

The State of African Utilities: Performance Assessment and Benchmarking Report

Water Operators' Partnerships



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Disclaimer

This second report on African Utilities' Performance Assessment and Benchmarking (2006 to 2009) was commissioned by the Global Water Operators' Partnerships Alliance–United Nations Human Settlements Programme (GWOPA/UN-Habitat), the African Water Association (AfWA), and the Water and Sanitation Program (WSP-Africa). The data collection and report production was undertaken by the WSP-AF in collaboration with AfWA and GWOPA–UN-Habitat. The views expressed in this report are those of the task team and do not necessarily reflect the opinions of the World Bank and collaborating institutions.

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Map of Africa

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Executive Summary

The Global Water Operators' Partnerships Alliance (GWOPA) was launched in January 2009 in Nairobi, with the aim of helping water operators to help one another, on a not-for-profit basis. GWOPA supports regional platforms to promote partnerships take place between utilities in a more systematic manner. In Africa, WOP-Africa (Water Operators Partnership–Africa) was initiated in 2007 at the Johannesburg workshop facilitated by the Water and Sanitation Program (WSP) and the United Nations Human Settlements Programme (UN-Habitat), where more than 120 utility managers agreed that not-for-profit utility-to-utility partnerships (WOPs) offered significant opportunities for sharing knowledge and improving the performance of the water and sanitation sector throughout Africa. It was during this workshop that it was agreed that AfWA would be the original host of WOP Africa.

A first report on African water utility performance assessment and benchmarking, WOP1, was prepared by the Water and Sanitation Program–Africa (WSP-AF) in 2008, based on utility performance data from 2003 to 2006. The report identified general trends in weaknesses at utility and sector level, and identified themes and modalities for WOPs. Successive drafts of the WOP1 report were reviewed and validated in three regional workshops. The workshops confirmed utilities' interest in mutual support and identified specific opportunities for WOPs. In the ensuing period the African Water Association (AfWA), with the support of UN-Habitat through the Global Water Operators' Partnerships Alliance (GWOPA), established the WOP-Africa secretariat and mobilized funding to support a number of WOPs.

As shown by the WOP1 report the performance of utilities across regions varies widely, which suggests that the weaker utilities have much to learn from the better performing ones. This report is a response to the recommendations made at the WOP1 workshops to periodically update the regional performance assessments and in addition to review a specific theme—the high priority theme chosen by utilities after WOP1 is how to improve or extend services to the urban poor.

This report is the second report on Africa water utility performance assessment and benchmarking and is based on utility performance data from 2006 to 2009 that was obtained directly from utility managers through a utility self-assessment questionnaire (USAQ) developed specifically for the study. The WOP2 report focuses essentially on Sub-Saharan Africa. It shows that in general utility performance has improved, but only marginally. Whilst utilities have managed to improve their operational efficiency (including billing and revenue collection efficiency) and water supply capacity, they have not been able to connect additional households at a rate which exceeds population growth.

Key findings are summarized below.

Technical Performance Indicators (See Section 3.3)

- **Urban water supply coverage**¹ has remained stagnant over the period at 59 percent overall. Utilities have not been able to increase coverage (through individual and shared connections) at a rate which exceeds population growth. Therefore the number of unserved urban households continues to increase. The report shows large variations in urban water supply coverage from 2006 to 2009 across regions and across utilities (see Section 3.3.1). In particular:
 - o A regional increase from 59 percent to 63 percent in Eastern Africa, with an increase from only 43 percent to 45 percent in Kenya and from 71 percent to 79 percent in Ethiopia.
 - o A regional reduction from 80 percent to 78 percent in Southern Africa, with an increase from 66 percent to 71 percent in Malawi, 89 percent to 95 percent in Swaziland, but a reduction from 86 percent to 80 percent in Zambia and 80 percent to 78 percent in South Africa.
 - o A regional reduction of 55 percent to 52 percent in Western and Central Africa, with a reduction from 48 percent to 45 percent in Nigeria, 95 percent to 88 percent in Senegal, but an increase from 60 percent to 72 percent in Burkina Faso.

- Coverage of sanitation services, although it has increased significantly in most countries between 2006 and 2009, lags behind urban water supply coverage (also in Section 3.3.1):
 - o A regional increase from 28 percent to 42 percent in Eastern Africa, with an increase from 18 percent to 32 percent in Ethiopia and 12 percent to 41 percent in Kenya.
 - o A regional increase from 51 percent to 54 percent in Southern Africa,² with an increase from 65 percent to 73 percent in South Africa, 29 percent to 38 percent in Swaziland, and a reduction of 46 percent to 38 percent in Zambia.

¹ Water supply coverage is calculated using data obtained directly from the utilities on total population in service area, population served with water connections, and population served through shared connections (including kiosks and communal water points).

² No figures were reported for Western and Central Africa as sanitation in this region is generally the responsibility of municipalities (which do not figure in this assessment).

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- Water supply and sanitation coverage is compared with the Millennium Development Goal (MDG) targets in the figure overleaf: whilst some countries have already met the target (in green), many of them are at risk of seeing high population growth lead to a net reduction in coverage (in orange) or risk failing to achieve the targets altogether (in red). **Significant additional efforts are needed to help countries get on and stay on track to achieve the urban water supply and sanitation MDGs, otherwise these will be missed.**
- Utilities have generally been unable to report accurate coverage figures which reflect that a large number of households share connections, and purchase water from communal water points and kiosks (see Section 2.3.2). This is due to the fact that coverage estimates are not based on household surveys and census data are, most of the time, out of date. The same applies to sanitation customers who use a mix of individual sewerage connections, individual or shared latrines, and independent sewerage schemes. This means that water supply and sanitation coverage data are potentially unreliable, therefore impacting on the reliability of national MDG targets (in particular on the planning of investments). **The methodology for assessing coverage of water supply and sanitation services needs to be reviewed and defined explicitly.⁶ Regular assessments also need to be undertaken through household and statistical surveys, rather than engineering estimates, and be shared with all sector stakeholders including policy makers, regulators, utilities, and development partners.**
- A large number of utilities (48 percent, principally in Nigeria but in other areas as well⁷) reported having no strategies and specific targets to expand services to the poor (unserved living in informal settlements). This is a positive trend from WOP1 but more still needs to be done. With the greatest part of population growth occurring in poor unplanned settlements this means that utilities are losing more and more potential customers to informal service providers, and thus face the risk of becoming redundant in those areas. **There is a need to develop clear and realistic pro-poor targets at the utility level and to ensure that these are monitored, evaluated, reported and, acted on at the national level.**
- **Nonrevenue water (NRW)** continues to be a major challenge for urban utilities in Africa. NRW has remained stagnant over the period at 32 percent (see Section 3.3.2). The

⁶ This had already been highlighted by GTZ (2007) in MDG monitoring for urban water supply and sanitation: Catching up reality in Sub-Saharan Africa

⁷ Overall 48 percent of utilities have targets, with 39 percent by population (meaning that larger utilities are less likely to have targets than smaller ones—whereas the concentration of poor households is greatest in larger cities (in particular, capital cities). More detailed results are presented in Section 3.6 on services to the poor.

