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Disclaimer

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Acronyms and Abbreviations

ADB	Asian Development Bank
ADP	Annual Development Program
AJK	Azad Jammu and Kashmir
AUSAid	Australian Government Overseas Aid Program
CBO	Community-Based Organization
CDS	Comprehensive Development Strategy
CISP	Community Infrastructure Service Program
CLTS	Community-Led Total Sanitation
DALY	Disability-Adjusted Life Years
DBO	Design, Build and Operate
DERA	Drought Emergency Rehabilitation Assistance
ESGO	Empowerment and Self-Governance Order
FATA	Federally Administered Tribal Areas
GB	Gilgit Baltistan
GoP	Government of Pakistan
H&PP	Housing & Physical Planning
HUD	Housing and Urban Development
HWASA	Hyderabad Water and Sanitation Agency
IBIS	Indus Basin Irrigation System
IBNET	International Benchmarking Network for Water and Sanitation Utilities
ICT	Islamabad Capital Territory
ICUN	International Union for Conservation of Nature
IFGI	Infrastructure for Growth Initiative
JBIC	Japan Bank for International Cooperation
JMP	Joint Monitoring Program
KMC	Karachi Metropolitan Corporation
KP	Khyber Pakhtunkhwa
KWSB	Karachi Water and Sewerage Board
LG&RDD	Local Government & Rural Development Department
LGO	Local Government Ordinance
MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Survey
NGO	Non-Governmental Organization
NRW	Nonrevenue Water
NSUSC	Northern Sindh Urban Service Corporation
O&M	Operations & Maintenance
ODF	Open-Defecation-Free
OPP-RTI	Orangi Pilot Project–Research and Training Institute
P&DD	Planning & Development Division
PATA	Provincially Administered Tribal Areas
PATS	Pakistan Approach to Total Sanitation
PCRWR	Pakistan Council of Research in Water Resources
PHE	Public Health Engineering
PHED	Public Health Engineering Department
PPP	Public-Private Partnership
PRSP	Poverty Reduction Strategy Paper
PSLM	Pakistan Social and Living Standard Measurement Survey
PWD	Public Works Department
P-WOP	Pakistan Water Operators Partnership
RWSS	Rural Water Supply and Sanitation
SAFRON	Ministry of State and Frontier Regions
SCIP	Sindh Cities Improvement Program
SDU	Strategic Development Unit
TMA	Tehsil Municipal Administration
UNICEF	United Nations Children's Fund
VDO	Village Development Organization
WASA	Water and Sanitation Agency
WASEP	Water and Sanitation Extension Program
WHO	World Health Organization
WSS	Water Supply and Sanitation
WSSP	Water and Sanitation Service 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: Azad Jammu Kashmir

Context

There have been major influxes of refugees into Azad Jammu and Kashmir (AJK): in 1947, 1965, and 1971 and in the years since 1990. Many of the earlier refugees were given land in AJK or Punjab, but there are still refugee colonies dating from 1965 and 1971.

The earthquake of October 8, 2005 caused widespread loss of lives and damage to social and physical infrastructure. A total of 267 water schemes were damaged, with 70 community-based organizations (CBOs) representing 247 schemes affected in rural areas and 9 CBOs representing 21 schemes in urban areas. Approximately Rs. 32 million (US$400,000) were spent to restore the damages, while Rs. 12 million (US$150,000) were written off by abandoning schemes beyond repair.[1]

Demographics

Azad Jammu and Kashmir (AJK), with its capital at Muzaffarabad, borders Indian Administered Jammu and Kashmir to the east (separated from it by the Line of Control), Khyber Pakhtunkhwa, Gilgit Baltistan and Punjab. AJK's total area is approximately 13,297 square kilometers.

AJK has an estimated population in 2012 of 5.3 million[2] of which just 10 percent live in urban areas. There are approximately 1,654 villages in AJK.[3] Village settlements are called *dhoks* and can consist of several *rakbas*, or smaller clusters of houses, which may be a *mohalla* in the plains. For administrative purposes a group of approximately 500 households makes up a revenue village.

The areas that have faced the most security issues experience poverty levels estimated to range from 70 percent to 90 percent, which are much higher than in the rest of the areas in AJK.[4]

Regional Governance

AJK is an independent state with a parliamentary form of government. The president is the constitutional head of the state, while the Prime Minister, supported by a Council of Ministers, is the chief executive. AJK has its own Legislative Assembly, Supreme Court, and High Court. The Ministry of Kashmir Affairs and Gilgit Baltistan are the executive link between the Government of Pakistan and the Government of Azad Jammu and Kashmir.

AJK is divided into 3 divisions (Muzaffarabad, Mirpur, and Poonch) and 10 administrative districts. These 10 districts are further divided into 30 subdivisions,[5] 189 union councils, and 1,758 revenue villages. In addition, there are 28 urban local councils: 3 municipal corporations (Muzaffarabad, Rawalakot, and Mirpur in larger cities), 10 municipal committees, and 15 town committees in AJK.

Currently, there are four service providers in AJK:

- **The Housing and Physical Planning (H&PP) Department's Public Health Engineering Wing** (referred to here as the PHED for consistency with counterpart entities in other regions) is responsible for construction and major rehabilitation of rural water supply and sanitation (WSS) schemes and the construction and maintenance of urban water supply and sanitation schemes, except in three towns and one municipality.
- **The Local Government and Rural Development Department (LG&RDD)** is responsible for water and sanitation policy and construction of rural WSS schemes with assistance from the PHED for technical issues. LG&RDD's policy is to transfer the schemes to communities for operation and maintenance (O&M) through a memorandum of understanding.

[1] Implementation Completion and Results Report: AJK CISP, *World Bank Report* No. ICR: 1123, March 2010.
[2] Volume II, table 1.1, data from Pakistan census bureau website, http://www.census.gov.pk.
[3] Punjab Water Supply and Sanitation Report, Volume III, 2012.
[4] ADB RRP.
[5] Administrative setup as of 2010.

- **Municipalities through their Tehsil Municipal Administrations (TMAs)** vary in capacity, depending primarily on their size. The urban sector has 28 urban local councils and TMAs. In four urban areas, municipalities are responsible for water and sanitation services. Municipalities report to LG&RDD.
- **CBOs** are responsible for the O&M of all rural WSS schemes. There are some 545 registered CBOs in the sector. Of these only 13.3 percent were deemed unsustainable.[6]

Within these institutional arrangements, the following observations are evident:

- There is a demonstrated success of CBO models and community mobilization through the assistance of external donors; and
- Limited fiscal resources yet multiple and interrelated agencies (including at local, regional, and federal levels) all working in a fairly small region are resulting in some overlap and duplication of effort.

Current Water Supply and Sanitation Coverage

In AJK, 85 percent of the urban population has access to improved water, as compared to the national average of 96 percent estimated by the Joint Monitoring Program (JMP) of WHO and UNICEF. In urban areas there are 50,392 consumer connections: 45,651 domestic and 4,741 commercial. In urban areas 99 percent of households reported "proper hand washing" after toilet use. It is estimated that 10 percent of the urban population defecates in the open.

Access to improved rural water supply is 80 percent in AJK compared to the national average of 89 percent estimated by the JMP.

There are some 7,500 water schemes (including hand pump schemes) in rural areas, all of which have been transferred to communities for O&M. Of these 82 percent are gravity based, 16 percent are pumping based, and 1 percent are combined. Community "contribution" has been reported in 49 percent of 6,961 water supply schemes. Out of these, in 66 percent of schemes the nature of the contribution is listed as manpower, followed by 29 percent in cash, while in 5 percent of schemes the contribution comes as material. Of the total number of schemes where the community contributed, 27 percent were in Kotli district, followed by 23 percent in Muzaffarabad. The lowest contribution was in Mirpur district.

The most prevalent category of rural sanitation varies among provinces and regions in the country, although nowhere does coverage with a flush toilet connected to a public sewer exceed 8 percent of households. According to data from the Multiple Indicator Cluster Survey (MICS), in AJK the "flush toilet connected to a septic tank is the most prevalent type of rural sanitation, used by 42 percent of households. It is estimated that 40 percent of the rural population defecates in the open.

According to the MICS, access to higher levels of services depends on wealth and education levels. In AJK, "house or yard connections" are accessed by 21 percent of the households with no education, whereas such connections are accessed by 24 percent of the households with secondary education. Only 10 percent of the households from the lowest income quintile access this level of service, whereas 39 percent of the highest income quintile accesses this service.

The MICS disaggregates data by "earthquake-affected and earthquake no affected" indicators, showing some substantive difference. For example, "improved source of drinking water and sanitary means of excreta disposal" was reported in 55 percent of "no affected" areas, compared to 29 percent in affected areas "Flush Toilets connected to public sewerage" were accessed by 5.8 percent of households in no affected areas as compared to 2 percent in affected areas. Fifty-six percent of households in no affected areas accessed flush toilets connected with septic tanks as compared to 36 percent in affected areas. Households using the open fields were reported at 30 percent in no affected areas as compared to 41.6 percent in affected areas.

Water Resources

AJK has diverse climate; ranging from subsumed and subtropical to moist temperate, dry cold temperate, very cold temperate, and, in the extreme north, snow deserts. There are diverse mountainous areas in the northern and middle sections and plains in the southern section. Altitude ranges from 275 meters in the south to 6,300 meters in the north. The main rivers are the Jhelum, Neelum, and Poonch, which join to flow into the Mangla reservoir in Mirpur District.

The lack of sewerage systems led to numerous challenges. All kinds of domestic and industrial sewage is discharged directly into the rivers, eventually ends up in them through streams, or is leached into the groundwater. Due to the lack of any disposal system, much of generated solid waste ends up in the rivers or on open ground.

[6] Implementation Completion and Results Report: AJK CISP, *World Bank Report* No. ICR: 1123, March 2010.

Service Quality

There is limited regional-level data available on service quality, and the following presents the limited information that has been gathered under this study.

Despite the abundance of water throughout the year in streams and river tributaries, almost all urban centers face water scarcity. Residents of un-served settlements have to rely on unsafe sources, such as rivers, contaminated open wells, springs, and natural streams. Contamination of water sources, intermittent supply, and intermixing of sewerage and water pipelines due to inadequate spacing, faulty joints, and old leaking pipes are major issues that require urgent attention.[7]

There is no city in Pakistan with a 24-hour/7-day water supply. In AJK the hours of supply for Muzaffarabad, Mirpur and Poonch range from 4 to 8 hours a day. In terms of nonrevenue water (NRW)—a key measure of both technical and commercial performance—there is virtually no metering, which means any estimates of NRW, are highly unreliable.

The PHED is responsible for collecting and treating wastewater. However, no part of the region treats waste water.

A total of 1,321 drinking samples were collected from 744 drinking water supply schemes, including hand pumps and piped supplies developed under the World Bank funded Community Infrastructure and Service Program Project (CISP) in eight districts of AJK. All the samples were analyzed for physical, chemical, and bacteriological water quality parameters. Based on the water analytical reports, it was found that all the water sources were found to be bacteriological contaminated. Unprotected water sources may be one of the reasons.

The proportion of rural schemes that are functional varies considerably from 48 percent in Sindh to 100 percent in GB with an average of 83 percent. The large variations may partly be explained by definitional differences of what constitutes functionality. Table 1 show that AJK's performance at 99 percent functional schemes is one of the best performances in the country. It performs better than Sindh, Balochistan, Khyber Pakhtunkhwa, Punjab, and the Federally Assisted Tribal Areas, trailing only Gilgit Baltistan.

Cost Recovery

Water consumption in both urban and rural areas is unmetered and is charged on a flat rate basis. A uniform tariff of Rs. 100 per connection per month is charged by the PHED in urban areas. Charges for domestic connections are made on the basis of the ferrule size.

Within AJK, the collection efficiency is between 40 and 50 percent. In rural areas, LG&RDD's policy is to transfer the schemes to communities for O&M through a memorandum of understanding. As noted, the beneficiary communities bear 100 percent of the cost of O&M.

Capital Investment

For 2009–12 (as reflected in Annual Development Plan documents for the period 2010–13), there were a total of 42 schemes. The total cost of these schemes was

[7] Asian Development Bank (ADB), Multi sector Rehabilitation and Improvement Project AJK (Tokyo: ADB, November 2004).

Table 1: Azad Jammu and Kashmir Executive Summary Rural Water Supply Systems, Total and Functional

Province/Region	Total number of schemes	Functional Schemes	Number of functional schemes operated by CBOs	Number of functional schemes operated by PHED	Share of total number of schemes that are functional
AJK	7,500	7,461	7,422	39	99%
Balochistan	2,353	1,746	1,005	741	74%
FATA	1,507	1,228	NA	NA	81%
GB	437	437	437	–	100%
Khyber Pakhtunkhwa*	4,056	3,399	1,161	2,238	84%
Punjab	4,058	2,715	2,448	267	67%
Sindh	1,384	666	339	327	48%
TOTAL	**21,295**	**17,652**	**12,812**	**3,612**	**83%**

Source: Data compiled during field visits 2012.
* O&M of rural schemes are no longer managed by communities.

Rs. 164,400 million. The total disbursed amount for the period was Rs. 7,784 million. The bulk of capital investment is in the urban area. During 2009–11, one federal government scheme was financed, having been costed at Rs. 5,123 million. Of this amount, Rs. 3,914 million has been disbursed.

Donors that have been active are World Bank, Asian Development Bank, United Nations Development Program, UNICEF and the Pakistan Poverty Alleviation Fund. The World Bank funded AJK CISP and the subsequent restructuring and reallocations after the 2005 earthquake (Earthquake Additional Financing Project) included US$40 million to bring water and sewage infrastructure to pre-earthquake levels. CISP's objective was to "support an increase in the number and capacity of community-based organizations, extend capacity and decentralize government management in the sector and to improve accountability systems". Approximately 80 percent of CISP schemes were implemented in rural areas, taking up 86 percent of the total budget.

Recommendations

There are a number of recommendations that the region of AJK might consider in improving the performance and sustainability of its urban and rural WSS sectors. The purpose of the recommendations is to lay the basis for equitable, efficient, and sustainable provision of water supply and sanitation services.

Recommendation One: Further Support the CBO-based Approach to Provision of WSS Services in Rural Areas

In AJK there is a need to continue to support and build on the successful approach to providing rural WSS through the use of CBO-managed systems. Service quality, access, and sustainability can be further improved if the current model is deepened, providing CBOs with a greater role in rural WSS project cycles and at the same time further building their capacity through a mix of training, networking and technical and administrative backstopping. To support this scale up of the existing model, the following steps are recommended:

- An administrative backstopping facility is established in the province that would proactively support CBOs in the management of their systems. This would include ongoing support for training of CBOs as well as recording and disseminating best practices for rural WSS. Such a facility could evolve to help with policy and legal reforms, programming, regulation of tariffs, metering and capacity building, monitoring and evaluation, and so forth.
- A more formalized technical backstopping facility is established that would proactively support CBOs in dealing with technical challenges in service delivery. This would range from advice on repairs and maintenance to organizing major rehabilitations of systems. This service is best suited to a technical organization that would need support to evolve into this new role.
- The CBOs take on a strong role to support sanitation improvements in the community, with support from the regional government through existing, but strengthened, implementation of the Pakistan Approach to Total Sanitation (PATS) model.

Recommendation Two: Develop Programs to Improve the Quality and Sustainability of Services in Muzaffarabad, Mirpur, and Poonch

In Muzaffarabad, Mirpur, and Poonch, the Government of AJK should consider investment programs built around service improvement plans that would enhance financial and operational performance while delivering results at minimum costs. The program might be based around a process that addresses quick payback investments before proceeding to investments that require more capital or more institutional capacity. Thus, financing would likely focus initially on energy efficiency programs to reduce total energy consumption per cubic meter of water delivered to consumers. Such programs could optimize pumps, increase levels of metering of both production and consumption, and gradually replace obsolete electromechanical equipment. Thereafter, further improvements might include updated billing and collection systems, leakage reduction activities, network expansion, and moving toward 24/7 continuous supply.

Executive Summary: Balochistan

Provincial Demographics

Balochistan had a population in 2012 of 9.7 million[8], of which 77 percent live in rural areas. The urban population has increased six times since 1951 and the current urban growth rate is 4.5 percent per annum. Balochistan accounts for 44 percent of the Pakistan's land area and has a population density of 12 persons per square kilometre. There are about 9,000 rural settlements. The provincial government, in its *Poverty Reduction Strategy Paper* (PRSP) and in its presentation to the Pakistan Development Forum 2003, estimated poverty at between 41 percent and 47 percent in 2002–03. This surpasses a national average of 25.7–28.3 percent according to World Bank estimates. Note, however, that the measurements of poverty in the province, obtained from some of the Household Income and Expenditure Surveys, have aroused scepticism.[9] Important for this report is that all indicators for access to clean water, percent of households without toilet, and access to health facilities have shown Balochistan to have the worst results of all the provinces.

