SUMMARY OF BACKGROUND PAPER 12

AFRICA INFRASTRUCTURE COUNTRY DIAGNOSTIC

Urban Water Supply in Sub-Saharan Africa

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About AICD

This study is part of the Africa Infrastructure Country Diagnostic (AICD), a project designed to expand the world's knowledge of physical infrastructure in Africa. AICD will provide a baseline against which future improvements in infrastructure services can be measured, making it possible to monitor the results achieved from donor support. It should also provide a more solid empirical foundation for prioritizing investments and designing policy reforms in the infrastructure sectors in Africa.

AICD will produce a series of reports (such as this one) that provide an overview of the status of public expenditure, investment needs, and sector performance in each of the main infrastructure sectors, including energy, information and communication technologies, irrigation, transport, and water and sanitation. The World Bank will publish a summary of AICD's findings in spring 2008. The underlying data will be made available to the public through an interactive Web site allowing users to download customized data reports and perform simple simulation exercises.

The first phase of AICD focuses on 24 countries that together account for 85 percent of the gross domestic product, population, and infrastructure aid flows of Sub-Saharan Africa. The countries are: Benin, Burkina Faso, Cape Verde, Cameroon, Chad, Congo (Democratic Republic of Congo), Côte d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage will be expanded to include additional countries.

AICD is being implemented by the World Bank on behalf of a steering committee that represents the African Union, the New Partnership for Africa's Development (NEPAD), Africa's regional economic communities, the African Development Bank, and major infrastructure donors. Financing for AICD is provided by a multi-donor trust fund to which the main contributors are the Department for International Development (United Kingdom), the Public Private Infrastructure Advisory Facility, Agence Française de Développement, and the European Commission. A group of distinguished peer reviewers from policy making and academic circles in Africa and beyond reviews all of the major outputs of the study, with a view to assuring the technical quality of the work.

This and other papers analyzing key infrastructure topics, as well as the underlying data sources described above, will be available for download from www.infrastructureafrica.org. Freestanding summaries are available in English and French.

Inquiries concerning the availability of datasets should be directed to vfoster@worldbank.org.

Summary

With only 56 percent of the population enjoying access to safe water, Sub-Saharan Africa lags behind other regions in terms of access to improved water sources. Based on present trends, it appears that the region is unlikely to meet the target of 75 percent access to improved water by 2015, as specified in the Millennium Development Goals. The welfare implications of safe water cannot be overstated. The estimated health and time-saving benefits of meeting the MDG goal are as much as $3.5 billion, or about 11 times as high as the associated costs.

Monitoring the progress of infrastructure sectors such as water supply has been a significant by-product of the MDGs, and serious attention and funding have been devoted in recent years to developing systems for monitoring and evaluating in developing countries. Thanks to the efforts of the WHO-UNICEF Joint Monitoring Program (JMP) on water supply and sanitation (WSS), access trends are now comparatively well understood. However, there is still relatively little understanding of how African water utilities actually *perform*, and the state of the reform process in the sector. This study draws on a new WSS database compiled as part of the Africa Infrastructure Country Diagnostic. The database collects primary data on institutional development and sector performance in 50 utilities across 23 countries in Sub-Saharan Africa. We use it here to present a snapshot of the current situation.

Declining coverage of utility water

Piped water reaches more urban Africans than any other form of water supply—but not as large a share as it did in the early 1990s. The most recent available data for 32 countries in the AICD DHS/MICS database[1] suggests that some 39 percent of the urban population of Sub-Saharan Africa is connected to a piped network, compared with 50 percent in the early 1990s (table A). Public standposts, also supplied by utilities, are the second most widely used source, serving 24 percent of the population. Analysis suggests that the majority of those who lack access to utility water, live too far away from the distribution network, although some fail to connect even when they live close by.