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best performers are the Western African utilities excluding Nigeria (with an average of 25 percent); the worst performers are in the Eastern African region (41 percent average), which is well above the accepted benchmark of 20 percent. High NRW is exacerbated by the **low level of customer and bulk metering across the region** (see Section 3.3.5). The consequence is that a large proportion of additional volumes of water into supply have actually been lost. Significant efforts in terms of technical assistance and funding need to be mobilized by utilities, governments, and investors to reduce losses.

- High NRW, coupled with poor continuity of supply (see Section 3.3.3), a high number of bursts and leaks on watermains (see Section 3.3.5), and poor water quality (see Section 3.3.6), illustrate that assets are in poor condition and need to be rehabilitated, either prior to or in parallel with infrastructure expansion programs.
- **Average unit consumption**, especially in the Western and Central African region (excluding Nigeria), has reduced (see Section 3.4.4).⁸ This would suggest that, whilst sometimes significant coverage expansion has been achieved (for instance, through social connection programs), this has not been complemented with investments in additional water supply (production and/or reduction of losses) capacity.

⁸ For instance, figures for ONEA in Burkina Faso indicate that the volumes of water produced and sold increased by 26 percent and 26 percent, respectively, but that the number of individual connections and standpipes increased by 55 percent and 26 percent, respectively.

Financial Performance Indicators

- **Collection efficiency**⁹ has remained stagnant at 97 percent (that is, still short of 100 percent). However, there is some variation within regions and countries, and 90 percent of the total revenues billed and collected are in South Africa (see Section 3.4.1):
 - o A reduction from 94 percent to 91 percent in Eastern Africa, with reductions in Kericho, Nairobi, and Nyeri.
 - o An increase from 85 percent to 89 percent in Southern Africa excluding South Africa (where collection efficiency has remained at 99 percent).
 - o A reduction from 96 percent to 94 percent in Western and Central Africa, with poor performance in Nigeria and Guinea.
- The best performers are the ONEA (in Burkina Faso), SEEG (in Gabon), eThekweni (in South Africa), and CDE (in Cameroon), which all report collection efficiencies greater than 100 percent.
- Government and institutional customers, which account for a significant proportion of billing (20 percent to 30 percent), are still not paying their bills on time and cannot be disconnected. This is causing poor performance in **collection period** (also in Section 3.4.1) and further eroding financial viability, which is likely to further deteriorate the quality of services and prevent expansion of services as maintenance is neglected and there are no funds for capital investment. This may mean that services to vulnerable customers, who use less water and therefore pay for less, is overlooked. **Significant improvements are required in revenue collection and in political commitment to pay water bills on time, throughout the region.**
- **Operating cost coverage ratios (OCCR)**, which is the ratio of collected revenues divided by operating costs, have also improved in general but are still too low: the average overall is 105 percent (see Section 3.4.2), which is significantly less than the international benchmark of 130 percent to 160 percent). In addition, there are significant variations even within the same countries, suggesting that regulatory institutions are not able to protect utilities adequately from political interference and pressure to keep tariffs artificially low.
- In the Western and Central African region (except Nigeria), the level of OCCR is within or above the recommended benchmark of 130 percent to 160 percent (sometimes greater than 200 percent) due to the fact that the operators are collecting additional

⁹ This is the ratio of total revenues collected divided by total bills issued.

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revenue from customers. This is used to not only reimburse capital investment and service expansion (as part of their respective lease contracts), but also to manage the assets more efficiently.

- There is a need to assess the operational practices of utilities and, in particular, determine whether their current level of operation and maintenance (O&M) expenditure is sufficient. Only then can detailed analyses of OCCR be undertaken, and operational improvements realistically planned.

Tariffs

- Most, if not all, utilities in the region have increasing block tariffs as a means of subsidizing consumption for the poorest households: 100 percent in Eastern Africa and Southern Africa, and 75 percent in Western and Central Africa.
- A comparison was made between individual consumption, the volume of water that is subsidized, and the implied household size. Only a few utilities in each region are actually able to provide enough water (minimum 50 liters per capita per) to households and a well-targeted consumption subsidy (also 50 liters per capita per day):
 - o Only three utilities in East Africa: Eldoret, Nairobi, and Nanyuki;
 - o Only two utilities in Southern Africa: Johannesburg and Southern Water and Sewerage Company in Zambia; and
 - o Only two in Western and Central Africa: Energie du Mali and SPEN in Niger.
- All the other utilities provide too little water and/or a very small volume of subsidized water. This is exacerbated by the fact that a significant number of households are actually sharing connections. Poor households are therefore still charged the higher tariff bands as they are sharing connections: this confirms that virtually all consumption subsidies (increasing block tariffs) are still very poorly targeted and need to be redesigned. This may be due, in part, to utilities' inability to assess and report coverage reliably.

Services to the Poor

The analysis of the effectiveness of services to the poor is based on a qualitative assessment of the number and type of pro-poor interventions and their quantitative impact on the overall water supply and sanitation coverage for each utility. Practitioners will be able to implement some of the technical, financial and socioeconomic approaches that are mentioned in the report (see Section 3.6).

Key findings are summarized below:

- Coverage in the Southern African region is the highest at 78 percent (despite the slight reduction). This is due to the fact that 65–70 percent of utilities in the region have clear strategies and targets for serving poor households, supported by the fact that half of the utilities have (a) pro-poor units that guide interventions in poor areas; (b) multiple levels of service and modes of payment which poor households can choose from; and (c) project delivery partnerships with community-based organizations (CBOs) and the local private sector.
- Coverage in the Eastern African region may have increased from 59 percent to 63 percent due to the fact that 70–80 percent of the utilities had pro-poor strategies and targets, supported by the fact that (a) half of utilities helping customers connect in the form of an amortized cost of connection; (b) 40 percent consider that they are giving a choice of level of service (water and sanitation) to customers,¹⁰ and (c) 45 percent have project delivery partnerships with CBOs and the local private sector.
- Coverage in the Western and Central African region (excluding Nigeria) has reduced from 65 percent to 62 percent, and fewer than 20 percent of utilities had pro-poor strategies, targets and pro-poor units, or were offering a choice of level of service, amortized costs of connections, and/or social connection programs. However, poor coverage figures (attributed to the lack of strategies and targets) in Nigeria (45 percent), Cameroon (42 percent), Benin (57 percent), Ghana (55 percent), CAR, and Togo hide excellent results achieved in Burkina Faso (from 60 to 72 percent), Gabon, Guinea, Mali, Niger, and Senegal (with close to 90 percent coverage).
- Social connection programs (which include subsidized connections as well as amortized connections), are believed to be the single largest contributing factor to improving services and demand for services in poor settlements at scale, particularly when they are associated with adequate planning for service improvement and expansion.
- Pro-poor strategies and annual targets to serve the poor, coupled with providing poor households with a choice of level of service and modes of payment, are considered to be the main drivers of expansion of services into low income settlements. On the other hand, poor coverage (and no or only limited coverage expansion) seems to be caused by a lack of strategy and targets to serve the poor as well as the inability of utilities to provide poor households with a choice of level of service and mode of payment.