Sector Institutional Arrangements/ Governance

Currently, four formal actors are providing water and sanitation services in Balochistan:

- **The Public Health Engineering Department (PHED)** is responsible for construction of urban water supply and sanitation schemes (except in cities with Water and Sanitation Agencies, WASAs) as well as construction and operation and maintenance (O&M) of rural schemes. The PHED is meant to have the capacity to undertake engineering works for both rural and urban areas, except for cities having over 1 million inhabitants.
- **WASAs** are corporate bodies established by provincial acts. In Balochistan the WASA act applies to all towns, but only one WASA has been created in the province (in Quetta).
- **Tehsil Municipal Administrations (TMAs)** are responsible for delivery of municipal services, including water supply and sanitation, as per the Local Government Ordinance of 2001. The urban sector has 42 local urban councils: Metropolitan Corporations, Municipal Corporations, and Town Committees. However, their technical and financial capacity depends primarily on their size and is often limited. With regard to water supply and sanitation (WSS) services they rely on the PHED for developing new assets but are themselves responsible for the operations and routine maintenance of the systems that are handed over to them by the PHED. The reporting line department is the Local Government and Rural Development Department.
- **Community-based organizations (CBOs)** provide O&M services for water schemes to a small portion of the rural population, with the remainder being served by the PHED. The CBOs active in the rural sector are meant to have the capacity to operate and maintain systems, but this capacity is often lacking and, even when present, is insufficient for more complex issues such as redesign, retrofit, or major repair activities.

In addition, and because water service delivered by the formal actors is often inadequate, households self-provision. According to the Pakistan Social and Living Standards Measurement (PSLM) 2010–11, at least 14 percent of households in Balochistan's urban areas and 84 percent of households in rural areas provide some or all of their water through hand pumps, motor pumps, dug wells, and, in the urban areas, "others" means. With regard to sanitation, data from the Multiple Indicator

[8] Volume II, table 1.1, data from Pakistan census bureau website, http://www.census.gov.pk.

[9] First, while Balochistan's GDP per capita from 1990/91 to 2001/02 was on average 5 percent below North West Frontier Province's, 17 percent below Punjab's, and 40 percent below Sindh's, Balochistan was shown as the province with the lowest share of the population below the poverty line in 1990/91 and 1998/99. Second, in 1991/92 and 1998/99, Balochistan's rural poverty was stated to be 4.4–5.8 percent *lower* than urban poverty, whereas rural poverty was 21 percent higher than urban poverty in 1993/4. This finding is surprising, because rural poverty systematically exceeds urban poverty in the other provinces (*Balochistan Needs Assessment*, August 2012, World Bank).

Cluster Survey (MICS) show that 66 percent of households in urban areas and 99 percent in rural areas are not connected to a public sewer and thus rely on their own arrangements, including septic tanks and open defecation.

These institutional arrangements involving multiple provincial actors have resulted in the following:

- Inefficient and nontransparent institutional structures, because multiple players, having overlapping responsibilities, are involved in the provision of water;
- Schemes being supply driven with a systemic disconnect between capital investment and O&M;
- Need for development and capacity building of Tehsil Municipal Administrations (TMAs) and/or the creation of alternative service delivery arrangements in order to overcome weak TMA capacity;
- Poor financial sustainability as a result of low institutional capacity and weak incentives to recover costs and deliver good quality services efficiently; and
- Compared to elsewhere in the country and the region, there is a limited role for CBOs to manage rural water supply and sanitation schemes.

Current Water Supply and Sanitation Coverage and Service Quality[10]

In Balochistan, 96 percent of the urban population has access to improved water, similar to the national average of 96 percent estimated by the Joint Monitoring Program (JMP) of WHO and UNICEF.

According to PSLM 2010–11, about 87 percent of the urban population has access to tap water, compared to 58 percent of the urban population nationally; a further 8 percent of the urban population (versus 36 percent nationally) is served by pumped systems; 2 percent of the urban population (versus 1 percent nationally) is served by dug wells; and 4 percent of the provincial urban population (versus 6 percent nationally) receives water by other means.

PSLM 2010–11 also reports that 84 percent of households in urban Balochistan have flush toilets. In urban areas, 49 percent of household members reported washing their hands after toilet use. It is estimated that 2 percent of the urban population defecates in the open.

Access to improved rural water supply is 33 percent in Balochistan, compared to the national average of 89 percent, as estimated by the JMP. According to PSLM 2010–11, about 21 percent of the rural population, compared to 19 percent of the rural population nationally, has access to tap water; a further 13 percent of the rural population (versus to 65 percent nationally) is served by pumped systems; 20 percent of the provincial rural population (versus 6 percent nationally) by dug wells; and 47 percent of the provincial rural population (versus 10 percent nationally) by other means (non-protected sources such as wells, rivers and canals).

According to the MICS data, in Balochistan the "pit latrine without slab" is the most prevalent type of rural sanitation, used by 18 percent of households. The most prevalent category of rural sanitation (other than open defecation) varies among provinces and regions, although nowhere does coverage with a flush toilet connected to a public sewer exceed 8 percent of households.

In rural Balochistan, a high percentage of rural households are without any toilet facility, with the exception of Mastang, Khuzdar, Awaran, and Harai (2 percent); Panjgur, Kharan, Washuk, and Bolan/Kachi (3 percent); and Quetta, Nasirabad and Kalat (7–9 percent). It is estimated that 60 percent of the rural population defecates in the open.

There is considerable variation in access to water among districts in Balochistan. For example, the MICS indicator "pipe in the dwelling or yard" is accessed by 2 percent of households in Musa Khel district as compared to 80 percent in Quetta. For four districts no data is available and in eight districts this access is less than 10 percent. In general, however, lack of data for Balochistan, and the reliability of available data, continues to be a constraint to accurately assessing the situation in the sector.

Water Resources

Scarcity of water is the critical constraint to Balochistan's development. While some 87 percent of Pakistan's total available water is contributed by the Indus Basin Irrigation System (IBIS), Balochistan lies at its periphery and relies largely on no perennial with some perennial sources of water (the latter from both IBIS and outside IBIS). Balochistan's water economy is highly segmented, with 18 river basins covering its vast territory. Rural livelihoods are dependent on precipitation and were severely affected during the drought from 1998 to 2005. Crops can fail after a seasonal drought, whereas livestock and orchards are vulnerable to persistent drought. Since agriculture accounts for 97 percent of Balochistan's water use, any strategy to deal with water scarcity needs to include the agriculture sector.

Groundwater is over exploited in many areas, and its quality is deteriorating. In Quetta, drinking water is drawn from tube wells that extract fossil water. Up to

[10] Lack of data and the reliability of available data is a limitation for sector analysis.

Table 2: Balochistan Executive Summary
Rural Water Supply Systems, Total and Functional

Province/Region	Total number of schemes	Functional Schemes	Number of functional schemes operated by CBOs	Number of functional schemes operated by PHED	Share of total number of schemes that are functional
AJK	7,500	7,461	7,422	39	99%
Balochistan	2,353	1,746	1,005	741	74%
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Sindh	1,384	666	339	327	48%
TOTAL	**21,295**	**17,652**	**12,812**	**3,612**	**83%**

Source: Data compiled during field visits 2012.
* O&M of rural schemes are no longer managed by communities.

1970, priority was given to provision of drinking water to major towns like Quetta, Sibi, Loralai, and Zhob. The rural population remains deprived of safe drinking water and is compelled to take drinking water from dug wells, springs, stagnant pools, and open ponds that collect rain water.

The province is home to the *karez* system of subterranean aqueducts or subsurface canals that have historically been community-managed schemes with an established water rights system. Until 1970 around "3,000 karez systems were in use, providing water to towns for domestic use and for irrigated agriculture."[11] At that time, the agricultural economy was totally dependent upon the supply of karez water. However, the area irrigated by karez in Balochistan decreased from 14.2 percent in 1980 to 7.5 percent in 2003. According to one estimate from IUCN (2012), there are about 1,176 reported/known functional karees in all of Balochistan, some of which are over 100 years old.

The Karez have recently fallen into disrepair largely due to abundant tube well extraction of groundwater. Currently only one third of Karez are functioning, constituting nevertheless one of the major water sources in parts of Balochistan. In places without access to surface water, karez water is used for drinking and household purposes.

Service Quality

There is no city in Pakistan with a 24 hour/7 day water supply. In Balochistan, the hours of supply range from 8 hours a day in Quetta to less than 4 hours a day in Gwadar. In terms of nonrevenue water (NRW)—a key measure of both technical and commercial performance—the Quetta-WASA reports up to 45 percent of total water production is lost to leakage or otherwise unpaid for. Metering coverage is low to nonexistent, and this undermines the reliability of the reported figures.

The WASAs and TMAs are responsible for collecting and treating wastewater. However, except for Quetta, which treats 12 percent of the collected wastewater, none of the cities treat their wastewater.

The proportion of rural schemes that are functional varies considerably from 48 percent in Sindh to 100 percent in GB with an average of 83 percent. The large variations may partly be explained by definitional differences of what constitutes functionality. Table 2 shows that Balochistan's performance at 74 percent functional schemes is below average although better than that of Sindh and Punjab.

Special mention must be made about the deep sea port city of Gwadar, where the lack of clean drinking water has led to a crisis. The city is supplied with 2 million gallons of water every four days against a daily requirement of 3.5 million gallons. That means that less than 15 percent (0.5/3.5) of daily water needs are being provided.

The cities of Gwadar and Jiwani, constituting 50 percent of the total population (250,000) of Gwadar district, rely entirely on the Ankara Kaur Dam for all their water needs, while residents of the other three coastal towns of

[11] *Turning the Tide: Reviving the Karez System in Balochistan*. Humid Safaris, Iran Bakhtaran and Maugham Khan IUCN. Date not provided.

Pasni, Ormara and Sun tsar are dependent on seasonal rivers. The Ankara Kaur dam is facing silting issues 20 years after its construction.

Reportedly, Rs. 4 billion (US$41,067,600) for the Shadi Kaur Dam and another Rs. 2 billion (US$20,533,800) for the Sawad Dam have been authorized for construction. The Balochistan Development Authority has also installed a desalination plant in Gwadar at a cost of Rs. 1 billion (US$10,266,900). In the meantime, as the water crisis continues, people are forced to buy water at very high prices from tankers that bring water from up to a hundred miles away.

Cost Recovery

Financial working ratios (the ratio between cash O&M—which excludes depreciation—and cash operating income) for Quetta WASA is 2.4, implying that it collects sufficient operating revenue to pay for only 42 percent of its cash operating costs. Increasing collections is difficult as long as service remains intermittent and unsafe and is exacerbated by poor metering and billing practices.

These low levels of cost recovery result from under pricing of water, poor commercial practices (nonpayment and theft), and inadequate attention to cost control. Quetta has a tariff system based on the size of the connection pipe, with prices ranging from Rs. 125 (US$1.3) per month for a one-half-inch connection to Rs. 250 (US$2.6) per month for a one-inch connection. In other areas of Balochistan, the flat monthly tariff is Rs. 50 (US$0.5) for domestic and Rs. 100 (US$1.0) for commercial connections. Apart from being inequitable, this flat rate charging system creates regressive water subsidies that benefit unmetered wealthy households who are connected first and who use more water than poor households.

Poor commercial performance explains the low collection rates of 21 percent for Quetta WASA. In the districts of Balochistan the collection ratios are below 15 percent. On the cost side, many schemes are seeing O&M costs rise due to escalating energy costs, which can have a significant impact on total operating costs. In Quetta, for example, the share of electricity in overall O&M costs is 39 percent. High levels of leakage from systems further exacerbate the situation, as water is pumped into the distribution system only to leak out of the pipes before reaching the customer. Improving energy efficiency, reducing leakage, and paying greater attention to cost recovery issues in project design are essential to redress the current shortfalls in cost recovery. The situation in TMA-managed water supply schemes indicates that, like in the Quetta WASA, they are financially unsustainable, because they do not generate enough revenue to pay for cash O&M costs.

Achieving a working ratio of less than 1.0 usually requires that attention be paid to both revenues and costs. However, in most rural schemes the latter are relatively modest so that attention needs to be paid more to the revenue side of the equation, particularly the tariffs and the collection efficiency.

International best practice is to meter consumption and charge on a volumetric basis. User charges typically cover at least the cost of operation and maintenance in rural areas, while in urban areas user charges should also make a contribution to either debt service or capital expenditure. In other words, the working ratio in urban areas should always be less than 1.0.

Capital Investment

For the period 2009–11 (as reflected in Annual Development Program documents for 2010–13) a total of 238 schemes were planned. The total cost of these schemes was Rs. 52,000 million. The total disbursed amount for the period was Rs. 18,000 million. There were 34 schemes where no disbursement took place during this three-year period. The bulk of capital investment is in the urban areas. Although the rural sector makes up only a maximum of 14 percent of the entire disbursement over the three years, its many small schemes accounted for between 42 percent 50 percent of the total number of schemes.

The federal Public Sector Development Program included three schemes for Balochistan: one each for Quetta, Gwadar and Kohlu. The total cost was Rs. 42,967 million (US$441,137) and the total amount disbursed between 2010 and 2013 was Rs. 19,872 million (US$204,023).

Recommendations

There are a number of recommendations that the Government might consider in reforming its sector policies. The purpose of the recommendations is to lay the basis for equitable, efficient, and sustainable provision of water supply and sanitation services.

Recommendation One: Take Steps toward Attaining Financial Sustainability in Urban Areas

All production and consumption in urban areas should be metered in order to enable service providers to better manage their systems—both technically and commercially. Metering will provide the data that will facilitate reducing losses in the production and distribution of

water. Over time consumers should be charged on the basis of their metered consumption. By doing so payment for services will become socially more equitable and subsidies can be targeted to low-income households who consume much less water than high-income households. This approach will also allow consumers to adjust their consumption to their willingness and ability to pay for service.

The investments in metering hardware will necessarily have to be complemented by upgraded consumer databases, design and implementation of tariff schemes that vary with the level of metered consumption, better customer service, and the design and implementation of software to allow for effective billing and collection. The investments in both hardware and software should be matched by higher levels of training of staff to administer the new systems and by incentives that will reward those service providers and their staff who manage to increase the levels of collections.

Recommendation Two: Further Develop the CBO-based Approach to Provision of Water Supply and Sanitation Services in Rural Areas

In Balochistan, there is a need to support and mainstream provision of rural water supply and sanitation (RWSS) through the use of CBO-managed systems. Service quality, access and sustainability can be improved if CBOs have a greater role in RWSS project cycles, and at the same time building their capacity can be strengthened through a mix of training, networking, and technical/administrative backstopping. To support this process is the following are recommended:

- The scope of the CBO model should include responsibility for identifying, designing and building RWSS schemes. Elsewhere in South Asia, rural CBOs are given much broader responsibility during the planning, design and implementation phases of the project cycle, leading to lower unit costs and greater sustainability. The CBO model is preferred in terms of appropriateness of design, adequacy of service level, and oversight of implementation.
- An administrative facility should be established in Balochistan that would proactively support and mainstream CBOs in the management of their systems. This would include ongoing support for training of CBOs and recording/disseminating best practices for RWSS. Such a facility would gradually enhance performance in the Balochistan systems and could evolve to help with policy and legal reforms, programming, regulation of tariffs, metering and capacity building, and monitoring and evaluation and so forth.
- To address the number of nonfunctioning RWSS schemes, a third party assessment should be conducted in order (i) to understand the reasons for nonfunctional schemes, (ii) document condition of functional and nonfunctional schemes, (iii) estimate investment needs for their operationalization and upgrading, and (iv) understand and document how tariffs are established and how the poor are serviced. A sector program can then be designed to address no functionality through a mix of investment and transfers of responsibility to better capacitated CBOs.

Recommendation Three: Develop Programs to Improve the Quality and Sustainability of Services in the Fast Growing Urban Centers of Quetta and Gwadar

In Quetta and Gwadar, the Government of Balochistan should consider investment programs built around service improvement plans that would enhance financial and operational performance while delivering results at minimum costs. The program might be based around a stepwise improvement process that tackles quick payback investments as a priority before proceeding to investments that require more capital or more institutional capacity. Thus, financing would likely focus first on energy-efficiency programs to reduce total energy consumption per cubic meter of water delivered to consumers. Such programs could optimize pumps, increase levels of metering of both production and consumption, and gradually replace obsolete electromechanical equipment. Thereafter further improvements might include updated billing and collection systems, leakage reduction activities, network expansion, and progress toward a 24/7 continuous supply.