Table A The evolution of urban water supply sources in Africa

Percentage of urban population accessing various water sources

	Piped water	Standposts	Wells/boreholes	Surface water	Vendors
1990–-95	50	29	20	6	3
1996–2000	43	25	21	5	2
2001–05	39	24	24	7	4

Source: Banerjee et al (2008).

Most city dwellers who do not obtain their water from a utility get it from wells and boreholes, which are the primary source of water for 24 percent of Africa's urban population. In some countries, such as

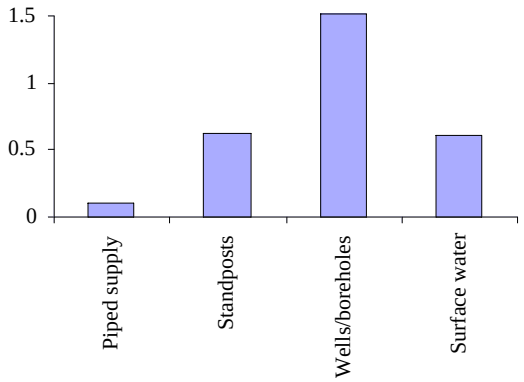
[1] This database, which includes surveys from 1990 to 2006, incorporates 32 countries, of which 24 have more than two time points, allowing analysis of trends. The 32 countries overlap broadly with the 24 focus countries of the Africa Infrastructure Country Diagnostic.

Chad, Mali, Nigeria, and Sudan, wells and boreholes constitute the principal source of urban water supply. Only about 7 percent of urban residents rely for drinking water on lakes, ponds, springs, or other forms of surface water. Vendors currently serve about 4 percent of the urban market, but the percentage is much higher in some countries, including Mauritania (32 percent), Niger (21 percent), Chad (16 percent), and Nigeria (10 percent).

Why has piped water coverage declined in urban Africa? Rapid population growth and rampant urbanization have put enormous pressure on utilities. Most of the population growth has occurred in peri-urban slum neighborhoods, and utilities have not been able to extend their networks fast enough.

The decline in the share of urban residents with access to improved water sources is primarily made up by the rise in coverage of wells and boreholes and by slight increases in surface water and vendor coverage in urban areas. Each year, the share of the urban population that gets its water through wells and boreholes rises by 1.5 percent, compared to 0.6 percent for public standposts and a mere 0.1 percent for piped water (figure A). Alarmingly, an additional 0.6 percent of the urban population turns each year to surface water.

Figure A: Annualized change in coverage (%)



The situation is not all grim. Some countries are making remarkable progress in expanding the coverage of piped-water systems. Ethiopia stands out as having the largest average annual gain in piped-water coverage, adding almost 5 percent of its population each year, immediately followed by Côte d'Ivoire (table B). In the case of public stand posts, Uganda stands out as achieving the fastest expansion, followed closely by Burkina Faso. Nigeria has experienced by far the most rapid expansion in wells and boreholes, which reach an additional 4 percent of its population each year, even as coverage of piped water and standposts declines. Uganda and Ethiopia stand out as the countries that have been most successful in curtailing reliance on surface water in urban areas.

Table B Annual increases in access of urban residents to various water sources, 1995–2005

Percent

Piped water		Public standposts		Wells/boreholes		Surface water	
Ethiopia	4.77	Uganda	4.67	Nigeria	3.99	Uganda	–1.98
Côte d'Ivoire	3.81	Burkina Faso	4.00	Malawi	3.10	Ethiopia	–1.08
Benin	3.58	Tanzania	3.91	Rwanda	3.03	Lesotho	–0.66
Burkina Faso	3.40	Rwanda	3.67	Ghana	2.65	Madagascar	–0.41
Mali	3.00	Malawi	3.01	Mozambique	2.31	Ghana	–0.21