¹⁰ Although this was not checked with customers.

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- More than 90 percent of utilities provide a consumption subsidy in the form of increasing block tariffs. Whilst this could be an effective tool to serve poor households, in practice this does not actually help poor households as these are not connected (and have to purchase water from vendors or share connections). Subsidies of formal connections therefore often do not reach poor households.
- Many innovative delivery mechanisms have been developed and implemented across the continent to increase and improve the quality of services to poor households. Options range from kiosks and standpipes in Western and Central Africa; different levels of services according to available network pressure and housing type in Durban, South Africa; and delegated management of distribution lines to third party operators in Kisumu, Kenya (although still at small scale). Some countries have also set up dedicated pro-poor units and are delivering large scale social connection programs that increase coverage to all households, including the poor (for example, in Senegal and Burkina Faso). Others have structured significant cross-subsidy mechanisms that help deliver free basic water to all households, including the poor (for example, in South Africa, in general, and Durban, in particular).
- However, despite the good approaches developed, it is considered that poor technical and financial performance is providing significant disincentives for utilities to serve poor households as, in order to limit their losses, utilities concentrate on providing services to and collecting revenues from more affluent customers which consume more water and which are charged the higher tariff band. Poor service provision from utilities whose technical and financial performance is already poor is exacerbated by the fact that they also lack clear strategies and targets to expand services to unplanned areas—instead this is undertaken in an ad hoc fashion.

Recommendations

This report assesses and benchmarks performance across 100 utilities in Africa covering 21 countries. Whilst progress has been made in increasing coverage of urban water supply and sanitation, a number of fundamental weaknesses have been identified. These need to be addressed both within utilities and within the institutional frameworks within which they operate. The report makes the following recommendations:

- Significant additional efforts are needed to help countries get on and stay on track to achieve the urban water supply and sanitation MDGs in Sub-Saharan Africa, otherwise these will be missed.

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- The institutional roles and responsibilities in the sanitation sector need to be clarified, in particular if utilities are expected to take responsibility for both off-site (sewerage) and on-site (latrines and septic tanks) sanitation. Institutional roles and responsibilities for providing services in unserved settlements also need to be clarified and included in detailed utility business plans.
- Clear and realistic pro-poor strategies and targets need to be developed at utility level. These specifically need to feed into national MDG targets which are then monitored, evaluated, reported, and acted on at national level.
- The methodology for assessing coverage of water supply and sanitation services needs to be reviewed and defined explicitly¹¹ to acknowledge the fact that a large proportion of poor households actually share connections (either use their neighbor's or purchase water from kiosks). Regular assessments also need to be undertaken through household and statistical surveys, rather than engineering estimates, and be shared with all sector stakeholders including policy makers, regulators, utilities and development partners. In particular, the methodologies for setting pro-poor and MDG targets need to be aligned with how progress against these targets is measured (for instance, JMP).
- Significant investments and technical assistance are necessary to help utilities become more efficient, as only then will they realistically be able to target poor households. Operational efficiency improvements should include asset management and infrastructure rehabilitation. These activities need to take place either prior to or in parallel with infrastructure expansion programs.
- Investments in social connection programs need to be complemented with investments in additional water supply (production and/or reduction of losses) capacity to prevent average per capita consumption from reducing.
- Significant improvements are required in revenue collection and in political commitment to pay water bills on time, throughout the region. This needs to be supported by a significant increase in metering—both bulk and district metering and customer metering.
- Policy makers and utility managers need to address the fact that utilities that are not providing services (increasing coverage) to a growing number of households living

¹¹ This had already been highlighted by GTZ (2007) in MDG monitoring for urban water supply and sanitation: Catching up reality in Sub-Saharan Africa.

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in poor (unserved) settlements are failing in their public mandate and are facing the risk of becoming less and less relevant. Addressing the needs of poor households with technically appropriate and demand-responsive delivery mechanisms that include cost-effective levels of service, easy-to-use and easy-to-pay-for water and sanitation services, and options for increasing access quickly (for example, amortization of connection costs) is paramount. Specifically, more work needs to be undertaken to explore the opportunities of increasing coverage of water supply to poor households with significant reductions in water losses.

- There is a need to look at the suitability of tariff structures (flat, increasing block tariff) and levels (volume and price) in all regions, and to help utilities adapt these to the actual characteristics of their customer bases (including number and type of customers, and volumes consumed). This needs to be complemented by improved billing and customer metering practices.
- Utility performance needs to be assessed and benchmarked at the national and regional levels by an independent body, for instance, national water associations (such as the AfWA) or a network of national regulators, and so on. Where existing, utility performance benchmarking systems need to be improved, data submitted by utilities independently reviewed, challenged and audited, prior to use and publication. Institutional frameworks need to incentivize utilities (through bonuses and penalties) to report correct and timely information which can be used for overall sector planning and monitoring.
- Existing utility performance benchmarking systems can be used, such as IBNET (International Benchmarking Network for Water and Sanitation Utilities, www.ib-net.org) or the National Benchmarking Initiative for Water Services in South Africa, which could also initially be based on a simplified set of key performance indicators.
- Utilities that are run on a commercial basis (for example, in South Africa, Senegal, and Burkina Faso) have fared much better than the rest because they have clear roles and responsibilities, performance targets, and payment mechanisms that are enshrined in a long term performance contract. This confirms the need for continued sector reform. Similar aspects of these contracts, in particular the role of government (as an asset owner and responsible for investment), could be adopted where workable by utilities in Africa.
- African water utilities are significantly affected by the number of poor households living in their service area, for example, 50–60 percent and 30–40 percent of the customer base in Kisumu and Nairobi, respectively. **Utilities that are unwilling or unable to provide sustainable water supply and sanitation services in these poor, unplanned**



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settlements are at risk of becoming redundant and losing a significant portion of their potential customers and revenue. Some utilities have developed specific strategies to improve services to unplanned/poor settlements: these and others from developing countries outside the region need to be shared across the continent.