The key should be to allocate funding in response to proven success—for example in expanding metering and numbers of hours of service while reducing levels on NRW. In delivering improved service, the programs should also facilitate improving institutional arrangements that are more aligned with efficient, accountable, and more autonomous service providers.

Recommendation Four: Develop a Long-term Strategy for an Integrated Framework for Water Supply, Agriculture, and Water Resources

Given the scarce supplies of water and the conflicting demands for its use (domestic, industrial, agricultural and others), a province wide water strategy is needed to balance the needs of different users, recognizing that the different sectors present different potential and opportunities.

For the *water resources sector*, there is a need to utilize the two-thirds of unutilized floodwater by developing cost-effective irrigation schemes to provide water for farming and to generate new livelihoods. Excess water during wet years can be stored in cascades of storage dams to provide reliability to s*ailaba* (floodwater irrigated) farming and support production of high value crops. The costs and benefits of different solutions would be tested and the use of market instruments to better manage demand should be considered.

For the *domestic water supply sector*, improvements should start by creating awareness of the crucial importance of conserving water. The only effective method for doing so is to meter water consumption and charge according to the amount of water consumed.

Recommendation Five: Pilot the Use of Regional Approaches to Water Supply and Sanitation

Given Balochistan's large land mass and sparse population, the long-term strategy will require regional interventions to achieve economies of scale in operations and to ensure an integrated planning approach. Accordingly, programs could group together the higher mountain areas like Ziarat, coastal areas including Gwadar, the dry Kharan region, Nasirabad and Jhal Magsi regions and the Lasbella region. The precise method of service delivery would be developed to meet the special needs of the region but would likely include the creation of an entity that would have responsibility for planning and providing WSS across all market segments (e.g. rural, small towns, large towns) but that would use a variety of mechanisms to deliver the service. This would include the use of CBOs in rural areas, local private sector in small towns and the entity itself as the service provider in the larger towns.

Alternative mechanisms for improved service delivery also need to be designed for those areas that have endemic unrest and that are a major security concern. These include the border areas with Iran and Afghanistan and should target areas such as DeraBugti, Mastung and Pishin, Khuzdar, Turbat, Panjgur, and Chagai. Alternative arrangements may include a combination of strategies including small-scale private sector interventions, community-based interventions, and larger national NGO driven programs.

Recommendation Six: Establishment of a Strategic Development Unit

It is recommended that a Strategic Development Unit (SDU) be created in Balochistan for both urban and rural development. This would be similar to the recently established Urban Policy and Strategic Planning Directorates in Sindh and KP, which were themselves modeled on the Urban Unit in Punjab. To this end, the province should establish a strategic development working group that would provide the terms of reference, objectives, and a work program for the SDU. The SDU could focus on the following policy priorities:

- Compile data related to current status of capital investment, cost recovery, tariff setting, and complaint tracking systems in water supply and sanitation as well as other urban services;
- Given the complexity and special rural specifics of Balochistan, prepare development plans for each region to provide a comprehensive overview of each area's infrastructure needs and priorities; and
- Given the overall lack of basic infrastructure, undertake a focused assessment to better understand how infrastructure needs to be identified, constructed, and operated and what approaches might best work to that effect.

Executive Summary: Federally Administered Tribal Areas

Context

The Federally Administered Tribal Areas (FATA), comprise of 7 Agencies (South and North Waziristan, Kurram, Orakzai, Bajaur, Khyber and Mohmand) and six smaller zones, called 'frontier regions' (Peshawar, Tank, Kohat, D.I Khan, Bannu and Lakki). The region faces serious challenges of security due to the conflict in the region.

The human development indicators in FATA regions are probably the poorest in Pakistan. Only 21.4 percent of the population is literate, 40 percent children of school going age are enrolled and only 12 percent enrolment in girl's schools. Infant mortality is 87 deaths per 1000 live births while maternal mortality is around 600 deaths per 100,000 live births.

Poverty levels are much higher than in the rest of the country. It is difficult to have accurate data collection or damage assessment due to the governance structure and high risk security issues.

Demographics

FATA is spread over a rugged mountainous terrain of 27, 220 square kilometers bordering Afghanistan on the west. FATA comprises seven agency-administered geographic units (South Waziristan, North Waziristan, Kurram, Orakzai, Bajaur, Khyber and Mohmand) and six smaller zones called "frontier regions": Peshawar, Tank, Kohat, D. I. Khan, Bannu and Lakki.

FATA had an estimated population in 2012 of 4.3 million,[12] of which 98 percent live in rural areas. Only Khyber, Kurram and North Waziristan agencies have an urban population. Population density in FATA is estimated at 155 persons per square kilometer.

Regional Governance

FATA is governed by an administrative set that is different from the rest of Pakistan. Its special status is coded under the Constitution of Pakistan of 1973. State law does not apply there and law is based on the Frontier Crimes Regulation, which dates to 1901 and British colonial occupation. Pakistan's usual laws of the land are thus not applicable in most parts of FATA and the writ of the government is enforced through the office of the FATA Secretariat and traditional community structures. The secretariat functions as the link to federal government and donors for organizing funds for different projects.

Currently, the main water supply and sanitation (WSS) service providers in FATA are:

- **The Public Health Engineering Wing** (referred to here as the PHED for consistency with counterpart entities in other regions) of the Works and Services Department in FATA is the lead executing agency for the construction and operation of rural WSS schemes. One executive engineer works in the Pesahwar office and one subdivisonal officer with two subengineers in each agency are responsiable for WSS activities.
- **The Local Government and Rural Development Department** (LG&RDD) is responsible for provision of municipal services in urban areas (municipalities and towns) in FATA. LG&RDD delivers municipal services (water; sewerage, drainage. and solid waste collection and safe disposal) to selected areas within FATA.
- **The FATA Development Authority** has recently been involved in initiating township development for providing better facilities in the tribal areas. It is planned that all facilities, including those for water and sanitation, will be part of the the proposed townships.
- **Communities** are responsible for the operation and maintenance of rural water supply and sanitation schemes through Community-Based Organizations (CBOs). Due to the lack of data, there is limited information on the CBO models in FATA.

[12] Volume II, table 1.1, data from Pakistan census bureau website, http://www.census.gov.pk.

These institutional arrangements result in the following:

- The need for development and capacity building of institutions, focusing on the existing institutions PHED and LG&RDD;
- Virtually no financial sustainability due to a lack of the concept of low cost operation and efficient delivery of good quality services; and
- Compared to elsewhere in the country and the region, there is limited information available on CBOs that are managing rural water supply and sanitation schemes.

Current Water Supply and Sanitation Coverage and Quality

According to the data collected by FATA officials (2011), 64.3 percent of the population (92.9 percent in urban and 39.3 percent in rural areas) had access to improved drinking water sources. In FATA, there is no single, major improved source of drinking water. The most common drinking water sources are water pipelines (used by 16.8 percent of the population), which run into the dwelling or onto the property, and public taps. About 35.7 percent of FATA's population does not have access to clean drinking water, including 16.2 percent who use surface water.

PHED data suggest that there are 1,507 drinking-water supply schemes across FATA. However, there is no reliable database available to manage this vast inventory efficiently or to assess and effectively deliver safe drinking water supply services in FATA.

According to the Multiple Indicator Cluster Survey (2007), the most prevalent practice of rural sanitation (other than using open fields) varies among FATA's areas, although nowhere does coverage with a flush toilet connected to a public sewer exceed 8 percent of households. In FATA, the "pit latrine with flush" is the most prevalent type of rural sanitation, used by 12 percent of households. It is estimated that 56 percent of the rural population defecates in the open. In 51 percent of households in urban areas, "all members reported washing hands with soap" after toilet use.

Family members spend considerable time fetching water on a daily basis. The majority of households collect water from sources outside their dwelling. Fetching water is a gender-specific activity in FATA, and it is estimated that over in 95 percent of the households it is adult women who collect water; in some cases they fetch water from as far away as two kilometers. The long haul for water—in most cases on steep slopes—dictates the usage patterns at the household level and in many cases contributes to diseases.

Wastewater treatment plants are not yet available in FATA. Usually, wastewater is disposed off in local streams (dry or running), fields, or low-lying areas. It thus enters waterways that are used as water sources for various purposes downstream (cleaning, irrigating and sometimes drinking).

The proportion of Pakistan's rural water supply schemes that are functional varies considerably across regions, from 48 percent in Sindh to 100 percent in GB, with a national average of 83 percent. The large variations may partly be explained by definitional differences

Table 3: Federally Administered Tribal Areas Executive Summary Rural Water Supply Systems, Total and Functional

Province/Region	Total number of schemes	Functional Schemes	Number of functional schemes operated by CBOs	Number of functional schemes operated by PHED	Share of total number of schemes that are functional
AJK	7,500	7,461	7,422	39	99%
Balochistan	2,353	1,746	1,005	741	74%
FATA	1,507	1,228	NA	NA	81%
GB	437	437	437	–	100%
Khyber Pakhtunkhwa*	4,056	3,399	1,161	2,238	84%
Punjab	4,058	2,715	2,448	267	67%
Sindh	1,384	666	339	327	48%
TOTAL	**21,295**	**17,652**	**12,812**	**3,612**	**83%**

Source: Data compiled during field visits 2012.
* O&M of rural schemes are no longer managed by communities.

of what constitutes functionality. Table 3 shows that FATA's performance at 81 percent functional.

Water Resources[13]

The main water source for drinking purposes in FATA is groundwater, which accounts for about 84 percent of public and private water supply schemes. Groundwater, nonetheless, is generally a scarce resource in FATA and is available only in the alluvial plains. In most parts of FATA, in particular in Mohmand and Khyber Agencies, the water table level extends below 500 feet in depth. With drought from the past four to five years, however, the water table has been depleted by more than 200 feet. As a result, the water shortage is becoming a critical issue.

The second major source in FATA for drinking purposes is surface water, which supplies about 16 percent of the population. Though most areas of FATA are dry, there are some small rivers and spring-fed streams, which serve as useful water sources for drinking and irrigation purposes.

Cost Recovery

Community involvement in planning, implementation and O&M of water supply schemes is very limited leading to virtually no cost recovery. Drinking water is considered a free good in the absence of any initiative and community awareness.

Capital Investment

Though engulfed in crisis and conflict, development funds have been cosnistently increaing in FATA. Its total Annual Development Plan came to Rs. 1,030 million in 2001–02 and increased to Rs. 12,514 million in 2010–11, about an 1,215 percent increase over 10 years. Funds for the PHED have also been increased from Rs. 128 million in 2001–2 to Rs. 935 million in 2010–11, an overall increase of 730 percent.

On average, water and sanitation sector allocations have increased by about 7 percent against 23 percent of total ADP during this period. Additionally, federal government and donor-funded projects have provided more than Rs. 770 million for drinking water supply schemes. Wastewater treatment facilities are lacking.

In addition to those in the ADP, other federal and donor-funded projects have also contributed to WSS schemes in the region. The Drought Emergency Rehabilitation Assistance (DERA) program provided Rs. 170 million for drinking water while the ADB-funded FATA Rural Development Project allocated Rs. 632 million for 2005–10 for Bajaur, Khyber and Mohmand agencies. The federal government initiative on Clean Drinking Water for All provided Rs. 69 million for a period of five years (in the FATA development plan for 2007–15).

Recommendations

There are a number of recommendations that FATA might consider in improving the performance and sustainability of its WSS sectors. The purpose of the recommendations is to lay the basis for equitable, efficient and sustainable provision of water supply and sanitation services.

Recommendation One: Focus on Operations and Maintenance

Service quality, access and sustainability can be further improved if the focus is placed on the operation and maintenance of the schemes. At the same time, it will be important to build capacity of the existing institutions such as the PHEDs and LG&RDD through a mix of training, networking and technical and administrative backstopping. To support this initiative, the following are recommended:

- A more formalized technical department be established that would proactively support CBOs in dealing with technical challenges in service delivery. This support would range from advice on repairs and maintenance to organizing major rehabilitations of systems. This service is best suited to the PHED, which would need support to evolve into this new role.
- Agencies themselves can take on a strong role to support sanitation improvements in the community, with support from the regional government through existing, but strengthened, implementation of the Pakistan Approach to Total Sanitation (PATS) model.

Recommendation Two: Develop Agency Strategic Water Supply and Sanitation Plans

Agency strategic water supply and sanitation plans could be developed for improved service delivery to those areas that have endemic unrest and that are a major security concern. These should target such areas as South and North Waziristan, Kurram, Orakzai, Bajaur, Khyber and Mohmand Alternative arrangements may include a combination of strategies such as small-scale

[13] Hydrogeology and Groundwater Resources of the NWFP, (Hydrogeology Directorate Peshawar of WAPDA in collaboration with Institute of Applied Geosciences Delft, The Netherlands: 2011).

private sector interventions, community-based interventions, and larger national nongovernmental organization–driven programs.

Recommendation Three: Promote Sanitation, Health and Hygiene Education

One of the key priorities could be to promote sanitation, health and hygiene education. Support to the key components of the behavioral change and communication strategy for health and hygiene education should be provided through the LG&RDD. Different interventions should be coordinated by the Local Government Department so they do not overlap and can have a cumulative impact focusing on stimulating community dialogue, scaling up PATS and creating demand for information and services.

Executive Summary: Gilgit Baltistan

Demographics

Gilgit Baltistan (GB) borders China, India, Afghanistan, and, within Pakistan, Khyber Pakhtunkhwa (KP). Its total area is approximately 72,000 square kilometers. GB is divided into two divisions (Gilgit and Baltistan); seven districts (Skardu, Ghizar, Gilgit, Hunza-Nagr, Diamir, Astore, Skardu and Ghanche); 19 tehsils; 105 union councils and 831villages.[14] Approximately 85 percent of the population lives in rural areas.

GB has an estimated population 2012 of 4.2 million.[15] As the GB *Economic Report* states, "GB's population is spread thinly across the territory, with 12 people per square kilometer as compared with 359 people per square kilometer in Punjab." Gilgit is the largest town, with a reported population of 216,760.

Regional Governance

GB has a relatively new constitutional/legal dispensation with the Gilgit Baltistan Empowerment and Self-Governance Order 2009, although it continues to have the status of a federal territory and not a province. However, its governance has been brought closer to that of the provinces. Earlier it was called the Northern Areas and was managed by the Ministry of Kashmir Affairs and Northern Areas (the same ministry that managed Azad Jammu and Kashmir). As a federally managed territory the Northern Areas did not have a full-fledged secretariat, and nearly all public sector water supply and sanitation (WSS) services were provided through the federal Public Works Department. Prior to that water and sanitation services in the Northern Areas were dependent on households, communities, NGOs, and CBOs.

Sector Institutional Arrangements

Currently the following institutions are involved in delivering water and sanitation services in GB:

- **The Public Works Department (PWD)** has a specific division, Public Health Engineering (PHE) that is responsible for construction and operation and maintenance (O&M) of urban water supply and sanitation schemes for Gilgit and Skardu. PWD also provides technical advice in the construction of water supply and sanitation schemes in rural areas and towns. A proposal has been made to expand PHE and to separate it from PWD.
- **Municipalities through their Tehsil Municipal Administrations (TMAs)** are responsible for municipal services delivery per the Local Government Ordinance 2001. GB has 105 urban local councils and 19 tehsil municipal administrative bodies. However, their technical and financial capacity depends primarily on their size and is often limited. With regard to WSS services, they are supported by the PWD for developing new assets but are themselves responsible for the operations and routine maintenance of the systems that are handed over to them by the PWD. Their capacity for such operational responsibility is generally lacking and if they are to successfully manage devolved services it will require capacity building. Their reporting line department is the Local Government and Rural Development Department (LG&RRD).
- **The Local Government and Rural Development Department** (LG&RRD) is responsible for water and sanitation policy and construction of rural water supply and sanitation schemes with assistance from PWD for technical issues.
- **Communities** are responsible for the operation and maintenance of all rural water supply and sanitation schemes through CBOs. Communities have been trained by external donors to operate and maintain systems but need assistance for more complex issues such as redesign, retrofit or major repair activities. The majority of these CBOs resulted from the Water and Sanitation Extension Program (WASEP), which

[14] Planning and Development Division, Government of Pakistan, "Provincial Sanitation Policy/Strategy" (final draft), July 2011.
[15] Volume II, table 1.1, data from Pakistan census bureau website, http://www.census.gov.pk.

has successfully partnered with 130 rural communities in the provision of integrated water supply and sanitation services. Support for WASEP has come from the Aga Khan Foundation and from the United Nations Development Program and the Pakistan Poverty Alleviation Fund, which coordinate on sanitation, health and hygiene education.