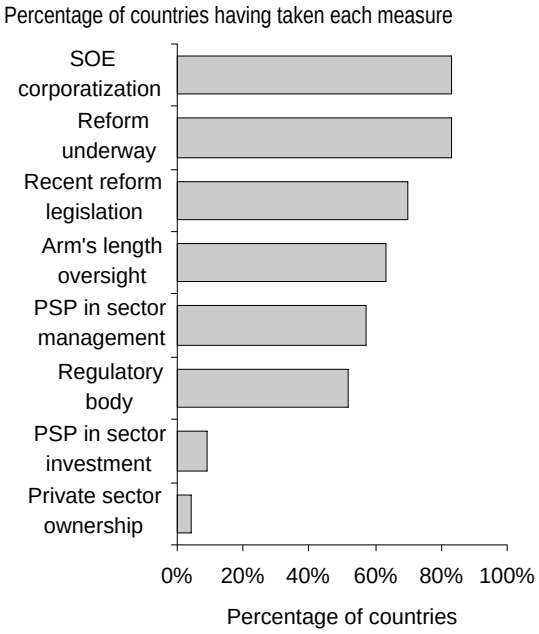
Source: AICD DHS/MICS Survey Database, 2007.

Directions of reform

Water-sector institutions follow no consistent pattern in Sub-Saharan Africa. One important dichotomy is with respect to decentralization, with about one-third of countries (primarily francophone) retaining a single national water utility, and the remaining two-thirds (primarily anglophone) having undergone some process of decentralization to local jurisdictions. Where service is centralized, a significant minority has chosen to combine power and water services into a single national multi-utility.

Widespread urban water sector reforms were carried out in the 1990s, with the aim of creating commercially oriented utilities and bringing the sector under formal regulation. One goal of the reforms was to attract private participation (investment and management) in the sector. Around 80 percent of the countries surveyed have initiated a major sector reform, in most cases underpinned by major new sector legislation. Corporatization is by far the most widely adopted reform measure (figure B). In about half of cases, some degree of private sector participation has been adopted, but only 10 percent of countries achieved private sector investment in the sector and even then only at a very low level. Almost half of the private sector experiences in water concern multi-utilities that provide both power and water services. Private sector contracts for water services have a relatively high failure rate of 25 percent overall, rising to 50 percent for lease and concession contracts.

Figure B Key measures in reform of the urban water supply sector in the 1990s



Source: AICD WSS Survey Database 2007.
SOE = state-owned enterprise; PSP = private sector participation.

Around half of the countries established regulatory bodies for the sector during the last decade. However, many of the francophone countries developed quite advanced regulatory frameworks without having recourse to an agency. The nascent regulators face the challenge of gaining stature, establishing a track record of sound decision-making, and acquiring competent staff. Around half of the countries have made reasonable progress in improving transparency of regulatory decisions based on the adoption of well-defined technical tools for regulation, while also achieving some degree of accountability (figure C). Nevertheless, very few countries—even among those that have established regulatory agencies—can claim to have achieved any degree of autonomy in regulatory decision making.

The limited success of private sector participation has led to a renewed focus on strengthening the corporate governance of public utilities. The prevalence of good governance practices remains relatively low, with little more than half of the utilities having some formal performance monitoring framework (such as a performance contract), a reasonably autonomous board of directors (including at least one independent member), and some level of managerial freedom in hiring and firing decisions (figure D). Water utilities make relatively limited use of outsourcing.