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Acronyms and Abbreviations

AfWA	African Water Association
ATP	Ability to pay
CAPEX	Capital expenditure
CAR	Central African Republic
CBO	Community-based organization
DRC	Democratic Republic of Congo
DN	Nominal diameter size
EU	European Union
GPOBA	Global Partnership for Output-Based Aid
GWOPA	Global Water Operators' Partnerships Alliance
h	hours
HH	household
HR	Human resources
IBT	Increasing block tariff
IWA	International Water Association
ISO	International Organization for Standardization
KPI	Key performance indicator
MDG	Millennium Development Goal
m	when used next to a number: million; otherwise meter
m ³	cubic meter (1,000 liters)
NGO	Nongovernmental organization
OBA	Output-based aid
OCCR	Operating cost coverage ratio
OEI	Overall efficiency indicator
OPEX	Operations expenditure
O&M	Operation and maintenance
NRW	Nonrevenue water
PN	Nominal (pipe) pressure
UN	United Nations
UN-Habitat	United Nations Human Settlements Programme
USAID	United States Agency for International Development
USAQ	Utility self-assessment questionnaire
US\$	United States Dollar
VAT	Value added tax
WOP Africa	Water Operators' Partnerships Africa
WSP-AF	Water and Sanitation Program-Africa region

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WSS	Water supply and sanitation
WTP	Willingness to pay
WUP	Water Utility Partnership

Note: For clarity, the acronyms of individual utilities have not been included in the above as they are explained in the text.

Acknowledgments

This second 'State of African Utilities: Performance Assessment and Benchmarking Report' is a multi-country and multi utility initiative of the World Bank's Water and Sanitation Program, undertaken with the specific support of the Department for International Development on behalf of the Water Operators' Partnerships and the Africa Water Association (AFWA).

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Chapter 1. Introduction

1.1 Background to the WOP Movement

The Water Utility Partnership (WUP) initiative implemented from 1998 to 2006 showed the value of exchanges and mutual learning among African water utilities. WUP brought to attention the critical challenge of extending services to the urban poor and developed key principles to do so, known as the 'WUP mantras' (also see Box 1):

- A reasonably efficient and financially viable utility is a precondition for serving the poor at scale.
- Improved utility performance is necessary but not sufficient to serve the poor as utilities need to work in partnership with local community-based organizations and private sector actors to deliver services.

The Water Utility Partnership (WUP) was followed by the establishment of the Global Water Operators' Partnership Alliance (GWOPA), a global initiative hosted by United Nations Human Settlements Program (UN-Habitat) to develop learning and mutual support among water operators. GWOPA was targeting primarily public utilities which are responsible for serving about 90 percent of the urban population and had a poor performance.

WOP Africa was defined by the Johannesburg Workshop in 2007 which gathered more than 120 African utility managers and specialists. Participants agreed to create not-for-profit operators' (WOPs) partnerships to improve knowledge sharing and performance, and prioritized the

following five themes to be the focus of the WOP Africa action plan:

1. **Management information systems**, to assist utilities to establish or strengthen management information systems necessary for monitoring and evaluation as well as for performance assessments and benchmarking aimed at continuous improvement of services.
2. **Services to the poor**, including strengthening pro-poor policies and strategies that define financing, and operational mechanisms and tariffs that ensure equitable provision of services to all urban residents, including the poor.
3. **Water supply and sanitation (WSS) and Millennium Development Goal (MDG) roadmaps**, including supporting operators as they develop roadmaps and action plans with long-term planning and financing perspectives to accelerate progress towards the achievement of MDGs.
4. **Human resources (HR) development and capacity building**, including catalyzing and encouraging utility-to-utility exchange of know-how and networking on training and HR development.
5. **Infrastructure development and asset management**, with clear separation of policy, service provision and regulation, as well as specific operational and asset ownership roles and responsibilities.

Box 1: WUP vision for water utilities

Efficient, well-managed, accountable, and responsive utilities which provide equitable, sustainable, good quality water, and sanitation in their areas of operation.

Sector policies and institutions providing the right incentive for utilities to:

- Extend services to the poor through partnerships with key stakeholders.
- Foster a culture of capacity-building, knowledge sharing, and networking.
- Ensure a sound environment and sustainability of water resources.

1.2 Summary of the WOP1 Report

In order to set WOP Africa on a solid foundation, the African Water Association (AfWA), GWOPA, and Water and Sanitation Program–Africa region (WSP-AF) undertook a detailed assessment of water utility performance. The resulting report, Water Operators Partnership: Africa Utility Performance Assessment, prepared by WSP-AF covered more than 134 utilities and was reviewed in three subregional workshops. These workshops gathered 250 managers from more than 100 utilities and were the launching of the WOP Africa initiative.

The key findings of the WOP1 report are summarized in Table 1. This table excludes operating cost coverage ratio as this was not determined at the subregional level.

Table 1: Summary of utility performance at WOP1 stage (2003–2006 data)

KPIs	Units	Eastern Africa	Southern Africa	Western Africa	Central Africa
Water supply coverage	%	64	65		
(without Nigeria)		79			
Nonrevenue water	%	44	23 (without Nigeria)	28	36
Continuity of supply	Hours per day	17	15	12	21
Staff productivity	Staff per 1,000 connection	14	23	12	
Collection ratio	%	76	94	77	
Collection period	Days	210	300	210	
Collection efficiency multiplied by revenue water	%	43	72	68	49

The main conclusions from the WOP1 stage can be summarized as:

- The major challenge facing utilities is expanding coverage.
- Operational (technical and financial) inefficiencies are a major cause of poor access to water services.
- Africa has a good number of well performing utilities and good practices for serving the poor.
- There are utility-to-utility exchanges that are already taking place that can be scaled up through WOP Africa.
- Availability and reliability of performance data is still a problem as in many cases management information systems are either poorly designed, incomplete and/or not systematically updated.

1.3 What has Happened Since the WOP1 Report

The AfWA and UN-Habitat have undertaken activities on four fronts:

1. **Establishing the WOP-Africa Secretariat and operationalization of the platform:** The WOP-Africa coordinator was appointed in 2009 and has launched an initial batch of WOPs.
2. **Operation:** WOP-Africa has sought to quickly start delivering results on the ground focusing on mutual support activities directed at reducing losses and other efficiency indicators, increasing coverage and investments through tangible improvements: up to now 15 partnerships have been facilitated and/or funded by WOP-Africa in collaboration with GWOPA (this has included the development of Performance Improvement Plans, PIPs). WOP-Africa and GWOPA also connected African utilities with mentors from the North and helped them to secure funding from external sources.

3. **Resource mobilization: Securing of \$3 m funding from United States Agency for International Development (USAID) and 500,000 Euros from the African Water Facility (African Development Bank).** The components of the USAID-funded proposals included:

- i. Promotion of management best practice with support for 15 utilities to reach ISO9001:2008 certification.
- ii. Special WOP initiative on Nonrevenue water (NRW).
- iii. Special WOP initiative to develop PIPs on pit latrine and septic tank sludge emptying through close collaboration with local governments.
- iv. Nigeria WOP initiative.
- v. Launching of the African Water Academy based at the National Water and Sewerage Corporation of Uganda.