This institutional arrangement, which involves multiple agencies, result in:

- Demonstrated success of CBO models and community mobilization through the assistance of external donors; and
- Limited fiscal resources yet multiple and interrelated agencies (including local, regional, and federal) all working in a fairly small region and likely resulting in some overlap and duplication of effort.

Current Water Supply and Sanitation Coverage

GB has not been included in the Pakistan Social and Living Standards Measurement (PSLM) data set since 2004–2005 and a Multiple Indicator Cluster Survey has not been undertaken. Therefore, data are scarce and not comparable to other provinces or regions. Considerable intraregional disparity exists, with upstream summer pastures and remote areas having poorer WSS service access.

The GB *Economic Report* (March 2011) prepared by the World Bank, Asian Development Bank, and the Government of GB, states that 62 percent of the population in GB has access to tap water, 31 percent to open reservoirs and streams, 1 percent to hand and/or motorized pumps, and 3 percent to other sources. Only 18 percent of households in GB were without any toilet facility, compared to 31 percent in the rest of Pakistan, so open defecation may be less of a problem in GB than in the rest of Pakistan.

GB lags behind the rest of Pakistan in the prevalence of modern toilet facilities with adequate disposal methods — either connected to a public sewage system or to a septic tank. About 37 percent of households in GB had adequate toilet facilities compared to 42 percent in the country as a whole. Access to water supply and access to modern sanitation facilities in GB also varied across districts and across the rural-urban divide. Access to modern flush systems in urban locations in GB was 20 percent higher than in rural areas. Overall, urbanites enjoy higher access rates to tap water and toilet facilities, by 80 and 20 percent, respectively, than rural inhabitants. The snapshot of WSS presented above is based on the 2004–2005 PSLM.

To date, WASEP has supplied potable water to 153,000 people, installed 9,200 latrines, and conducted 5,700 hygiene education sessions, generally with women and children. As part of WASEP the Aga Khan Foundation, through the Aga Khan Planning and Building Services, has implemented100 village water systems, of which 97 were gravity fed. This led to 100,000 people getting access to safe drinking water. In addition, 7,400 latrines were built.

Water Resources and Climatic Conditions

GB's water resource management and climatic conditions are critical for all of Pakistan. GB contains the world's largest natural glaciers outside the polar region, and is home to three of the highest mountain ranges in the world (Himalaya, Karokoram and Hindukush) and 5 of the world's 10 mountains taller than 8,000 meters. The region is at high risk for earthquakes, landslides, rock falls, mudflows, glacial movement, avalanches, flash floods, and river floods.[16] The region is called a high-altitude cold desert due to the Himalaya and Ladakh ranges. GB is barren and dry with very sparse vegetation. Except for the districts of Diamer and Astore, GB does not have forest cover. Agricultural land counts for less than 5 percent of the total landmass.

There are two rivers in the vicinity of Gilgit, the Gilgit and Hunza Rivers. A large number of small rivers emerging from various glaciers as well as big springs and lakes all feed into these rivers. Seasonal variations have an impact on the discharge of primary rivers resulting in a significant decrease in the flow in peak winter season. The flow is greatest from July to September when snows are melting in the mountains and monsoons bring large amounts of rain causing landslides, high flood levels, and an increase in the turbidity of water.

GB is vulnerable to climate change. The climate stations in Gilgit, Skardu, Gupis and Bunji show total temperatures increasing by 0.440 degrees centigrade per decade from 1980 to 2006.[17]

Service Quality

There is limited regional-level data available on service quality and the following presents the limited information that has been gathered under this study.

[16] UNDP-HABITAT and NED, "Gilgit City," in An Overview of *LandiKotal City* (Islamabad: 2011), http://urban.unhabitat.org.pk/Portals/0/Portal_Contents/Gilgit%20Baltistan/Gilgit/City%20Profile%20-%20Gilgit.pdf.

[17] F. Ali, "Climate Change Probability In Gilgit-Baltistan," Pamir Times, December 2, 2010.

There is no city in Pakistan with a 24-hour/7-day water supply. In GB, the hours of supply for Gilgit and Skardu range from 4 to 8 hours a day. In terms of non-revenue water (NRW)—a key measure of both technical and commercial performance—there is virtually no metering, which means any estimates of NRW are highly unreliable.

PWD and PHE are responsible for collecting and treating wastewater. However, no part of the province actually treats waste water.

In rural areas, out of the 100 rural water schemes that were built by WASEP with support from the Agha Khan Foundation, 97 have 24-hour supply, and 83 systems have maintained WHO standards (water quality is subject to some variation due to heavy metal and coli form bacteria content). The three schemes with power-driven pumps have been unable to maintain the same level of service due to power outages and the cost of running the system. These are all CBO-managed schemes, in which CBOs have been an integral part of the design and construction process.

The proportion of schemes that are functional varies considerably from 48 percent in Sindh to 100 percent in GB. This is a remarkable achievement for GB. Nationally, 83 percent of the schemes are reported to be functional. The large variations may partly be explained by definitional differences of what constitutes functionality. The inter-provincial comparison in the figure below shows that compared to other provinces and regions GB has the best ratio of functional/non-functional schemes.

[18] GB Draft Drinking Water Supply Policy and Strategy, July 2011.

Cost Recovery

Water consumption in both urban and rural areas is unmetered and is charged on a flat rate basis with monthly tariffs ranging from Rs. 30 (US$0.32) to Rs. 150 (US$1.6) depending on the size of the holding.

Within GB the collection efficiency is highest in schemes that were built through funds from KfW by WASEP. In the 100 villages developed with support from the Agha Khan Foundation functional user groups have been established of which 80 percent run their facilities well (book keeping is "exemplary") and 20 percent adequately. Individual user groups set tariffs.

Capital Investment

From 1995 to 2010 the government of GB allocated on average less than 0.1 percent of the budget in the GB Annual Development Plan for WSS.[18] Planned investment for construction of new schemes is nominal. An important concept in the allocation of resources to improving drinking water safety is that of incremental improvements toward long-term targets. Priorities set to remedy the most urgent problems should therefore be linked to long-term targets of further water quality improvements.

Limited fiscal resources constrain investment in WSS, and the need for financing is significant. It is estimated that an annual investment of Rs. 500 million will be needed over a period of 10 years to provide safe drinking water and basic sanitation facilities to all households in GB. Another rough estimate is that the construction of a basic drainage system in Gilgit would

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Sindh	1,384	666	339	327	48%
TOTAL	**21,295**	**17,652**	**12,812**	**3,612**	**83%**

Source: Data compiled during field visits 2012.
* O&M of rural schemes are no longer managed by communities.

require a capital investment of Rs. 1.5 billion (equivalent to approximately one-third of the total GB annual budget). Without these investments, contamination of rivers and water channels due to open drains and unhygienic waste-dumping practices is increasing, especially in urban centers like Gilgit.

In rural areas, each union council representative receives Rs. 80,000 (US$1,000) per year to undertake WSS projects. This leads to atomized projects that are either nonviable or are not prioritized by the communities in the first place. Focusing on projects based on need and potential returns, emphasizing cost recovery and partnering with CBOs to pool resources, will be crucial to offset the gaps in public financing of WSS projects.

Recommendations

There are a number of recommendations that the region of GB might wish to consider in improving the performance and sustainability of its urban and rural WSS sectors. The purpose of the recommendations is to lay the basis for equitable, efficient, and sustainable provision of water supply and sanitation services.

Recommendation One: Further Support the CBO-based Approach to Provision of WSS Services in Rural Areas

In GB there is a need to continue to support and build on the successful approach to providing rural WSS through the use of CBO-managed systems. Service quality, access, and sustainability can be further improved if the current model is deepened, providing CBOs with a greater role in rural WSS project cycle and at the same time further building their capacity through a mix of training, networking, and technical/administrative backstopping. To support this scale up of the existing model the following are recommended:

- An administrative backstopping facility is established in the province that would proactively support CBOs in the management of their systems. This would include ongoing support for training of CBOs as well as recording and disseminating best practices for rural WSS. Such a facility could evolve to help with policy and legal reforms, programming, regulation of tariffs, metering and capacity building, monitoring and evaluation, and so forth.
- A more formalized technical backstopping facility is established that would proactively support CBOs in dealing with technical challenges in service delivery. This would range from advice on repairs and maintenance to organizing major rehabilitations of systems. This service is best suited to a technical organization such as the PWD, but it would require that the PWD be supported to evolve into this new role.
- The scope of the existing GB CBO model be expanded to include responsibility for identifying, designing, and building rural WSS schemes. At present the PWD is the lead agency in system development, and this can lead to a disconnect with the communities to be served in terms of appropriateness of design, adequacy of service level, and oversight of implementation. Elsewhere in South Asia, rural CBOs are given much broader responsibility during the planning, design, and implementation phases of the project cycle, leading to lower unit costs and greater sustainability.
- The CBOs take on a strong role to support sanitation improvements in the community, with support from the regional government through existing, but strengthened, implementation of the Pakistan Approach to Total Sanitation (PATS) model.

The proposed administrative and technical support service could be undertaken by PWD or PHE, but in either case it would require some restructuring and retraining of staff in these entities to provide the new service.

Recommendation Two: Develop Programs to Improve the Quality and Sustainability of Services in Skardu and Gilgit

In Skardu and Gilgit, the Government of GB should consider investment programs built around service improvement plans that would enhance financial and operational performance while delivering results at minimum costs. The program might be based on a stepwise improvement process that tackles quick payback investments as a priority before proceeding to investments that require more capital or more institutional capacity. Thus, financing would likely focus first on energy efficiency programs to reduce total energy consumption per cubic meter of water delivered to consumers. Such programs could optimize pumps, increase levels of metering of both production and consumption, and gradually replace obsolete electromechanical equipment. Thereafter, further improvements might include updated billing and collection systems, leakage reduction activities, network expansion, and moving toward 24/7 continuous supply.

Recommendation Three: Promote Sanitation, Health and Hygiene Education

Build on the work done by government and NGOs on sanitation, health, and hygiene education. Support to the key components of the behavioral change and communication strategy for health and hygiene education

should be provided through the Planning and Development Division (P&DD). Different interventions should be coordinated by the P&DD so they do not overlap and can have a cumulative impact focusing on stimulating community dialogue, scaling up PATS and creating demand for information and services.

Executive Summary: Khyber Pakhtunkhwa

Context

Khyber Pakhtunkhwa (KP) is vulnerable to militancy and some areas such as Swat and Dir have experienced sustained conflict for several years. In addition, the catastrophic floods in 2010 and a major earthquake in 2005, all required government and international interventions and investment to address the natural emergencies.

Provincial Demographics

KP had an estimated population in 2012 of 23.2 million,[19] of which 83 percent live in rural areas. Peshawar, the capital of KP, is currently home to about 2.1 million people. The bulk of the urban population is concentrated in the 10 largest cities.[20] The estimated population density was 345 persons per square kilometer in 2011, which is more than double that of 30 years ago.[21] A few districts, including Battagram, Buner, Kohistan and Shangla and a few tehsils like Matta, Mastuj, Ghazi, Takht-e-Nusrati, Oghi and Jandool are entirely rural without any urban settlements. About 27 percent of the rural population lives below the poverty line.[22] This compares to a national average of 25.7–28.3 percent according to World Bank estimates.

Sector Institutional Arrangements

Currently, the following four formal actors are providing water supply and sanitation (WSS) services in KP:

- **Public Health Engineering Department (PHED)**[23] is responsible for construction and operations of rural water supply and sanitation schemes. PHED obtains resources from provincial governments to undertake all capital works and for operational expenses.
- **Water and Sanitation Service Peshawar (WSSP)** was provided the approval by the Government of KP to be established in 2012 as the first corporate utility in Pakistan. WSSP will be an autonomous corporation to provide and improve water supply, sanitation, and solid waste services in urban areas of Peshawar. Previously, service provision for Peshawar was handled by seven different agencies, including four Tehsil Municipal Administrations (TMAs), Peshawar Development Authority, Cantonment Board and PHED.
- **Municipalities through their Municipal Committees** are responsible for municipal services delivery per the Local Government Ordinance (LGO) 2012. There are 50 municipal administrative bodies (excluding Peshawar) providing municipal services. However, their technical and financial capacity is variable depending primarily on their size. In regard to WSS services, they rely on the PHED for developing new assets but are themselves responsible for the operations and maintenance (O&M) of the systems that are handed over to them by the PHED. Their capacity for such operational responsibility is limited, and if they are to successfully manage devolved services it will require significant capacity building. Municipalities are staffed by personnel from two different services: the Provincial Unified Group of Functionaries, which are the senior level/management/engineering staff, and the local employees. Their reporting line department is the Local Government and Rural Development Department (LG&RDD).
- **Communities**. There are some 3,900 registered NGOs in KP active in the rural sector.[24] Communities

[19] Volume II, table 1.1, data from Pakistan census bureau website, http://www.census.gov.pk.

[20] By descending order the 10 largest cities are Mardan, Nowshera, Charsadda, Swabi, Mingora, Abbotabad, Kohat, DI Khan, Haripur. Tariq Rahim, AurangZeb and Shaheen Shaukat, "Urbanization in the North West Frontier Province," *Sarhad Journal of Agriculture* 23, no 1 (2007): 237, table 5,http://www.aup.edu.pk/sj_pdf/Urbanization%20in%20north%20west%20frontier%20province.pdf.

[21] Source, Government of Khyber Pakhtunkhwa website, http://www.khyberpakhtunkhwa.gov.pk/aboutus/Area-Population.php.

[22] Volume II, table 1.2, data from Social Policy and Development Centre, Karachi, 2004. According to CDS KP, the rate of poverty in rural areas is 41.1. percent compared with 28.1 percent for urban areas.

[23] The PHED was upgraded to a full administrative department in 1992.

[24] Social Welfare Department, KP, February 2013.

are meant to have capacity to operate and maintain systems, but they are often insufficient for more complex issues such as design, retrofit, or major repair activities. Even though PHEDs are responsible for the O&M, from 1993 to 2010 about 1,161 water supply schemes were developed and handed over to Village Development Organizations (VDOs) for operation and maintenance under the Social Action Program.[25] Under LGO 2012, PHED has taken back all the schemes from VDOs effective January 1, 2013 and is now managing O&M itself.

In addition, because formal water services are often inadequate, households frequently self-provision. According to the Pakistan Social and Living Standards Measurement (PSLM) 2010–11, at least 46 percent of households in urban areas and 84 percent of households in rural areas provide some or all of their water through hand pumps, motor pumps, and dug wells. In relation to sanitation, data from the Multiple Indicator Cluster Survey (MICS) show that 42 percent of households in urban areas and 95 percent in rural areas are not connected to public sewers and thus rely on their own arrangements, including septic tanks and open defecation.

These institutional arrangements, which involve multiple province agencies and split responsibilities between asset development and asset operation, result in the following:

- Limited accountability for delivery of service in terms of the levels and quality of service provided because the divided responsibility for services enables an agency to attribute any shortcomings to other agencies involved;
- Need for development and capacity building in municipalities and/or the creation of alternative service delivery arrangements in order to overcome weak municipal capacity;
- Need to further support and develop the VDO model for planning, implementation, and operations of rural water supply and sanitation systems even though it may take longer for such schemes to be sustainable in KP: Experience elsewhere in Pakistan and the region points toward greater sustainability of the VDO/community-based model (CBO) in the long run; and
- Poor financial sustainability as a result of low capacity and weak incentives to recover costs and deliver good quality services efficiently.

[25] For additional information on the Social Action Program, refer to Pakistan Water Supply and Sanitation Study, Vol. II, Chap. 1.

Current Water Supply and Sanitation Coverage

In KP 71 percent of the urban population has access to improved water as compared to the national average of 96 percent estimated by the Joint Monitoring Program (JMP) of WHO and the UNICEF.

About 63 percent of the urban population, compared to 58 percent of the national urban population, has access to tap water; a further 28 percent of the urban population (compared to national urban average of 36 percent) is served by pump systems; 4 percent of the urban population (versus 1 percent nationally) is served by dug wells; and 4 percent of the provincial urban population (6 percent nationally) gets water by other means.

PSLM 2010–11 report 91 percent of households in urban KP have flush toilets. In urban areas 73.1, percent of households reported washing hands after toilet use. According to the PSLM, 3 percent of the urban population defecates in the open.