Figure C Prevalence of good regulatory practice

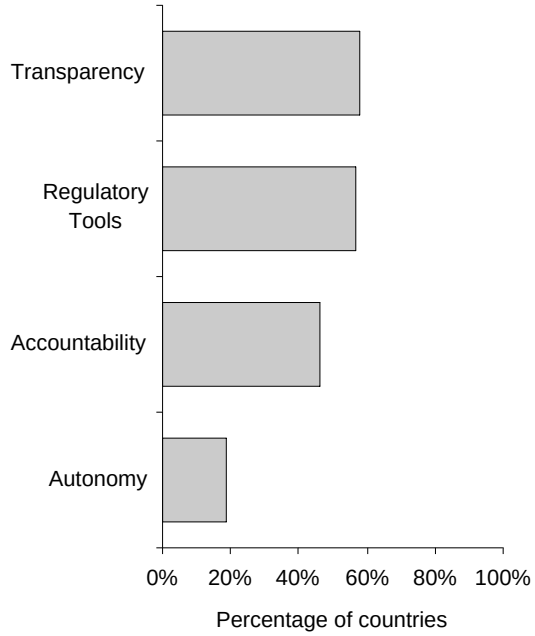
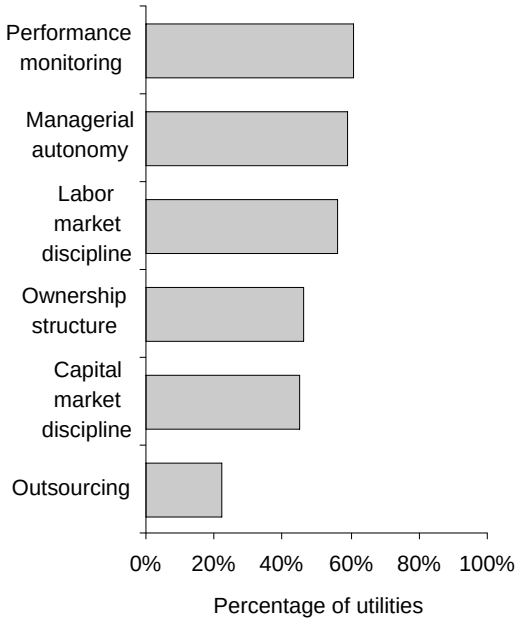


Figure D Prevalence of good governance of state-owned enterprises



Source: AICD WSS Survey Database 2007.

Room for improvement

The performance of water utilities in the sample countries is generally low. Water that is supplied but that cannot be billed (known as nonrevenue water) averages around 30 percent (table C), compared to a good-practice benchmark of 23 percent for developing countries. Labor productivity averages just over six employees per thousand connections, compared to a good-practice benchmark of five for developing countries. On average utilities just cover their operating costs, with an operating-cost-coverage ratio of

Table C Utility performance by country typology

	Water consumption	Employees per 1,000 water connections	Nonrevenue water	Collection ratio	Operating cost coverage
Unit	liters pc pd	#/1000 conn	%	%	Ratio
Low income, aid-dependent	72	8	32	74	1.1
Low income. resource-rich	169	14	41		0.9
Middle income	201	3	27	72	0.8
Scarce water resources	168	6	30	70	1.0
Abundant water resources	76	7	33	87	0.9
Small utility	97	14	36	65	1.0
Large utility	164	5	29	75	1.0
Overall average	155	6	30	73	1.0

1.0, compared to a good practice benchmark of 1.3 for developing countries. Collection efficiency is estimated at just over 70 percent.

Water consumption in the region is relatively modest, at just over 150 liters per capita per day. No clear relationship is found between metering ratios, water pricing, and water consumption. Neither do higher rates of metering seem to contribute to lowering nonrevenue water, suggesting the importance of losses for nontechnical reasons (such as theft). Overall, there is no evidence to suggest that utilities are making effective use of demand management tools, although neither can current levels of popular water consumption be regarded as wasteful.

Across the surveyed countries one finds systematic differences in utility performance according to the macroeconomic and hydrologic characteristics of the country. Utilities in middle-income countries perform substantially better on just about every measure, except for operating-cost coverage, where they are handicapped by relatively high operating costs. Within the low-income bracket, utilities in aid-dependent countries perform substantially better than those in resource-rich countries, suggesting that the former achieve greater discipline in the use of financial resources. Utilities in countries where water resources are scarce provide much higher levels of water to their customers, who probably have little alternative to utility water. Probably for the same reason, collection efficiency is much more lax in these cases. There is also a marked tendency for large utilities to perform better than smaller ones. The largest difference, however, is to be found in labor productivity, where large utilities outperform the small by a factor of three to one.