The components of the AWF grant included:

- i. Support of 10 WOPs.
 - ii. Establishment of an operators' database.
 - iii. Third round of benchmarking.
4. **Establishment of the utility performance database** (hosted by the AfWA) and the launch of the second Africa Water Utility Performance Assessment and Benchmarking (2006–2009), which is the object of this report, and subsequent subregional workshops.

The WOPs that were implemented since 2008 have also focused on improving collection, reporting, and management of information—in particular, information on customers (billings) and on assets. The reduction of NRW is the single greatest need expressed by utility managers during each of the three workshops, and thus has been a major focus of WOPs.

Box 2: Upcoming WOP partnerships for 2012–2013

- **SDE (Senegal)** with SEG (Guinea) and SNDE (Mauritania).
- **NWSC (Uganda)** with Ogun State Water Board (Nigeria), Thika Water (Kenya), and GWC (Ghana).
- **RAND WATER (South Africa)** with River State (Nigeria).
- **ONEA (Burkina Faso)** and **SONEB (Benin)**.
- **SWSC (Swaziland)** with Nkana and Kafubu (Zambia).

Note: Mentors' names are in bold.

Source: AfWA.

For more information on these ongoing WOPs, refer to: <http://gwopa.org/engage-with-us/the-pipeline/groups/viewgroup/18-wop-africa-10-wops>

1.4 Objectives of this Report

The objective of this report is to present the outcome of the second assessment of water utility performance (that is, WOP2) using a number of recognized industrywide key performance indicators (KPI).

The report attempts:

1. To assess whether the performance of the participating utilities has improved since 2006 (data published in 2008), by comparing **data from 2006 to 2009**.
2. To assess whether water supply and sanitation coverage efforts have been of sufficient scale to overtake urban population growth and, therefore, whether the utilities are contributing to their

respective countries' efforts to achieving the MDGs.

3. To review efforts to improve service provision to poor households, and to derive recommendations for practical pro-poor approaches.
4. As with WOP1, to identify areas of water utility management and performance where there is strong potential for WOPs.

The report was discussed and reviewed in successive drafts by utility managers in three regional workshops which were carried out in the Eastern, Southern and Western African regions and in held in Naivasha (Kenya), Lusaka (Zambia), and Dakar (Senegal), respectively. Separate workshop proceedings are available for each of these workshops.

1.5 Scope and Limitations

The assessment and benchmarking exercise of water utility performance which is presented in this report should not be construed as showing an independent assessment of utility performance.

The assessment was undertaken with data submitted by the utilities themselves and reasonable care was exercised in checking the validity of the information. Individual utilities had the opportunity to review their figures and the conclusions were reviewed and broadly validated by utility managers who participated in the three regional workshops.

The report as it stands provides a meaningful overview of the current trends and issues in the performance of urban water utilities in Sub-Saharan Africa. It also constitutes a useful basis for identifying and promoting WOPs.

The objective, as mentioned in this chapter, is not to present an exhaustive assessment of utility performance, but rather to identify overall sector trends and provide a guide for more systematic reporting and analysis of performance to be undertaken in each of the countries and regions of the AfWA. The information submitted by the utilities was verified, as much as possible, against published data including regulatory reports, Annual Reports, and so on, but has not been audited.

1.6 Audience and Use of the Report

This report is intended for all water supply and sanitation sector stakeholders, in particular utility managers and government staff (including regulators, policy makers, and their advisors), so that they can use the information and the methodologies presented in this report (including the USAQ) to develop, implement, and monitor utility performance improvement plans, which include targets, strategies for improvement, and the identification of investment needs.

It is considered that similar performance assessment and benchmarking systems, as presented herein and in line with that which was developed since the early 2000s by the International Benchmarking Network for Water and Sanitation Utilities (IBNET, see: www.ib-net.org) can be developed that are linked with the financial incentives given to utilities (for example, capital investment programs, tariff reviews, more risk transfer, more autonomy, and so on).

The report can also be read by non-experts that are interesting in understanding the principal key performance indicators that are usually used to monitor, evaluate, and benchmark water utilities.

1.7 Structure of this Report

The structure of this report is:

- **Chapter 1** is the introduction of the report, which presents the background to the study and the objectives of the report.
- **Chapter 2** contains and presents the research approach and methodology, reviews the quality of the information received, and the data that were collected and analyzed (by region, country, and utility).
- **Chapter 3** contains the results of and commentary on utility performance assessment looking at technical and financial key performance indicators. Chapter 3 also contains an analysis of the type and effectiveness of water supply and sanitation services provided to the poor in the region.
- **Chapter 4** is the conclusion of this report. It also contains recommendations for specific themes which utility managers can address through WOPs.

The detailed utility performance database compiled from the USAQs is included as an electronic appendix to this report.

Chapter 2. Background and Methodology

2.1 Rationale for Performance Assessment and Benchmarking

2.1.1 Why is Utility Performance Assessment Useful?

- Reporting of performance allows utility managers, policy makers, regulators, and the general public to assess whether utilities are fulfilling their mission, and to form a view on their ability to do so in the future.
- Performance assessment can be done objectively as it is based on internationally recognized indicators and benchmarked against local and global best practice.
- Policies and strategies can be adapted and implemented more reliably if the organizations responsible for service provision are accountable and if the impact of their services can be measured.
- Utility performance assessment ultimately has an impact on tariffs, capital and operational investment requirements, operational practices, if the assessment leads to the development of a utility specific performance improvement plan.
- Trends can be identified and analyzed and performance improvement programs developed and implemented—for instance, are the utilities on track to achieving the MDGs?

2.1.2 Why is Benchmarking Useful? What Benchmarks are Useful?

- Benchmarking is a standard tool for assessing the relative performance of utilities against their peers.
- It is typically undertaken at national level by regulators to assess the performance of utilities that operate as monopolies (for example, utilities in England and Wales, Zambia, Kenya, and so on), prior to setting targets.
- Benchmarking can also be useful when considering the performance of large scale national organizations such as the utilities in West Africa—which only report performance data to national institutions.
- In general, utility performance benchmarking is undertaken for utilities of similar size, or in similar countries. However, in this assessment utility performance is compared across the Eastern, Southern and Western and Central African regions. Where necessary, commentary on utility size, institutional framework, and so on (that may provide an explication for particular aspects of performance) is provided.

Box 3: Who benchmarks utility performance?

- The National Water and Sanitation Council (NWASCO) in Zambia (on a yearly basis).
- The Water and Sanitation Regulatory Board (WASREB) in Kenya (on a yearly basis).
- The Office of Water Services (Ofwat) in the UK—for domestic utilities and on international capital maintenance costs (on a yearly basis).
- The Electricity and Water Utilities Regulatory Authority in Tanzania (on a yearly basis).
- Single-utility regulators such as the PURC in Ghana, and ARM in Niger.
- The International Benchmarking Network for Water and Sanitation Utilities (IBNET) which is managed by WSP in Washington D.C., and which contains data for more than 1,000 utilities going back to 1996.

to ensure that the additional information on serving the urban poor was captured from the start of the review. The structure of the USAQ and the definition of key performance indicators closely followed the toolkit developed and used by the IBNET.