Access to improved rural water supply is 76 percent in KP, compared to the national average of 89 percent estimated by the JMP. According to the PSLM, about 41 percent of the province's rural population (compared to 19 percent national) has access to tap water; a further 23 percent of the rural population (65 percent nationally) is served by pump systems; 12 percent of the provincial rural population (6 percent nationally) by dug wells; and 23 percent of the provincial rural population (versus 10 percent nationally) gets water by other means.

According to the MICS data, in KP the "flush toilet (pit, septic tank, and public sewerage)" is the most prevalent type of rural sanitation, used by 46.1 percent of households. In rural KP, a high percentage of rural households are without any toilet facility: the exceptions are Chitral (3 percent), Nowshera (4 percent) and Bannu (5 percent), Lower Dir (6 percent), rural Upper Dir and Hangu (7 percent), and Malakand and Peshawar (8 percent). It is estimated that 39 percent of the rural population defecates in the open.

According to the MICS, access to higher levels of services depends on education and income levels. In KP house or yard connections are accessed by only 25 percent of the households without education; whereas such connections are accessed by 38 percent of the households with secondary education. Only 18 percent of the households from the lowest income quintile access this level of service, whereas 45 percent of the highest income quintile accesses this service.

Data provided by the Local Government and Rural Development Department (LG&RDD) shows that there were 676 water supply schemes (674 tube wells and 2 gravity) in all TMAs of KP, which were supplying water

to 591,412 households (4.16 million people) through 582,213 connections.

There is room to improve coverage performance in KP, and the Government has prepared and approved a Comprehensive Development Strategy (CDS) for 2010–2017. The goals of the CDS as defined by the province are to expand the availability of clean water, especially in areas threatened by conflict, and to ensure that all KP has100 percent access to safe sanitation. It also assesses the costs of the priority programs involved.

Water Resources

Groundwater is over exploited in many areas, and its quality is deteriorating. Integrated water resources management faces serious technical challenges arising from increasing demand for water from all users. As a result, the quality of water is declining and groundwater reserves are falling.

In parts of KP (and likely elsewhere in the country), poor collection and treatment of human waste is adversely impacting access to readily available, low cost, shallow groundwater. The MICS data set shows a high dependence on groundwater and surface water sources, particularly for the poor. In KP the motorized pump and house hand pump accounted for 25.7 percent of provincial use: 30.6 percent of households in urban areas and 24.8 percent of households in rural areas. In the central and southern regions of the provinces, they accounted for 40.3 percent of urban and 39.9 percent of rural households.[26]

The provincial government does not have facilities for conducting water quality analysis. Two studies undertaken by the Pakistan Council of Research in Water Resources in upper KP (Mardan, Buner, Swat, Upper Dir, and Lower Dir districts) and in rural areas of four districts are available for raw water quality (PCRWR).[27] In upper KP, analyses of five districts, namely Mardan, Buner, Swat, Lower Dir, and Upper Dir have been conducted. The conclusions are the following:

- All the samples from Lower Dir and 90 percent from Upper Dir had excessive bacteria levels, and the water is unfit for drinking.
- Seventy-nine percent, 70 percent, and 75 percent of samples from Mardan, Buner, and Swat, respectively, had bacteriological contamination above permissible levels. About 83 percent of samples were not suitable for drinking due to excessive bacteriological contamination.
- Moreover, an average of about 15 percent had calcium, 17 percent had fluoride, and 14 percent had turbidity with impermissibly high values.

PCRWR carried out another extensive study in rural areas of Pakistan that included four districts of KP, namely Abbottabad, Swat (Mangora), Mardan, and Peshawar. It concluded the following:

- Ninety-nine percent of samples from the Abbottabad area, 97 percent in Peshawar, and 93 percent in Mangora were unsafe, while 80 percent of samples from Mardan were unsafe for drinking.
- On average, more than 62 percent of samples had high E.coli contamination while 9 percent had high nitrate, 11 percent had high iron, and 11 percent had excessive turbidity values.

WHO (2012) reported on water quality in KP for internally displaced persons camps and host communities. The tests revealed that 40 percent of the samples were contaminated; samples included water from shallow-dug pump wells, storage tanks, and water handled at the household level.[28]

Service Quality

There is no city in Pakistan with a 24 hour/7 day water supply. In KP the hours of supply range from 9 hours a day in Peshawar to 3–4 hours a day in Abbottabad, Mardan, and Swat.

In terms of nonrevenue water (NRW)—a key measure of both technical and commercial performance—Peshawar reports that up to 45 percent of total water production is lost to leakage or is not paid for. However, metering coverage is virtually nonexistent, which means that any estimates of NRW are highly unreliable.

The TMAs are responsible for collecting and treating wastewater. Even though Peshawar has four treatment plants, none are in operation. None of the other cities treat their wastewater.

The proportion of schemes that are functional varies considerably from 48 percent in Sindh to 100 percent in GB. The large variations may partly be explained by definitional differences of what constitutes functionality. Nationally 83 percent of the schemes are reported to be functional. The figure for KP is 84 percent—which is reasonable.

[26] MICS divides the province regionally for some indicators: Central, Hazara, Malakand and Southern. In Malakand the highest prevalence is in-house pipe in the dwelling or yard and in Hazara it is the protected spring.

[27] PCRWR has carried out a detailed water quality survey throughout KP, but results have not been published yet.

[28] WHO, Summary of Environmental Health Activities in August 2012-KP/FATA. http://www.emro.who.int/images/stories/pakistan/documents/pak_documents/ENV_Health/Summary_of_Environmental_Health_Activities_In_KP-FATA.pdf.

Table 5: Khyber Pakhtunkhwa Executive Summary Rural Water Supply Systems, Total and Functional

Province/Region	Total number of schemes	Functional Schemes	Number of functional schemes operated by CBOs	Number of functional schemes operated by PHED	Share of total number of schemes that are functional
AJK	7,500	7,461	7,422	39	99%
Balochistan	2,353	1,746	1,005	741	74%
FATA	1,507	1,228	NA	NA	81%
GB	437	437	437	–	100%
Khyber Pakhtunkhwa*	4,056	3,399	1,161	2,238	84%
Punjab	4,058	2,715	2,448	267	67%
Sindh	1,384	666	339	327	48%
TOTAL	**21,295**	**17,652**	**12,812**	**3,612**	**83%**

Source: Data compiled during field visits 2012.
* O&M of rural schemes are no longer managed by communities.

Cost Recovery

Household water bills are based on a flat rate of Rs. 120 per month (US$1.2) for domestic users in urban areas. The flat rate charging system creates regressive water subsidies that benefit unmetered wealthy households who are connected first and who use more water than poor households.

Weak commercial performance is reflected in the low collection rates. These range from 72 percent in Abbottabad, 55 percent in Peshawar, 46 percent in Mansehra and only 16 percent in Nowshera. Urban schemes that are managed by municipalities are largely not financially sustainable because they do not generate enough revenue to pay for cash O&M costs, let alone contribute to depreciation charges or capital expenditures.[29]

Data collected for the past six years show that expenditures have increased from Rs. 750 million (US$683,675) in 2005–06 to Rs. 970 million (US$9,937,553) in 2010–11, an increase of about 29 percent in nominal terms. Revenue collection has also increased, from Rs. 45 million (US$461,020) in 2005–06 to Rs. 180 million (US$1,844,082) in 2010–11, a 300 percent increase. These increases have resulted in a significant improvement in the working ratio, from 16.7 to 5.4 during the six-year period. While this is a positive development, however, today under 20 percent of the operating costs of urban systems are recovered from user fees. This is extremely low by any standard.

On the cost side, many urban schemes are seeing O&M costs rise due to escalating energy costs, which are often a large part of total operating costs. In Peshawar, for example, the share of electricity in overall O&M costs is 38 percent. High levels of leakage from systems further exacerbate the situation, as water is pumped into the distribution system only to leak out of the pipes before reaching the customer. Improving energy efficiency, reducing leakage, and paying greater attention to cost recovery issues in project design are essential to redress the current shortfalls in cost recovery.

International best practice is to meter consumption and charge on a volumetric basis. User charges typically cover at least the cost of O&M in rural areas while in urban areas user charges should also make a contribution to either debt service or capital expenditure. In other words, the working ratio in urban areas should always be less than 1.0.

Capital Investment

For the period 2009–2011 (as reflected in Annual Development Program documents for 2010–13), there were a total of 37 schemes receiving capital investments.[30] The total cost of these schemes was Rs. 16,264 million. The

[29] Municipal revenues include own source revenue, Octroi Compensatory Grants, and provincial transfers. Own source revenue includes a property tax that is collected by the provincial government and generally deducted by the provincial government on account of funds owed to the province or to utilities such as electricity, and so forth.

[30] Capital investment programming for the sector is not reflected in the Annual Development Program document unless funds are disbursed in a particular financial year, in which case the scheme is reflected in the subsequent year.

total disbursed amount for the period was Rs. 5,249 million. Capital investment programming does not focus on finishing schemes on which construction has begun. As a result schemes are constructed over several years by spreading available funding over many schemes through small disbursements in each financial year (or in some cases alternate years). On average the construction period is approximately 9.3 years.

For more than 50 percent of the amount disbursed over this three-year period it was not possible to identify which of the investments were rural and which were urban. However, for the investments that were identifiable by category, urban investments were more than three times the rural investment. About 40 percent of all schemes (from those that could be identified) were for urban areas.

The bulk of the schemes are primarily in the water subsector, followed by water and sanitation, and followed by sewerage. During 2009–11, (i) 48 percent of the schemes were exclusively for water, (ii) 32 percent of the schemes were for water supply and sanitation, and (iii) only 16 percent of the schemes were for sewerage and sanitation. About 86 percent of the schemes were executed by PHED, which also accounted for 81 percent of total disbursement over the three-year period.

Recommendations

There are a number of recommendations that the Government of KP might consider for improving the performance and sustainability of its urban and rural WSS sectors. The purpose of the recommendations is to lay the basis for equitable, efficient, and sustainable provision of water supply and sanitation services.

Recommendation One: Support the Provision of Water Supply and Sanitation Services in Rural Areas

In KP, there is a need to further support and mainstream the provision of RWSS and focus on sustainable O&M. Service quality, access, and sustainability can be improved if providers have a greater role in RWSS project cycles while at the same time they build their capacity through a mix of training, networking, and technical/administrative backstopping. To support this process is the following are recommended:

- In KP, the PHED has taken back the responsibility of those schemes that were transferred to CBOs for operation. This can lead to a disconnect with the communities to be served in terms of appropriateness of design, adequacy of service level, and oversight of implementation. PHED needs to engage the community in planning, construction, and post construction stages to ensure sustainability and ownership. There is a need to explore models that could be most effective in KP, ranging from community management of all O&M to community support to PHED in service delivery.
- The O&M of the CBO model can be done by the PHEDs in cooperation with the VDOs. As capacity is developed over the long run, this model should also include responsibility for identifying, designing, and building RWSS schemes.
- An administrative facility should be set up in an existing department in KP that would proactively support and mainstream providers in the management of their systems. This would include ongoing support for training and for recording/disseminating best practices for rural water supply and sanitation. Such a facility would gradually enhance performance in the KP systems and could evolve to help with policy and legal reforms, programming, regulation of tariffs, metering and capacity building, monitoring and evaluation, and so forth.
- A more formalized technical backstopping facility could be established that would proactively support dealing with technical challenges in service delivery. This would range from advice on repairs and maintenance to organizing major rehabilitations of systems. This service is best suited to a technical organization such as the PHED, but it would require that the PHED be supported to evolve into this new role. The facility would also undertake an analysis to further understand why VBO-structured schemes were simply not sustainable.

Recommendation Two: Create Incentive Programs for Improved Performance in Both Urban and Rural WSS Provision

In urban settings the Government of KP should consider programs that incentivize recipients to improve their financial and operational performance and deliver results at minimum costs. The program might be based around a step-wise improvement process that tackles quick payback investments as a priority before proceeding with investments that require more capital or more capacity. Thus, incentives would likely focus first on energy efficiency programs to reduce total energy consumption per cubic meter of water delivered to consumers. Such programs could reward optimization of pumps, increased levels of metering of both production and consumption, and gradual replacement of obsolete electromechanical equipment. Thereafter, further improvement steps would include updated billing and collection systems, leakage reduction activities, net-

work expansion, and movement toward 24/7 continuous supply.

The key should be to allocate funding to systems with proven success—for example, in expanding metering and numbers of hours of service and in reducing levels on NRW. Such performance-driven allocation criteria will also likely shift investment allocations toward a timely completion of systems on which construction has already started. In delivering improved service, the program should also facilitate improving institutional arrangements that are more aligned with efficient, accountable, and more autonomous service providers—particularly relevant in the case of support to WSSP.

The investments in metering hardware and toward reducing levels of NRW will necessarily have to be complemented by upgraded consumer data bases, design and implementation of tariff schemes that vary with the level of metered consumption, and the design and implementation of software to allow for effective billing and collections. The investments in both hardware and software should be matched by higher levels of training of staff to administer the new systems and by incentives that will reward those service providers and their staff who manage to increase the levels of collections.

Over time, consumers should be charged on the basis of their metered consumption. In such a scenario, payment for services will become socially more equitable and subsidies can be targeted to low-income households who consume much less water than high-income households. This approach will also allow consumers to adjust their consumption to the willingness and ability to pay for service.

To address the number of nonfunctioning RWSS schemes, a third party assessment should be conducted in order to (i) understand the reasons for nonfunctional schemes, (ii) document the condition of functional and nonfunctional schemes, (iii) estimate investment needs for their operationalization and upgrading and (iv) understand and document how tariffs are established and how the poor are serviced. A program can then be designed to address non-functionality through a mix of investment and transfers of responsibility to better capacitated CBOs.

Recommendation Three: Provide Additional Resources to Implement the KP Sanitation Strategy and Community Led Total Sanitation

The KP Sanitation Strategy envisions scaling up the rural sanitation program through facilitation by the LG&RDD and providing implementation and social mobilization support through PHED and other partners and civil society. Since the program is ambitious, KP should increase resources for capacity building and increase trainings for social mobilizing programs in communities toward Open Defecation Free. The goal should be to scale up the work being undertaken to train communities and partner organizations.

In implementing the KP Sanitation Strategy, consideration should be given to adopting a model of CLTS. This involves including CLTS, behavioral change and sanitation in an integrated manner that targets (i) scaling up of present approaches through government and donor financing, (ii) sustainability and monitoring of sector outcomes, and (iii) creation of sanitation markets and capacity.

Recommendation Four: Support the Water and Sanitation Service for Peshawar

The establishment of the WSSP provides KP the opportunity to learn from the experiences of water and sanitation agencies (WASAs) in other provinces and the region. As WSSP joins the countrywide benchmarking initiative (PWOP-S), it can also gain knowledge from the experiences of the other WASAs. Since WSSP will be the first corporate entity in Pakistan to provide water supply, sanitation and solid waste, it also presents an opportunity to provide improved integrated services in a more comprehensive manner.

Recommendation Five: Support the KP Urban Unit

The KP Urban Unit was established in 2012. It is recommended that the government support the Urban Unit in KP and guide it to address evolving sectoral issues such as the following:

- Understanding sources of poor drinking water quality and developing appropriate solutions (this should cover both urban and rural areas given the endemic nature of the problem and the likely similarity of technical solutions);
- Compiling and reporting data on water, wastewater and solid waste services, O&M, and cost recovery;
- Supporting the development of integrated financial plans, training, service improvement plans, customer service, and approaches to improved maintenance O &M in urban WSS providers;
- Developing customer service programs for improved relationships with WSS end users; and
- Improving capital investment programming in the province.

Executive Summary: Punjab

Provincial Demographics

Punjab had an estimated population in 2012 of 94 million[31] of which 31 percent live in rural areas. Lahore, the capital is currently home to about 8 million people. The province has four other cities with populations in excess of 1 million: Faisalabad (3 million), Gujranwala and Rawalpindi (2 million each), and Multan (1.7 million). Collectively, about half of the urban population in Punjab is concentrated in these five cities. In addition, three other large cities (Sialkot, Bahawalpur, and Sargodha) are poised to cross the 1 million mark.

Among the provinces and regions in the country, Punjab has the highest urban poverty rate, with 32 percent of the urban population below the "basic needs urban poverty line." This compares to a national average of 25.7–28.3 percent according to World Bank estimates.

