water and shallow groundwater for households to abstract for domestic use, the lack of wastewater collection and treatment adversely affects the quality of drinking supplies. As a result, wastewater treatment becomes important as a means to protect current and future use of that low-cost water source. It is understood that a wastewater treatment program is being initiated in Lahore to begin to address this issue.

Wastewater is also a dominant health and environmental problem in Karachi, due to the increase in wastewater volumes. There are three wastewater treatment plants that face operational difficulties and rising energy costs, and there are significant amounts of solid waste entering the plants. The Federal Government is providing a portion of financing to support improving the wastewater problems of Karachi.

A long-term strategy for wastewater management is needed across all urban centers. Such a strategy should focus on the use of appropriate and affordable technologies, and seek to give wastewater treatment economic value which will lead to higher levels of reuse – an important issue in many resources constrained areas. The role for the private sector will be particularly important as they will be able to leverage public sector financing/skills with their knowledge of capital and operational efficiencies.

Recommendation Seven: Improve the Knowledge Gap on Service Delivery of Urban Slums

At present some 40 percent of the urban population lives in urban slum areas. In spite of this it appears that there is limited baseline information available about the quantity and quality of services provided in the slums, nor about the institutional, social and administrative constraints that affect how best such services can be provided. Given the scale of the challenge, and the negative consequences that flow from poor access, it is recommended to undertake a focused assessment to better understand the current level of services, how services need to be improved and what approaches might best work to that effect. Such an assessment would include primary research as well as drawing on secondary data and international experiences to shape an approach that will meet the specific needs of the country.

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