Do utilities in countries that have undertaken institutional reforms perform systematically better than those that have not? There is evidence that countries undertaking standard reforms—such as corporatization of state-owned enterprises, creation of regulatory bodies, private participation, and decentralization—achieve substantially higher collection ratios than those that do not (table D). They also perform somewhat better in recovering operating costs. However, when it comes to nonrevenue water and labor productivity, one finds no such pattern. If anything, countries that have undertaken institutional reforms do worse on these indicators. Overall, therefore, the evidence is mixed.

Table D Utility performance by institutional category

	Employees per 1,000 water connections	Non-revenue water	Collection ratio	Operating cost coverage
unit	#/1000 conn	%	%	ratio
SOE corporatization	12	33	51	0.8
Not corporatized	8	28	37	0.6
Existence of a regulatory body	13	40	69	0.9
No regulatory body	10	25	29	0.7
Private participation	11	35	52	0.8
No private participation	12	29	42	0.8
Decentralized	10	35	58	0.8
Centralized	15	28	30	0.6
Overall average	6	30	73	1.0

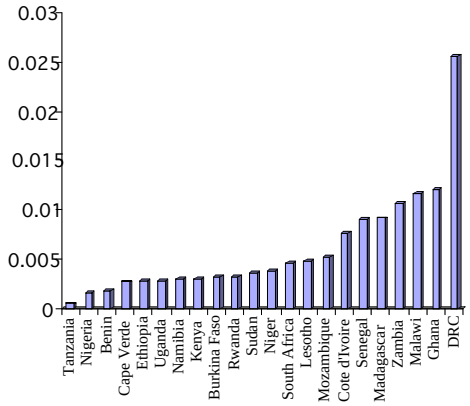
The economic burden of inefficient utilities

Underpricing of water by utilities, and their operating inefficiencies, place a significant burden on the economy. They also distort the incentives open to utilities and consumers, leading to overconsumption and waste of scarce resources. These practices can be measured as a quasi-fiscal deficit (QFD), or hidden cost, that adversely affects optimal resource allocation and financial sustainability in the sector. The notion compares the amount of nonrevenue water, the degree of underpricing, and the rate of collection of the utility with an ideally functioning utility in the African context, and calculates the associated loss in revenue.

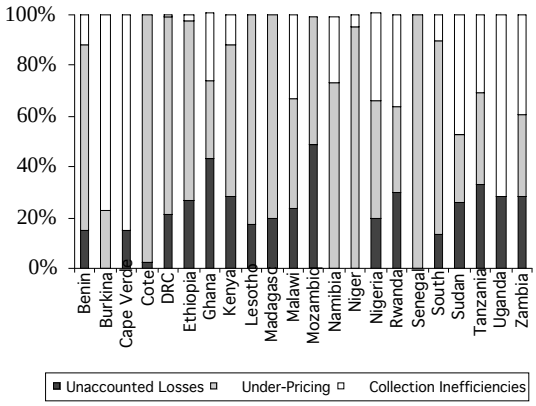
Together, the average QFD or of the utilities in the countries studied amounts to fully 0.6 percent of GDP—a startlingly high amount. The worst offenders are Democratic Republic of Congo, Ghana, Malawi, and Zambia, where more than 1 percent of GDP is drained off by underpricing and technical inefficiencies (figure E1). Underpricing accounts for almost 55 percent of the total accumulated QFD figure E2), an indication that water tariffs are set well below full cost recovery. Technical and collection inefficiencies make up the rest of the deficit. Overall, utilities are recovering only about a third of the revenues owed to them.

Figure E Volume and composition of quasi-fiscal deficits, 2005–06

1. Share of GDP



2. Composition



Source: Briceno-Garmendia, 2008.