Sector Institutional Arrangements/ Governance

Currently, four formal actors are providing water and sanitation services in the Punjab:

- **The Public Health Engineering Department (PHED)** is responsible for construction and major rehabilitation of rural water supply and sanitation schemes—routine operation and maintenance (O&M) is the responsibility of community-based organizations (CBOs)—and the construction of urban water supply and sanitation schemes except in those cities with Water and Sanitation Agencies (WASAs). The PHED has the resources to undertake all capital works for rural and urban areas except for the five WASA cities.
- **Water and Sanitation Agencies** are corporate bodies created by provincial acts and are responsible for the provision of water supply and sanitation services in Lahore, Faisalabad, Gujranwala, Rawalpindi, and Multan. Their reporting departments are Housing and Urban Development (HUD) and PHED.
- **Municipalities through their Tehsil Municipal Administrations (TMAs)** are responsible for municipal services delivery per Pakistan's Local Governance Ordinance of 2001. The urban sector has 240 urban local councils and MAs. However, they have limited technical and financial capacity, which varies depending primarily on their size. In regards to water and sanitation services (WSS), they rely on the PHED for developing new assets but are responsible for the operations and maintenance of the systems that are handed over to them by the PHED. Their capacity for such operational responsibility is improving but limited and if they are to successfully manage devolved services it will require significant building capacity. Their reporting line department is the Punjab Local Government and Rural Development Department.[32]
- **Communities** are responsible for the operation and maintenance of rural water supply and sanitation in the province through CBOs. Communities are meant to have capacity to operate and maintain systems, but this capacity is often lacking or insufficient for more complex issues such as redesign, retrofit, or major repairs of schemes.

In addition, and because water service delivered by the formal actors is often inadequate, households themselves self-provision. According to the Pakistan Social and Living Standards Measurement (PSLM) 2010–11, at least 46 percent of households in urban areas and 84 percent in rural areas provide some or all of their water through hand pumps, motor pumps, and dug wells. In relation to sanitation, data from the Multiple Indicator Cluster Survey (MICS) shows that 42 percent of households in urban areas and 95 percent in rural areas are not connected to public sewers and thus rely on their own arrangements including septic tanks and open defecation.

[31] Volume II, table 1.1, data from Pakistan census bureau website, http://www.census.gov.pk.
[32] http://pmdfc.org.pk/pdf/Finaldraft-Annual20Report17-09-2011.pdf.

These institutional arrangements, which involve multiple province agencies and split responsibilities between asset development and asset operation, result in the following:

- Limited accountability for delivery of service in terms of the levels and quality;
- The need for development and capacity building of TMAs and/or the creation of alternative service delivery arrangements in order to overcome weak TMA capacity;
- The need for building institutional and technical support for CBOs in their management of rural water supply and sanitation systems;
- Poor financial sustainability as a result of low capacity and weak incentives to recover costs and deliver good quality services efficiently;
- Lack of clarity in public resource management decisions due to multiplicity of agencies and overlap of mandates and functions; and
- Schemes being supply driven with a systemic disconnect between capital investment and O&M.

Current Water Supply and Sanitation Coverage

In Punjab 91 percent of the urban population has access to improved water as compared to the national average of 96 percent estimated by the Joint Monitoring Program (JMP) of WHO and the UNICEF. About 46 percent of the urban population in Punjab, compared to 58 percent of the urban population nationally, has access to a piped water supply in the yard or house, while a further 45 percent of the urban population accesses supply through motor or hand pumps (compared to national figure of 36 percent). This indicates a higher reliance in Punjab on non piped sources, primarily groundwater.

The PSLM 2010–11 reports 97 percent of households in urban Punjab have flush toilets. In urban areas, 81 percent of households report washing hands after toilet use. It is estimated that 2 percent of the urban population defecates in the open.

Access to improved rural water supply is 93 percent in Punjab, compared to the national average of 89 percent estimated by the JMP. According to PSLM 2010–11, about 14 percent of the rural population in Punjab has access to tap water, compared to 19 percent of the rural population nationally, while a further 80 percent of the rural population in Punjab access water supply through motor or hand pumps (compared to national figure of 65 percent). This again indicates a higher reliance in Punjab on non piped sources, primarily groundwater.

According to the MICS data, in Punjab the "flush toilet with septic tank" is the most prevalent type of rural sanitation, used by 38 percent of households. Overall, Punjab has the highest percentage of households reporting no toilet: 23 percent. In rural Punjab, a high percentage of rural households is without any toilet facility: The exceptions are rural Islamabad (3 percent), Gujranwala (7 percent), and Sialkot (9 percent). It is estimated that 28 percent of the rural population defecates in the open. Open defecation and associated poor hygiene practices are known to result in high levels of child mortality and poor health outcomes.

A more detailed analysis of the MICS shows that access to higher levels of services depends on wealth and education levels. In rural areas, house or yard connections are accessed by 12 percent of the households with no education whereas such connections are accessed by 31 percent of the households with higher education. Only 32 percent of the households from the lowest income quintile access this level of service whereas 44 percent of the highest income quintile access this service. This illustrates a degree of inequity in the current service arrangements.

Water Resources

Groundwater is overexploited in many areas and its quality is deteriorating. 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. In 2005, annual groundwater extraction to the extent of 35 million acre feet was reported in Punjab, a 35-fold increase since 1947. This large-scale groundwater extraction has greatly depleted the levels of good quality, or "sweet," groundwater.[33]

Furthermore, according to an October 2009[34] analysis report by the Pakistan Council of Research in Water Resources (PCRWR), groundwater from some 183 tube wells was found to have excessive levels of arsenic in Punjab. Another analysis conducted by the University of Engineering and Technology in June 2010 revealed that out of 392 tube wells in Punjab, high concentrations of arsenic were found in groundwater from 168 such wells, while in 82 others the level of this poisonous chemical was between 10 and 50 parts per billion.[35]

These challenges to both the quantity and quality of groundwater are particularly critical in Punjab. As

[33] http://www.esri.com/news/arcwatch/0709/pakistan-groundwater.html.
[34] http://www.eoearth.org/article/Aquifer_depletion.
[35] *Express Tribune*, September 18, 2011.

noted, there is a high dependence by people, particularly the poor, on direct access to groundwater and surface water sources in the province.

Service Quality

There is no city in Pakistan with a 24-hour/7 day water supply. In Punjab the hours of supply in the five WASAs range from 17 hours a day in Lahore to 14–16 hours in Gujranwala, 6–8 hours in Rawalpindi and Multan, and 6 hours in Faisalabad.

In terms of nonrevenue water (NRW)—a key measure of both technical and commercial performance—Gujranwala reports 58 percent of total water production is lost to leakage oris unpaid for. Such losses are 39 percent for Rawalpindi, 30 percent for Multan, and 24 percent for Faisalabad. However, metering coverage in the WASAs is low and undermines the reliability of the reported figures. There is no metering in Multan, 1 percent in Faisalabad, 3 percent in Gujranwala, 12 percent in Rawalpindi, and 52 percent in Lahore. Outside of the WASA cities there is virtually no metering, which means that any estimates of NRW are highly unreliable.

The WASAs and TMAs are responsible for collecting and treating wastewater. However, among Punjab's cities only Faisalabad treats wastewater and it treats only 20 percent of the collected wastewater.

The proportion of rural schemes that are functional varies considerably from 67 percent in Punjab to 100 percent in GB. The large variations may partly be explained by definitional differences of what constitutes functionality. Nationally, 83 percent of the schemes are reported to be functional.

The quality of water delivered to customers is an issue. According to the Punjab MICS data, bacterial presence in the water provided inside houses was reported at 47 percent in rural areas and 52.4 percent in urban areas. Although large urban cities are meant to have better quality and levels of water service, in Punjab's large cities 62.6 percent of the households had bacterial contamination inside the households as compared to 42.3 percent in smaller urban areas. This high incidence in large cities is likely caused by poor wastewater collection coupled with intermittent water supply, which result in sewage being sucked into water mains as they are emptied each day.

Cost Recovery

Financial working ratios—the ratio between cash O&M costs (but excluding depreciation) and cash operating income—for WASAs range from 1.1 in Faisalabad to 1.3 in Rawalpindi, 1.6 in Gujranwala, and 2.8 in Multan, implying that no WASA collects sufficient operating revenue to pay for its cash operating costs. Increasing collections is difficult as long as service remains intermittent and unsafe and is exacerbated by poor metering and billing practices. These low levels of cost recovery result from under pricing of water, poor commercial practices, and inadequate attention to cost control.

As very few water meters are installed in the water supply systems, the WASAs apply a stepped tariff systems based on the area of the consumer's plots. The lowest step is usually for homes up to 2,500 square meters (m^2). The steps increase by 1,000–2,500m^2. The first step tariff ranges from Rs. 377 (US$4.00) per month

Table 6: Punjab Executive Summary
Rural Water Supply Systems, Total and Functional

Province/Region	Total number of schemes	Functional Schemes	Number of functional schemes operated by CBOs	Number of functional schemes operated by PHED	Share of total number of schemes that are functional
AJK	7,500	7,461	7,422	39	99%
Balochistan	2,353	1,746	1,005	741	74%
FATA	1,507	1,228	NA	NA	81%
GB	437	437	437	–	100%
Khyber Pakhtunkhwa*	4,056	3,399	1,161	2,238	84%
Punjab	4,058	2,715	2,448	267	67%
Sindh	1,384	666	339	327	48%
TOTAL	**21,295**	**17,652**	**12,812**	**3,612**	**83%**

Source: Data compiled during field visits 2012.
* O&M of rural schemes are no longer managed by communities.

in Lahore to Rs. 35 (US$0.38) per month in Multan. The price of 1,000m^2 ranges from Rs. 833 (US$8.86) per month in Rawalpindi to Rs. 250 (US$2.26) in Multan. The flat rate charging system creates regressive water subsidies that benefit unmetered wealthy households who are connected first and who use more water than poor households.

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. 449 (US$4.9) for up to 2,500m^2 to Rs. 49 (US$0.53) for 1,000m^2.

Poor commercial performance is reflected in the low collection rates of WASAs. These range from 40 percent in Gujranwala, 51 percent in Faisalabad, 75 percent in Rawalpindi, 88 percent in Multan, and 98 percent in Lahore. In the districts of the Punjab the collection ratios range from 40 percent to 80 percent in urban areas. The high collection rates in Multan and Lahore provide benchmarks against which other urban providers can be measured.

On the cost side many schemes are seeing O&M costs rise due to escalating energy costs. Where power costs are a large part of total operating costs, this can have a significant impact. In Gujranwala, for example, the electricity share of overall O&M costs is 45 percent. High levels of leakage from systems further exacerbate the situation, as water is pumped into the distribution system only to leak out of the pipes before reaching the customer. Improving energy efficiency, reducing leakage, and paying greater attention to cost recovery issues in project design are essential to redress the current shortfalls in cost recovery.

The situation in TMA-managed water supply schemes indicates that, like in the WASA, they are financially unsustainable, since they do not generate enough revenue to pay for cash O&M costs. Only two of the Punjab districts, Chakwal and MandiBahauddin, have a working ratio of less than 1.0. In the other 18 districts, the operating expenditures exceed revenue collected with an average working ratio of 1.6. This means that about 37 percent of operating expenses have to be financed from sources other than revenue.As in the WASAs poor commerical performance, inadequate tariffs and high levels of leakage are the main problems in these smaller urban areas.

Water consumption in rural areas in Pakistan is largely unmetered, even though some 100 rural water schemes are known to be metered in Punjab. As a result, tariffs are mostly charged on a flat tariff basis, with monthly tariffs in Punjab ranging from Rs. 22 (US$0.23) in Bhakar district to around Rs. 90 (US$0.96) in Jehlum, Kasur, and DG Khan. This compares to Rs. 30 (US$0.32) to Rs. 150 (US$1.6) in the other provinces and regions, with the level depending on the size of the holding.

Within Pakistan the collection efficiency in rural water schemes is highest in Punjab, at 80–90 percent. These schemes are operated by CBOs and this supports a hypothesis that CBO-managed schemes are likely to be more sustainable than those operated by provincial or regional entities. Some 20 districts in north and central Punjab are either earning a surplus or breaking even on a cash basis.

International best practice is to charge and collect user charges that cover at least the costs of O&M in rural areas and in urban areas make a contribution to either debt service or capital expenditure. In other words, the working ratio should always be less than 1.0.

Capital Investment

For the period 2009–12 (as reflected in Annual Development Plan documents for 2010–13) there were a total of 674 schemes. The total cost of these schemes was Rs. 164,400 million. The total disbursed amount for the period was Rs. 37,600 million. On average the construction period is approximately 4.5 years—which is too long. Capital investment programming does not focus on rapid completion of schemes on which construction has begun, and schemes are constructed over several years because available funding in spread over many schemes through small disbursements each financial year (or in some cases, alternate years).

The bulk of capital investment is in the urban areas. Although the rural sector only made up about 30 percent of the entire disbursement over 2009–12, its many small schemes accounted for over 70 percent of the total number of schemes. Less than 0.05 percent of the capital investment was spent on sector planning and project management, as compared to an international benchmark of about 5 percent.

During 2009–11, three Federal Government schemes have been financed in Punjab (two in Southern Punjab and one in Lahore) at a total estimated cost of Rs. 5,400 million. Of this, some Rs. 4,480 million has been disbursed.

Recommendations

There are a number of recommendations that the Government might consider for improving the performance and sustainability of its urban and rural WSS sectors. The purpose of the recommendations is to lay the basis for equitable, efficient, and sustainable provision of water supply and sanitation services.

Recommendation One: Take Steps toward Attaining Financial Sustainability in Urban Areas

All production and consumption in urban areas should be metered in order to enable service providers to better manage their systems, both technically and commercially. Metering will provide the data that will facilitate reducing losses in the production and distribution of water.

Over time, consumers should be charged on the basis of their metered consumption. By doing so payment for services will become socially more equitable and subsidies can be targeted to low-income households who consume much less water than high-income households. This approach will also allow consumers to adjust their consumption to their willingness and ability to pay for service.

The investments in metering hardware will necessarily have to be complemented by upgraded consumer data bases, design and implementation of tariff schemes that vary with the level of metered consumption, and the design and implementation of software to allow for effective billing and collection. The investments in both hardware and software should be matched by higher levels of training of staff to administer the new systems and by incentives that will reward those service providers and their staff who manage to increase the levels of collections.

Recommendation Two: Further Support the CBO-based Approach to Provision of WSS Services in Rural Areas

In the Punjab there is a need to further support and build on the approach to providing rural WSS through the use of CBO-managed systems. Service quality, access and sustainability can be improved if the current model is deepened, providing CBOs with a greater role in rural WSS project cycles and at the same time building their capacity through a mix of training, networking, and technical and administrative backstopping. To support this transition, the following are recommended that:

- An administrative backstopping facility be established in the province that would proactively support CBOs in the management of their systems. This would include ongoing support for training of CBOs and recording and disseminating best practices for rural WSS. Such a facility would gradually enhance performance in the Punjab systems and could evolve to help with policy and legal reforms, programming, regulation of tariffs, metering and capacity building, monitoring and evaluation and so forth. This facility might be similar to that provided to the urban sector through the Punjab Urban Unit.
- A more formalized technical backstopping facility be established that would proactively support CBOs in dealing with technical challenges in service delivery. This would range from advice on repairs and maintenance through to organizing major rehabilitations of systems. This service is best suited to technical organizations such as PHEDs, but it would require that the PHED be supported to evolve into this new role.
- The scope of the existing Punjab CBO model be expanded to include responsibility for identifying, designing, and building rural WSS schemes. At present the PHED is the lead agency in system development, and this can lead to a disconnect with the communities to be served in terms of appropriateness of design, adequacy of service level, and oversight of implementation. Elsewhere in South Asia, rural CBOs are given much broader responsibility during the planning, design, and implementation phases of the project cycle, leading to lower unit costs and greater sustainability.

Recommendation Three: Establish Programs to Create Incentives for Improved Performance in Both Urban and Rural WSS Provision

For the urban setting, the Government of Punjab should consider programs that incentivize recipients to improve their financial and operational performance and deliver results at minimum costs. The program might be based around a stepwise improvement process that tackles quick payback investments as a priority before proceeding to investments that require more capital or more capacity. Thus, incentives would likely focus first on energy efficiency programs to reduce total energy consumption per cubic meter of water delivered to consumers. Such programs could reward optimization of pumps, increased levels of metering of both production and consumption, and gradual replacement of obsolete electromechanical equipment. Thereafter further improvement steps might include updated billing and collection systems, leakage reduction activities, network expansion, and moving toward 24/7 continuous supply.

The key should be to allocate funding to systems with proven success—for example in expanding metering, numbers of hours of service, and in reducing levels of NRW. Politically driven allocation should be replaced by criteria that reward operational excellence and achieving 24/7 continuous service. Such performance-driven allocation criteria will also likely shift investment allocations toward a timely completion of systems on which

construction has already started. In delivering improved service, the programs should also facilitate improving institutional arrangements to be more aligned with efficient, accountable, and more autonomous service providers.