- USAQs were sent to 134 utilities throughout Africa and were completed by 106 of these utilities in Sub-Saharan Africa. However, the analysis uses more or less complete data submitted by only 91 utilities.
- WSP-AF engaged local consultants to help some of the utilities with data collection, input, and data verification.
- Data received from utilities were checked by WSP-AF for completeness and consistency through liaison and follow-up with the utilities.
- KPIs and trends between 2006 and 2009 were analyzed and commented on.
- Utilities were ranked for most technical and financial indicators.

2.2 Process of Data Collection and Verification

2.2.1 Process

The process of data collection is summarized below:

- A detailed Utility Self-Assessment Questionnaire (USAQ, which is included in Appendix 1) was prepared jointly by the WSP-AF, AfWA, and UN-Habitat to build on the success of the WOP1 work and

2.2.2 African Subregions

The subregions used by the AfWA were used for categorizing each of the utilities into the Sub-Saharan Africa region. No assessment is made of Northern African utility performance in this report.

The different subregions (and individual countries) are illustrated in the map in Figure 1.

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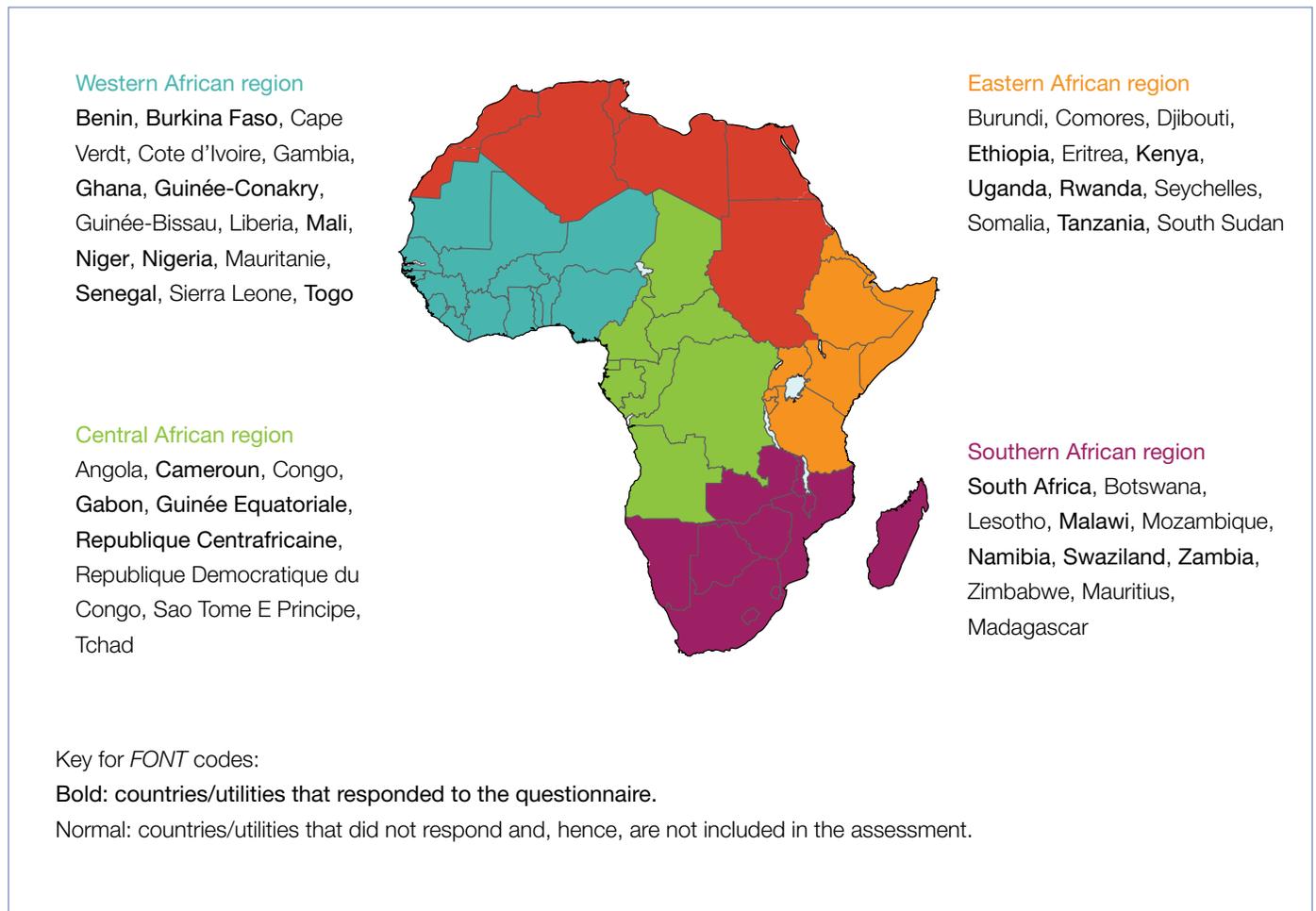
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Box 4: Structure of the USAQ

1. General information: name, towns served, contact details of managing director, and person responsible for completing the USAQ.
2. Types of services provided by the utility: bulk production, distribution, wastewater, on-site sanitation services and so on, type of performance agreement, and regulatory structure (if applicable).
3. Key statistics on utility coverage, networks, and connections.
4. Volumes produced and sold by customer category.
5. Volumes of wastewater collected and treated, including fecal sludge collection and treatment.
6. Continuity of supply, numbers of households affected, and asset management data (bursts, leaks, blockages, water quality tests, and so on).
7. Total billed amounts by customer category and service (water supply and sewerage).
8. Total collected amounts by customer category and service (water supply and sanitation).
9. Operational costs.
10. Staffing and HR training and development policies.
11. Services to the urban poor.
12. Sources of water and type of treatment processes.
13. Gross fixed assets value, capital investments, and funding sources available to the utility.
14. Experience with utility-to-utility partnerships.
15. Water and sewerage tariff structures and levels.

Figure 1: African subregions used to summarize performance (courtesy of AfWA)



2.3 Data Verification and Quality of Information Received

2.3.1 Data Verification Methodology

This Section briefly describes the methodology developed during this assignment:

1. All calculations of KPIs were undertaken by WSP-AF

using data obtained from the USAQ and the utility performance database).

2. Checks for completeness and consistency were undertaken by WSP-AF. Some of these quality assurance tests included:

- Checking that the total population served was not greater than the total population.
- Checking that sums were correct, for example,

total population served compared with population served with individual house connections, kiosks and shared connections; total volume of water sold to all customer categories is not greater than total volume of water into supply.