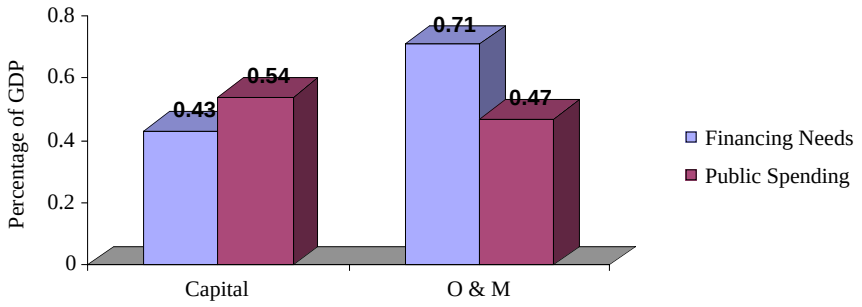
Note: All the utilities in countries with decentralized multi-utility structure are not represented here, so it is an underestimation for countries such as Nigeria, Sudan, South Africa, Tanzania, and Zambia.

Average tariffs for water in Sub-Saharan Africa are already comparatively high by global standards. At around US$0.60 per cubic meter (for average consumption of 10 m3 per month), the average is just about enough to cover the region's relatively high operating costs. However, it is estimated that to reach full capital cost recovery and thereby address the underpricing problem identified above, tariffs would need to approach US$1 per cubic meter. Given the modesty of household budgets, such tariffs would be manifestly unaffordable to the vast majority of the population in all but a handful of the middle-income and better-off low-income countries.

A modest financing gap

The annual cost of achieving the Millennium Development Goal for access to improved water is estimated at 1.3 percent of GDP—0.43 percent of GDP for capital investment and 0.71 percent for operations and maintenance (figure F). These estimates assume a basic level of service and make minimal allowance for rehabilitation requirements. In that sense, they should be considered a lower bound..

Figure F Gap between financing needs and available resources in the urban water sector



Source: Briceno-Garmendia and Smits (2008), Mehta et al. (2005).

Comparing investment requirements to historic public investment in the water sector suggests that, in the aggregate, there is no major shortfall with respect to capital spending. This means that the current resource envelope has the potential to meet investment requirements if appropriately allocated and efficiently spent. With regard to operations and maintenance expenditure, however, there does appear to be a significant shortfall, on the order of 0.2 percent of GDP, or about US$1 billion per year. The size of the financing gap for operations and maintenance is less than the magnitude of the hidden costs of utility inefficiencies in collection and distribution described above.

Different paths to success

It is hard to generalize about the water sector in Sub-Saharan Africa. Different countries have adopted a wide array of institutional models and are at varying stages on the path to reform. Judged against the ultimate goal of accelerating access to the MDGs, seven countries stand out as moving more than 3 percent of their population each year closer to this target (table E).

But contrary to what might be expected, none of these countries performs systematically well, either on efficiency of utilities, allocation of public spending, or quality of institutional reforms. In most cases several, though by no means all, of these factors are present; and the factors present differ from case to case. The case of Ethiopia, in particular, stands out because a major expansion in access has taken place in spite of inefficient utilities, low spending, and little institutional reform. Clearly, there are different paths to success in the water sector. The important thing is that some countries are managing to find them.

Table E Making sense of strong performance on access

	Outcomes	Efficiency		Spending		Institutions		
Country	Annual change in coverage (%)	Utility efficiency	Utility cost recovery	Annual expenditure per capita	Annual ODA per capita	Regulation score	Reform score	Governance score
Burkina Faso	7.40	low	high		high	high	low	high
Uganda	5.51	low	high	low	low	high	high	low
Ethiopia	4.50	low	low	low	low	low	low	low
Benin	4.38	high	high	high	high	low	low	high
Chad	3.63			low	high	low	low	low
Côte d'Ivoire	3.30	high	low	low	low	low	high	high
Rwanda	3.01	low	high	low	low	low	low	low