To address the number of nonfunctioning rural WSS schemes, a third party assessment should be conducted in order to (i) understand the reasons for nonfunctional schemes, (ii) document the conditions of functional and nonfunctional schemes, (iii) estimate investment needs for their operationalization and upgrading, and (iv) understand and document how tariffs are established and how the poor are serviced. A program can then be designed to address non-functionality through a mix of investment and transfers of responsibility to better capacitated CBOs.

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

Reducing operating costs and improving performance are critical to improving sustainability in the urban sector. One way of doing this would be to leverage public sector service providers through the use of targeted PPPs on a pilot basis, for example, to deliver improved service at lower costs through management contracts or outsourcing of key NRW activities on a performance-based payment basis. Developing PPPs will necessarily be gradual and be based on payment for concrete achievements. The current wide gap between operating costs and revenue makes it unrealistic to expect private sector participation to be remunerated on the basis of cash operating surpluses, as would be desirable in the long run. Instead, dedicated sources of secure payment of private sector services will have to be identified, such as using domestic and foreign grant financing. PPPs will therefore likely take the form of pilot programs in areas such as designing and implementing energy efficiency programs and improving the quality of service in confined geographical areas in a city's distribution system and only in areas with strong government buy in.

Recommendation Five: Provide Additional Resources to Implement the Punjab Sanitation Strategy and Community-Led Total Sanitation (CLTS)

The Punjab Sanitation Strategy envisions scaling up the rural sanitation program through facilitation by the Local Government and Community Development Department and providing implementation and social mobilization support through HUD and the PHED. Since the program is ambitious, Punjab should increase resources for capacity building and increase trainings for social mobilization programs in communities toward open-defecation-free status. The goal should be to scale up the work being undertaken to train communities and partner organizations.

In implementing the Punjab Sanitation Strategy, consideration should be given to adopting a model of CLTS+. This involves including CLTS, behavioral change, and sanitation in an integrated manner that targets scaling up of present approaches through government and donor financing, sustainability, and monitoring of sector outcomes to create sanitation markets and capacity.

Recommendation Six: Enhance Wastewater Treatment in Lahore and Other Areas

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 those supplies. As a result, wastewater treatment becomes important as a means to protect current and future use of the low-cost water source.

It is understood that a program focused on Lahore is being initiated for the management of wastewater pollution. The Ravi River is filled with millions of gallons of sewage from households and industries, and as a result it pollutes surface and groundwater that is abstracted for domestic use. A program focused on collecting and treating that sewage will not only help protect access to low-cost shallow water sources but will also improve the environment of urban dwellers who live near the existing polluted water courses. In other countries, the cleanup of rivers and canals in urban areas has also delivered a range of other benefits, ranging from greater amenity value of the waterways to higher tax revenues from increasing property prices.

On a broader front, it will also be important to start assessing the capacity of the WASA and TMAs to design and operate waste water treatments plants and/or natural wastewater treatments in the smaller cities and towns. As necessary, this will likely require specialized staff and an open attitude to partnering with the private sector in the wastewater subsector.

Recommendation Seven: Expand the Role of the Punjab Urban Unit

The Urban Unit provides a strong knowledge base for Punjab and is a recognized center of excellence in the country, as evidenced by the establishment of similar units in other provinces (Sindh and KP have recently set up Urban Units). It is recommended that the role of the Urban Unit in Punjab is expanded to consider evolving sectoral issues such as the following:

- Enhancing the autonomy and accountability of service providers in the urban sector;
- Compiling and reporting data on water and wastewater services, maintenance O&M, and cost;
- Supporting the development of integrated financial plans, service improvement plans, and approaches to improved operation and maintenance in urban WSS providers;
- Improving capital investment programming in the province; and
- Informing stakeholders of the impact of urban WSS service quality on the environment and health.

Executive Summary: Sindh

Province Demographics

Sindh has an estimated population of 35.8 million in 2012[36] of which 49 percent live in rural areas. Its urban population has increased fourfold since 1951, making Sindh the most urbanized province in Pakistan. A mega-urban region is consolidating around the economic powerhouse of Karachi, including Thatta and Jamshoro Districts. After Karachi, Hyderabad is the most urbanized district in Sindh. Karachi holds 63 percent of the provincial urban population; Hyderabad district 8 percent; and Sukkur, Larkana, and Khairpur 3 percent each.

Poverty levels are high in Sindh: 37 percent of the population lives below the poverty line. This compares to a national average of 25.7–28.3 percent according to World Bank estimates.

Sector Institutional Arrangements/ Governance

Currently, six formal actors are providing water and sanitation services in Sindh:

- **Water and Sanitation Agencies (WASAs)** are created by provincial act. There are two WASAs in Sindh: the Karachi Water and Sewerage Board (KWSB) and the Hyderabad Water and Sanitation Agency (HWASA). KWSB was established in February 1983 under the Sindh Local Government (amendment) Ordinance within the Karachi Metropolitan Corporation (KMC). In 1996, the Karachi Water and Sewerage Board Act created an independent KWSB separate from KMC. Their reporting line is the Local Government Department. HWASA, a unit within the Hyderabad Development Authority, was created in 1976. In subsequent years; two more permanent directorates were created to extend the network in Hyderabad.[37]
- **The Public Health Engineering Department (PHED)** is responsible for construction and operation and maintenance (O&M) of rural water supply and sanitation schemes and the construction of urban water supply and sanitation schemes except in Karachi, Hyderabad, and cities covered by the Northern Sindh Urban Service Corporation (see below for cities covered).
- **Municipalities through their Tehsil Municipal Administrations (TMAs)** are responsible for municipal services delivery per the Local Government Ordinance of 2001. The urban sector has 152 urban local councils, of which 123 are TMAs. With regard to water and sanitation services (WSS) they rely on the PHED for developing new assets but are themselves responsible for the operations and routine maintenance of the systems that are handed over to them by the PHED. Their technical and financial capacity vary, however, depending primarily on their size. Their capacity for such operational responsibility is limited and if they are to successfully manage devolved services significant building capacity will be needed. Given their limited capacity, the Local Government Department is providing support to enhance their ability to fulfill their responsibilities in service delivery.
- **The Northern Sindh Urban Service Corporation (NSUSC)** is a regional utility (i.e., it includes several municipalities over more than one district) owned by the districts. It is the first such sector utility that has been registered with the Securities and Exchange Commission of Pakistan. NSUSC was created under the Sindh Cities Investment Improvement Program of the Asian Development Bank and includes the following urban areas: Sukkur, New Sukkur, Rohri, Khairpur, Shikarpur, Larkana, Gotki, and Jacobabad. Although the model was complex to establish, the company's work has gained momentum in recent years and has initiated a process of sector reform in

[36] Volume II, table 1.1, data from Pakistan census bureau website, http://www.census.gov.pk.

[37] They are the Project Directorate Hyderabad Development Package for the implementation of a federal program and a Directorate under HAD called the Directorate of Water Supply and Sewerage Project under the Islamic Development Bank's Greater Hyderabad Sewerage Package (Rs. 980 million).

Sindh. It is planned that new regional utilities, responsible for water supply, sanitation and solid waste, will be established in central and southern Sindh.

- **Communities** provide services through their community-based organizations (CBOs) in the rural sector. Even though the PHED is responsible for the O&M of rural schemes, water supply schemes were developed and handed over to CBOs for operation and maintenance under the Social Action Program.[38] In addition, Rural Support Programs in Sindh (Sindh Rural Support Organization and the Thar Deep Rural Development Program) have completed over 1,400 drinking water supply schemes and 1,100 sanitation schemes.[39] Communities are meant to have capacity to operate and maintain systems but are generally not able to redesign, retrofit, or make major repairs to facilities.
- **Small-scale private sector providers** often fill gaps in services. It is estimated that more than 40 percent of the water provided to Karachi comes from tankers. Karachi has nine hydrant locations where water supply companies can legally buy water and fill their tanker trucks. However, it is estimated that at least 160 legal hydrants are being illegally used. More than 50 percent of the population of Karachi resides in the *katchiabadi* (squatter settlements). Citizens residing in the "non-regularized" katchiabadis cannot legally access piped water from KWSB and are therefore forced to access water from informal service providers such as these tankers.

In addition, because formal water **s**ervices are often inadequate, households frequently self-provision. According to the Pakistan Social and Living Standards Measurement (PSLM) 2010–11, at least 28 percent of households in urban areas and 86 percent of households in rural areas receive water through hand pumps, motor pumps, dug wells, and other means. According to the Multiple Indicator Cluster Survey (MICS), 17 percent of households in urban areas and 92 percent in rural areas are not connected to a public sewer, and thus rely on their own arrangements, including septic tanks and open defecation.

[38] Under the Social Action Program, funding was allocated to improve program design and implementation and introduce government funding of basic services in a number of areas, including in rural water supply and sanitation. The program advocated community management, participation, and cost recovery and initiated the flow of resources from government to NGOs.

[39] RSPN, an Immediate Impact Assessment Survey of RSPs Community Physical Infrastructure Projects (London and Islamabad: DfID and RSPN, 2010).

These institutional arrangements, which involve multiple provincial agencies and split responsibilities between asset development and asset operation, result in the following:

- Limited accountability for delivery of service in terms of the levels and quality, since the divided responsibility for services enables an agency to attribute any shortcomings to other agencies;
- Need for development and capacity building of TMAs and/or the creation of alternative service delivery arrangements in order to overcome weak TMA capacity;
- Need to further develop the CBO model for planning, implementation, and operations of rural WSS given that experience elsewhere in Pakistan and the region points toward greater sustainability of the CBO model;
- Poor financial sustainability as a result of low capacity and weak incentives to recover costs and deliver good quality services efficiently;
- Lack of clarity in public resource management decisions due to multiplicity of agencies and overlapping mandates and functions; and
- Schemes being supply driven with a systemic disconnect between capital investment and O&M.

Water Supply and Sanitation Coverage

In Sindh 91 percent of the urban population has access to improved water as compared to the national average of 96 percent estimated by the Joint Monitoring Program (JMP) of WHO and UNICEF.

According to the PSLM 2010–11, about 72 percent of the urban population, compared to 58 percent of the national population, has access to tap water; a further 24 percent of the urban population (compared to 35 percent of the national urban population) is served by hand and motor pumps; and 4 percent of the provincial urban population (versus 6 percent nationally) accesses water by other means. There are differences between PSLM and MICS data, with the latter, for example, reporting a lower coverage of access to tap water (66 percent versus 72 percent).

The PSLM 2010–11 reports 95 percent of households in urban Sindh have flush toilets. MICS reports that "flush toilets connected to public sewerage" are used by 83 percent of the population. These high figures are due to higher service levels in Karachi. It is estimated that 3 percent of the urban population defecates in the open.

Access to improved rural water supply is 90 percent in Sindh, compared to the national average of 89 percent

estimated by the JMP. According to the PSLM 2010–11, access to improved sources of drinking water in rural areas in Sindh is 83 percent. About 13 percent of the rural population, compared to 19 percent of the national rural population, has access to tap water; a further 68 percent of the rural population (versus 65 percent of the national rural average) is served by motor- and hand pumps; 8 percent of the provincial rural population (versus 6 percent nationally) by dug wells and 10 percent of the provincial rural population (versus 10 percent nationally) has access by other means. As for the urban statistics the MICS reports lower access to tap water in rural areas as compared to the PSLM (8 percent versus 13 percent).

The most prevalent means of rural sanitation (other than open fields) varies across areas, although now coverage with a flush toilet connected to a public sewer exceeds 8 percent of households. In Sindh, "VIP latrines" are used by 14 percent of the households; 29 percent of the population defecates in open fields and 2 percent of the rural population uses buckets. The PSLM 2010–11 reports that 26 percent of the population in rural Sindh has flush toilets.

The above figures show that 76 percent of rural residents and 24 percent of urban residents rely on borehole or dug wells for their water supply. In the rural areas of Jamshoro, Shikarpur and Kashmore, and Matiari and in the urban areas of Larkana and Ghotki, there is a 100 percent dependence on groundwater for drinking purposes.[40] This indicates a higher reliance in Sindh on non-piped sources, and thus a need to manage water resources so as to preserve such access.

In the urban areas the Orangi Pilot Project–Research and Training Institute (OPP-RTI) has demonstrated strategies for community participation, engagement with local governments, and engagement with utilities. It also conducts documentation and analysis of the sector. Direct assistance to communities in Orangi town in northwestern Karachi and the demonstration effect of OPP-RTI's work benefited over 108,000 households (more than 865,000 people) in nearly 7,600 lanes, representing almost 90 percent of the entire settlement of Orangi. Collectively, communities invested nearly US$1.7 million of their own money in their community's sewerage system. What is puzzling is that this success story has not been replicated elsewhere in the country despite offering a solution that is low cost and meets many of the attributes of the Government's own sanitation policy.

Water Resources

Sindh has serious problems of water logging and salinity due to the nominal gradient, accretion of riverbeds, inadequate salt exit, and traditional watering of crops. The problems of water logging and salinity pose a major threat to sustainability of irrigated agriculture on about 30 percent of irrigated lands in Sindh. This situation is aggravated by the low efficiency of the irrigation system.

In parts of Sindh, poor collection and treatment of human waste is adversely impacting access to readily available, low-cost, shallow groundwater and surface water. Ground water is overexploited in many areas, and its quality is deteriorating. A Pakistan Council for Research in Water Resources (PCRWR) study (2004) reported that in Sindh almost 95 percent of shallow groundwater supplies are bacteriologically contaminated.

Arsenic and fluoride contents of groundwater are of major concern. Less than 30 percent of groundwater is fresh.[41] For example, the high level of fluorides in Thar region ground waters (32 mg/l) are devastating to the lives of Tharis. The high level of fluorides in drinking water causes crippling skeletal fluorosis, bone deformities, calcification of ligaments, pain, immobility, and paralysis.[42]

Sindh is vulnerable to flood damage caused by the Indus River which flows centrally through the province. Flood embankments have been constructed to provide some protection. In addition a flood protection bund has been constructed along the western periphery of the Sukkur Barrage Right Bank Canal to protect the nearby irrigated area from torrential discharges from Khirthar Hills Range and Balochistan. The protection infrastructure is generally not maintained but is repaired after damage caused by floods. Extraction of deep groundwater further aggravates the issue.[43]

Service Quality

There is no city in Pakistan with a 24-hour/7 day water supply. In Sindh the hours of supply range from 4 hours a day in Karachi, 6–8 hours a day in Larkana, 5 hours in Shikarpur, and 18–24 hours a day to 50 percent of the customers in Hyderabad and 2–4 hours a day for the rest of the customers.[44]

[40] In addition, in Tharparkar there is a 96.4 percent dependence on groundwater in rural areas and 93.75 percent in Shikarpur there is a 93.75 percent dependence on ground water in rural areas. Pakistan Council of Research in Water Resources (PCRWR) 2012 and consultant analysis.

[41] Volume II, page 27.

[42] F. H. Mugha, Karachi, Pakistan, December, 2012.

[43] Sindh Water Supply and Sanitation Provincial Report 2012.

[44] Japan International cooperation Agency (JICA) *Sector Survey on Water Supply Planning in Pakistan* (Tokyo: JICA, 2009).

Nonrevenue water (NRW) is a key measure of both technical and commercial performance. NRW is reported at 60 percent for Hyderabad and ranges from 30 percent to 40 percent for KWSB. However, since there is virtually no metering; any estimates of NRW are highly unreliable for the WASAs as well as the TMAs.

It is estimated that Karachi needs about 600 million gallons of water per day, but the city currently receives only about 435 million.[45] However, part of the shortfall is due to a dilapidated water supply infrastructure and much of the water demand can likely be met if the system is rehabilitated and leakage is reduced.

The WASAs and TMAs are responsible for collecting and treating wastewater. There are three sewage treatment plants in Karachi but only two are functional. The officially quoted share of wastewater treated in Karachi is 12 percent.[46] Of the 6,000 industrial units along the coastal belt, almost all discharge their untreated effluent directly into the Arabian Sea. There are 10 declared wetlands of international importance, Ramsar Sites, in Sindh.

The proportion of rural schemes that are functional varies considerably from 48 percent in Sindh to 100 percent in GB with an average of 83 percent. The large variations may partly be explained by definitional differences of what constitutes functionality. Sindh's performance at 48 percent functional schemes is the lowest observed performance.