- c. Converting similar currencies (for example, Franc CFA) into identical units (millions, billions, and so on) for later conversion into US\$.
 - d. Checking that volumes produced per annum made sense (and that utilities had followed the units of Million m³, that is, Mm³, per year).
3. Calculation of all KPIs and summary by utility, country, subregion, and region per year.
 4. Challenging some of the KPIs and discussion with utilities on quality of data.

2.3.2 Quality of Information Received through the USAQ

The process of data verification for completeness and consistency showed that:

- The Sections of the USAQ on human resources, services to poor households, sources of water and sources of investment, and tariffs were generally well responded to.
- However, most utilities were not consistent with the units of data requested in the questionnaire, including volume of water produced per annum (in Mm³/year), number of connections (in '000), length mains (in km), and so on. Suitable adjustments were thus made in consultation with the utilities.
- A significant number of utilities did not report reliable water supply coverage estimates due to lack of data on the breakdown of connections by customer type and the number of people sharing connections. This is especially true for utilities that serve a large number of communal water points and is discussed in more detail in the Section on coverage (Section 3.3.1).
- All utilities had difficulties reporting volumes of water produced or volumes purchased (in the case of bulk supply), volumes into supply, and volumes sold by customer category.

Box 5: Best reporting of performance data

A number of utilities stand out with good quality (complete and consistent) data. This highlights a culture of data and performance reporting, both internally and externally.

- Private utilities (PPPs): SEEG (Veolia) in Gabon and Mbombela/ Silulumanzi (Cascal) in South Africa.
- Public utilities: National Water Supply and Sewerage Corporation in Uganda.
- Local public utility: Nyeri Water and Sewerage Company in Kenya.
- Municipal water departments: Johannesburg Water and eThekweni Water Services in South Africa.

Table 2: Numbers of utilities contacted and questionnaires received by subregion

AfWA regions	Number of utilities contacted	Responses received (and used)
Eastern Africa	32	29
Southern Africa	58	21
Western and Central Africa	44	39
Total	134	89

- All but the smallest utilities (including municipal departments and authorities) were able to split billings and revenue collection by customer type, but there was a general difficulty in reporting operation and maintenance (O&M) costs.

This demonstrates that utilities still need to improve their management information systems, whether they are reporting lengths of mains, number and location of watermains bursts and sewer blockages, the number of working meters, operational costs, volumes sold, billings and collections by customer category or the number of people served.

The utilities that submitted the most complete and consistent USAQs are summarized in Box 5.

2.4 Number of Questionnaires

One hundred and thirty-four questionnaires were sent to utilities in the course of 2010; 89 USAQs were received and analyzed. The assessment therefore draws on detailed utility performance data from 65 percent of the utilities contacted (21 countries). All of the larger utilities (population greater than 1 million) contacted completed and returned the questionnaires, except for the water and sewerage board of Lagos in Nigeria.

Chapter 3. Results of Performance Assessment and Benchmarking

3.1 Key Statistics of Utilities that Participated in this Self-Assessment

The utilities surveyed represent a total population of 156 million, of which 77 percent are in the Western and Central African region due largely to the population of 71 million in Nigeria. This region also has the highest number of large utilities serving more than 1 million population, either as metropolitan utilities or national utilities with a mandate to serve all cities and towns.

The utilities surveyed in the Eastern and Southern African regions represent a population of 17.9 and 18.7 million,

respectively. The two regions are characterized by eight metropolitan utilities serving capitals and principal large cities in these countries with a population greater than 1 million, as well as a large number of smaller utilities that operate at a municipal level.

Table 3 summarizes utilities by size, type of services provided, and region. Summaries of population sizes are shown in Figure 2. The table demonstrates how the size of the countries and cities could distort comparisons across utilities from different regions. In particular, large countries such as Nigeria, Ethiopia, and South Africa in the Western, Eastern, and Southern regions, may distort the performance of these regions.

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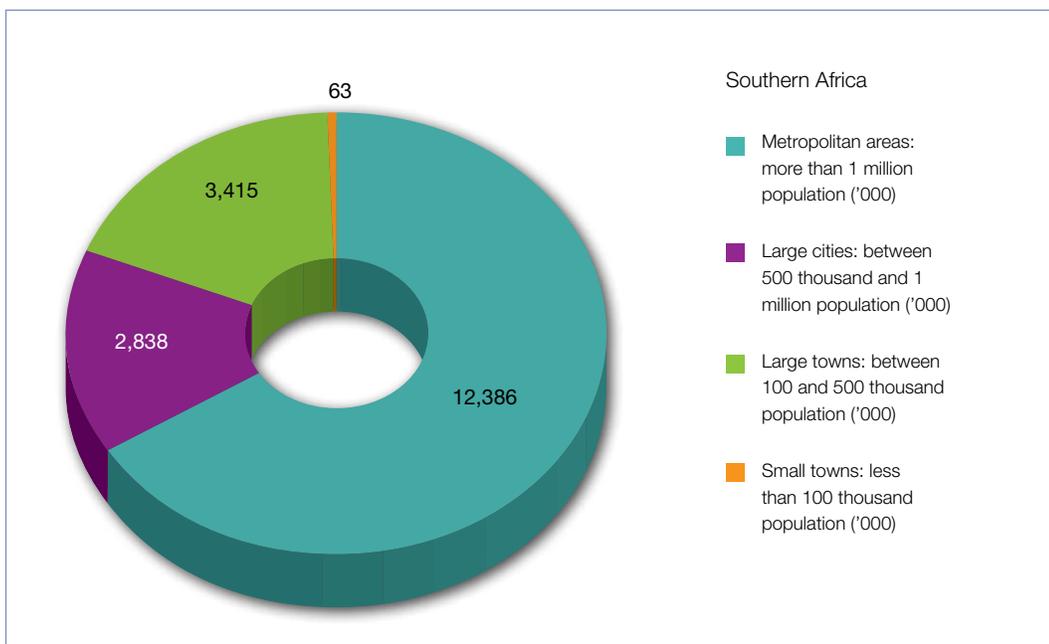
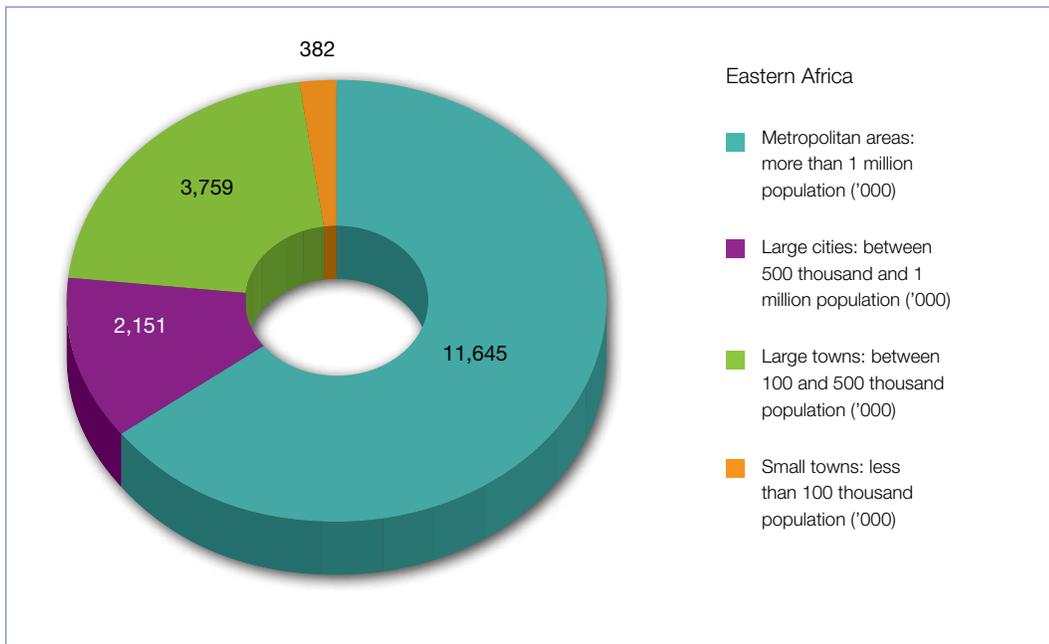
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Table 3: Summary of number of utilities per type of service and population size