A PCRWR survey conducted in 2008 found that 63 percent of the schemes were not functioning because of lack of funds (i.e., high O&M costs), 16 percent because of theft, 8 percent because of water shortages, 8 percent because of network problems, 4 percent because of a lack of interest, and 1 percent for other reasons.[47] Interestingly, the data for this survey shows that only 2 percent were not functioning because of community disputes or nonpayment of electricity bills.

Although Sindh has adopted a sound sanitation strategy,[48] there is still 28 percent of the population defecating in open fields in rural Sindh. This is surprising given the Government's support for the Community-Led Total Sanitation (CLTS) and the Pakistan Approach for Total Sanitation (PATS). The concept of CLTS is to create open-defecation-free (ODF) villages through behavioral change in the entire community, rather than to construct sanitation facilities for individual households. This is the main feature of the National Sanitation Policy and the Sindh Sanitation Strategy, which provides financial rewards for defined outcomes. PATS has been built upon the same parameters as CLTS and is based on four key pillars: (i) creating demand for ODF communities, (ii) sustaining demand through supply-side interventions, (iii) promoting participatory health and

[45] Achieving Water Sustainability in Pakistan. *A Complete Analysis on Pakistan's Water Supply (Page 5).*
[46] http://www.kwsb.gos.pk.
[47] PCRWR, Technical Assessment Survey Report of WSS, Sindh Province, 2008.
[48] The Government of Sindh's Provincial Sanitation Strategy (2011) focuses on access, affordability, and developing services with a focus on poor and marginalized communities. Additional themes include leveraging technology and supporting private sector participation in the development and operation of services. The strategy aims to serve 35 million people, including over 7 million poor, in the province of Sindh. Principles included are strong community engagement, clear institutional, and legal roles and robust monitoring and oversight.

Table 7: Sindh Executive Summary
Rural Water Supply Systems, Total and Functional

Province/Region	Total number of schemes	Functional Schemes	Number of functional schemes operated by CBOs	Number of functional schemes operated by PHED	Share of total number of schemes that are functional
AJK	7,500	7,461	7,422	39	99%
Balochistan	2,353	1,746	1,005	741	74%
FATA	1,507	1,228	NA	NA	81%
GB	437	437	437	–	100%
Khyber Pakhtunkhwa*	4,056	3,399	1,161	2,238	84%
Punjab	4,058	2,715	2,448	267	67%
Sindh	1,384	666	339	327	48%
TOTAL	**21,295**	**17,652**	**12,812**	**3,612**	**83%**

Source: Data compiled during field visits 2012.
* O&M of rural schemes are no longer managed by communities.

hygiene practices, and (iv) attaining adequate drainage and wastewater treatment through constructed wetlands. The significance of PATS is that it encourages moving away from an approach of shame and disgust toward instilling dignity and respect among the community in achieving total sanitation at the household and community level and becoming ODF communities. PATS emphasizes success through demonstration and availability of appropriate sanitation solutions.

The quality of service noted above has been severely impacted in recent years by natural calamaties. The annual floods of 2010–12 have affected Sindh deeply, resulting in close to 8 million homeless people. After the 2010 floods, PCRWR conducted water quality monitoring in the districts of Jaffarabad, Sukkur, Dadu, Nasuhehroferoze, Kamber, Shahdakot, Sikarpur, Ghotki, Jamshoro, Larkana, Kashmore, Thatta, Nasirabad, Jafferabad and Sibi. In these districts, 1,839 samples from 621 affected water supply schemes were collected and analyzed. The report showed that the water quality was worst in the districts of Larkana, Nasirabad and Sukkur, where almost 100 percent of samples were unfit for drinking; contamination was comparatively less severe in Jacobabad and Nasusherhroferoze, where the unsafe percentage remained around 50–60 percent.

In the 2010 floods alone, a total of 17 districts were affected. Lost water supply and sanitation infrastructure in Sindh was estimated at Rs. 1,512 million, within indirect losses of Rs. 3,390 million. In 2010, the assessment's recommended an allocation of Rs. 3,658 million for reconstruction, management systems, newinfrastructure, energy audits and policy work.[49] The 2011 flood asessment estimated direct damages in Sindh of Rs. 457 million in 378 reported schemes (including Rs. 148 million for public water supply and Rs. 253 million for sanitation). Indirect losses in Sindh have been calculated at Rs. 79 million. The reconstruction needs were estimated at Rs. 1,832 million, of which Rs. 834 million was for water and Rs. 998 million was for sanitation.[50] The districts of Shaheed Benazir Abad, Mirpurkhas, Umerkot, and Matiari suffered the greatest damage to their WSS systems. Where flooding was more extensive in scope and duration, the bulk of the damage was primarily to electrical and mechanical components, pumping machinery, transformers, building foundations, and sewerage and drainage systems. This indicates an urgent need to consider how to design and build disaster-resilient water and sanitation systems.

[49] Pakistan Floods: Preliminary Damage Assessment (World Bank, Asian Development Bank, and Government of Pakistan, 2010).
[50] 2011 Pakistan Floods: Preliminary Damage and Needs Assessment.

Cost Recovery

Financial working ratios—the ratio between cash O&M costs (excluding depreciation) and cash operating income—range from 1.13 in Karachi to 2.2 in Hyderabad, implying that no WASA collects sufficient operating revenue to pay for its cash operating costs. Increasing collections is difficult as long as service remains intermittent and unsafe and is exacerbated by poor metering and billing practices.

Household water bills are based on a flat rate of Rs. 449 (US$4.78) per month in Karachi and approximately Rs. 472 (US$4.8) per month in Sindh. In October, 2011, the tariffs in Karachi were revised and increased by 82 percent—an unprecedented one-time increase. Poor commercial performance is reflected in the low collection rates of WASAs. These range from 43 percent in Karachi to 61 percent in Hyderabad.

On the cost side, many schemes are seeing O&M costs rise due to escalating energy costs. This can have a significant impact where power costs are a large part of total operating costs. In Karachi, for example, the electricity share of overall O&M costs is 57 percent. High levels of leakage from systems further exacerbate the situation as water is pumped into the distribution system only to leak out of the pipes before reaching the customer. Improving energy efficiency, reducing leakage and paying greater attention to cost recovery issues in project design are essential to redress the current shortfalls in cost recovery.

These low levels of cost recovery result from under pricing of water, poor commercial practices, and inadequate attention to cost control. In addition, the flat rate charging system creates regressive water subsidies that benefit unmetered wealthy households who are connected first and who use more water than poor households.

Municipally managed urban schemes, outside of Karachi and Hyderabad, are also largely not financially sustainable, since they do not generate enough revenue to pay for cash O&M costs, let alone contribute to depreciation charges or capital expenditures. Weak commercial performance is reflected in the low collection rates. These range from 68 percent in Mithi and Islamakot to 9 percent in Khairpur to only 7 percent in Dadu.

Water consumption in rural areas is unmetered and is charged on a flat rate basis, with monthly tariffs ranging from Rs. 30 (US$0.32) to Rs. 150 (US$1.6) depending on the size of the holding. In general, however, little consideration appears to have been given to establishing an equitable tariff system that would generate sufficient revenue to meet operating costs in most rural WSS systems. As with urban schemes, many rural schemes

are seeing O&M costs rising due to escalating energy costs. This situation is exacerbated by technology-driven project design leading to higher energy costs. Improving energy efficiency and paying greater attention to cost recovery issues in project design are essential to redress the current shortfalls in cost recovery. Often, low tariff rates are set and the service provider's weak financial position is compounded by erratic billing and poor collection performance. The average collection rate is estimated to be about 25–40 percent in rural Sindh.

International best practice is to meter consumption and charge on a volumetric basis. User charges typically cover at least the cost of operation and maintenance in rural areas whilst in urban areas; user charges should also make a contribution to either debt service or capital expenditure. In other words the working ratio in urban areas should always be less than one.

Capital Investment

For the period 2009–12 (as reflected in Annual Development Program documents for 2010–13), there were a total of 513 investment schemes started. The total cost of the schemes was Rs. 63,912 million. Capital investment programming does not focus on rapidly finishing schemes on which construction has begun. Schemes are typically constructed over several years by spreading available funding over many schemes receiving small disbursements each financial year (or in some cases alternate years).[51]

The bulk of capital investment amount, over 90 percent, is in the urban area, but the rural area had an almost equal number of schemes. The bulk of the schemes are primarily in the drainage and water subsectors. The bulk of capital investment (85 percent) is routed through the PHED. The total cost of schemes in the federal Public Sector Development Plan is Rs. 17,428 million.

There are some successful NGO-supported programs such as the Sindh Rural Support Organization. In sanitation schemes, the community contribution has averaged 20 percent. In the water supply sector community, contribution has varied by type of scheme; dug wells had the highest level of community contribution at 30 percent. The average cost per scheme was about Rs. 800,000.

Recommendations

There are a number of recommendations that the Government of Sindh might consider for improving the performance and sustainability of its urban and rural WSS sectors. The purpose of the recommendations is to lay the basis for equitable, efficient and sustainable provision of water supply and sanitation services.

Recommendation One: Take Steps toward Attaining Financial Sustainability in Urban Areas

All production and consumption in urban areas should be metered in order to enable service providers to better manage their systems, both technically and commercially. Metering will provide the data that will facilitate reducing losses in the production and distribution of water. Over time, consumers should be charged on the basis of their metered consumption; payment for services will become socially more equitable and subsidies can be targeted to low-income households that consume much less water than high-income households. Consumers can then also adjust their consumption to their willingness and ability to pay for service.

The investments in metering hardware will necessarily have to be complemented by upgraded consumer data bases, design and implementation of tariff schemes that vary with the level of metered consumption and the design and implementation of software to allow for effective billing and collections. The investments in both hardware and software should be matched by improved customer service, in part through higher levels of training of staff to administer the new systems and by incentives that will reward those service providers and their staff who manage to increase the levels of collections.

Recommendation Two: Further Develop the CBO-based Approach to Provision of WSS Services in Rural Areas

In Sindh there is a need to further develop the demand-responsive approach to providing rural WSS services, especially in the interior areas. Changes should include the use of CBOs to operate and maintain the schemes. Based on experience elsewhere in the country and the region, such models have demonstrated higher levels of sustainability compared to schemes managed by province-level entities. As this will be a relatively new concept for parts of the province, it is recommended that this model be introduced on a pilot basis and in full partnership with the communities and the PHED. The following specific measures should be taken:

- An administrative backstopping facility should be established in the province that would proactively support CBOs in the management of their systems. This would include ongoing support for training of CBOs, and recording and disseminating best practices for

[51] Capital investment programming for the sector is not reflected in the Annual Development Program document unless funds are disbursed in a particular financial year, in which case the scheme is reflected in the subsequent year.

rural water supply and sanitation. Such a facility would gradually enhance performance in the Sindh systems and could evolve to help with policy and legal reforms, programming, regulation of tariffs, metering and capacity building, monitoring and evaluation and so forth.

- A more formalized technical backstopping facility should be established that would proactively support CBOs in dealing with technical challenges in service delivery. This would range from advice on repairs and maintenance to organizing major rehabilitations of systems. This service is best suited to a technical organization such as the PHED, but the PHED would need to be supported to grow into this new role.
- The scope of the model should be gradually expanded to include responsibility for identifying, designing, and building rural WSS schemes. At present the PHED is the lead agency in system development, a situation that can lead to a disconnect with the communities to be served in terms of appropriateness of design, adequacy of service level, and oversight of implementation. Elsewhere in South Asia, rural CBOs are given much broader responsibility during the planning, design, and implementation of the project cycle, which has led to lower unit costs and greater sustainability.

Recommendation Three: Establish Sector Programs to Create Incentives for Improved Performance in Both Urban and Rural WSS Provision

For the urban setting, the Government of Sindh should consider establishing a sector program that incentivizes recipients to improve their financial and operational performance and deliver results at minimum costs. The program might be based around an improvement process that tackles quick payback investments as a priority before proceeding to investments that require more capital or more capacity. Thus, incentives would likely focus first on energy efficiency programs to reduce total energy consumption per cubic meter of water delivered to consumers. Such programs could reward optimization of pumps, increased levels of metering of both production and consumption, and gradual replacement of obsolete electromechanical equipment. Thereafter, further improvement steps might include updated billing and collection systems, leakage reduction activities, network expansion, and progress toward 24/7 continuous supply.

It would be essential to allocate funding to entities with proven success—for example, in expanding metering, numbers of hours of service, and in reducing levels on NRW. Politically driven allocation should be replaced by criteria that reward operational excellence and achieving 24/7 continuous service. Such performance-driven allocation criteria will also likely shift investment allocations toward timely completion of systems on which construction has already started. In delivering improved service, the program should also facilitate improving institutional arrangements that are more aligned with efficient, accountable, and more autonomous service providers.

To address the number of nonfunctioning rural WSS schemes, a third party assessment should be conducted in order to (i) understand the reasons for nonfunctional schemes, (ii) document the condition of functional and nonfunctional schemes, (iii) estimate investment needs for their operationalization and upgrading, and (iv) understand and document how tariffs are established and how the poor are serviced. A program can then be designed to address non-functionality through a mix of investment and transfers of responsibility to better capacitated CBOs.

Recommendation Four: Provide Additional Resources to Implement the Sindh Sanitation Strategy and Community-Led Total Sanitation (CLTS)

The Sindh Sanitation Strategy envisions scaling up the rural sanitation program throughout the province through facilitation by Local Government and Community Development Department and providing implementation support through the PHED. Since the program is ambitious, Sindh should increase resources for capacity building and increase trainings for social mobilization programs in communities towards ODF. The goal should be to scale up the work being undertaken to train communities and partner organizations.

In implementing the Sindh Sanitation Strategy consideration should be given to adopting a model of CLTS. This involves including CLTS, behavioral change, and sanitation in an integrated manner that targets scaling up of the present approaches through government and donor financing, sustainability, monitoring of sector outcomes, and creating sanitation markets and capacity.

Recommendation Five: Create Wastewater Treatment Capacity for Karachi and Other Cities, Possibly through the Use of Public-Private Partnerships (PPPs)

Wastewater is a dominant health and environmental problem in Karachi due to the increase in wastewater volumes. Currently, there are three wastewater treatment plants, each of which face technical difficulties because of insufficient O&M, rising energy costs, and significant amounts of solid waste entering the plants.

It is estimated that only 15 percent to 25 percent of the sewage flow actually reaches the treatment plants. The rest of the wastewater (including industrial) flows into the storm water drainage system and into the Malir River, Layari River, and Karachi Harbor. Current attempts at wastewater treatment are not effective for this megacity. Wastewater treatment requires a long-term strategy that focuses on the use of appropriate and affordable technologies. Giving wastewater treatment economic value, in particular through wastewater reuse, is long overdue.

On a broader front, it will also be important to start assessing the capacity of the Hyderabad WASA and, eventually, TMAs to design and operate waste water treatments plants and/or natural wastewater treatments in interior Sindh. As necessary and similar to the situation in Karachi, this will likely require the need for specialized staff and an open attitude to private sector participation in the wastewater subsector, given the need for external expertise and for a potential source of financing.

Recommendation Six: Support Flood-affected Areas through Preparation of Emergency District Level Plans and Financing

Emergency district plans should be prepared for flood-affected areas. They should include a pre-flood and post flood inventory of water and sanitation facilities and identification of high hygiene risk areas. The plans should recommend ways to maximize coordination among the stakeholders for water and sanitation interventions and assess issues such as prevention of diseases, promotion of health, conservation of water, and recycling of nutrients and organic matter. They should also include disaster-resilient concepts and technologies in designing and construction of water supply and sanitation infrastructures. For example, treatment of wastewater through constructed wetlands should be further analyzed in rural and semi-urban areas.

The district level plans can identify the emergency needs as well as long-term financing requirements for flood impacted areas. These will serve the basis of support from the province and donors.

Recommendation Seven: Support the Sindh Urban Unit

The Sindh Urban Policy and Strategic Planning Directorate, Planning and Development Department was established in 2012 along the lines of the Urban Unit in Punjab. Priority areas for the sector are currently being identified by the Urban Unit. The directorate should establish a strategic development working group that provides advice and peer review for its ongoing work. The directorate could focus on the following policy priorities:

- Improving WSS as well as urban infrastructure and services data related to the current status of capital investment, municipal finance and management, cost recovery, and tariff setting;
- Informing the impact of water quality on the environment and health (e.g., Thar area);
- Surveying current and potential private sector and community-based providers of WSS services;
- Providing a comprehensive overview of the Hyderabad's infrastructure needs and priorities through a Hyderabad strategic plan, given the city's growing population and service needs; and
- Undertaking a focused assessment to better understand how services need to be improved in urban slums and what approaches might work best, given the large proportion of the population living in the urban slums.

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