	Eastern Africa	Southern Africa	Western and Central Africa	Total	%
Number of countries	4	5	13	22	
Number of utilities	28	21	36	85	
Type of services provided					
Piped water supply services	28	21	36	85	100%
Bulk water supply	7	7	19	33	38%
Wastewater (domestic and industrial) services	20	16	2	38	43%
On-site sanitation (latrines, septic tanks)	11	8	2	21	24%
Storm water drainage	1	2	1	4	5%
Solid waste services	3	3	0	6	7%
Other (for example, electricity, roads)	1	3	2	6	7%
Number of utilities (by population living in the service area)					
Total population to be served by utilities (million)	17.9	18.7	119.9	156.5	
More than 1 million (metropolitan area)	4	4	33	41	48%
Between 500 thousand and 1 million (large cities)	3	4	2	9	10%
Between 100 and 500 thousand (large towns)	16	12	1	29	32%
Less than 100 thousand (small towns)	5	1	0	6	5%

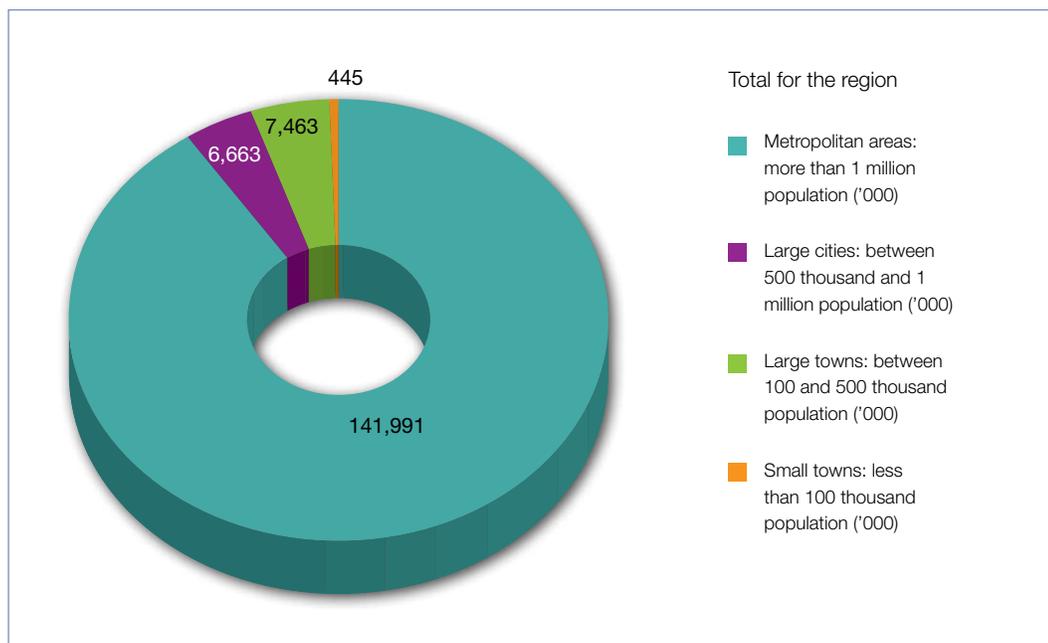
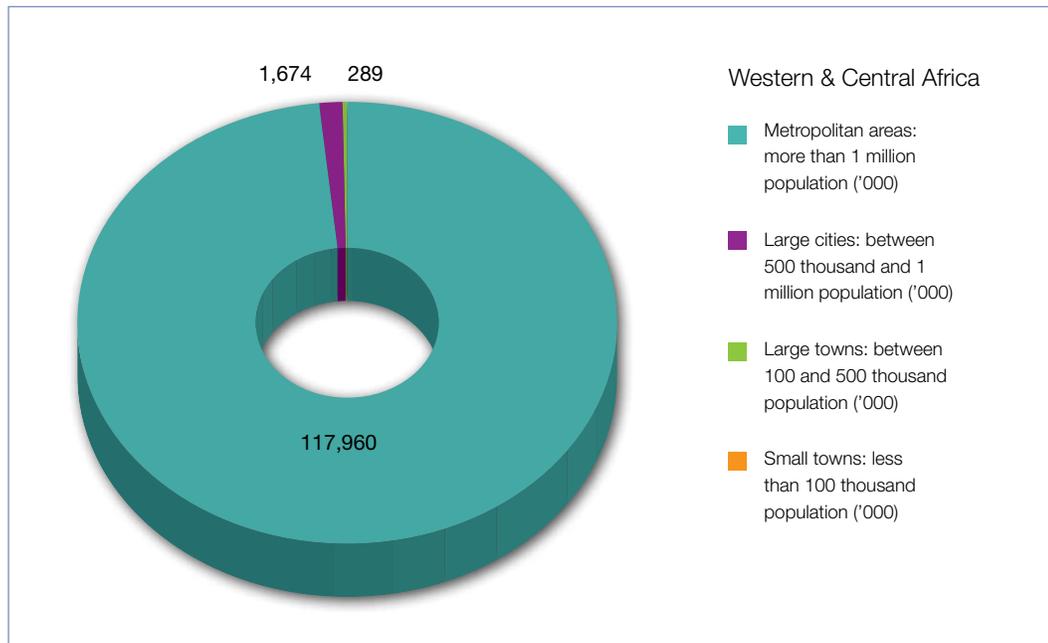
Figure 2: Summary of population size by region (2009)



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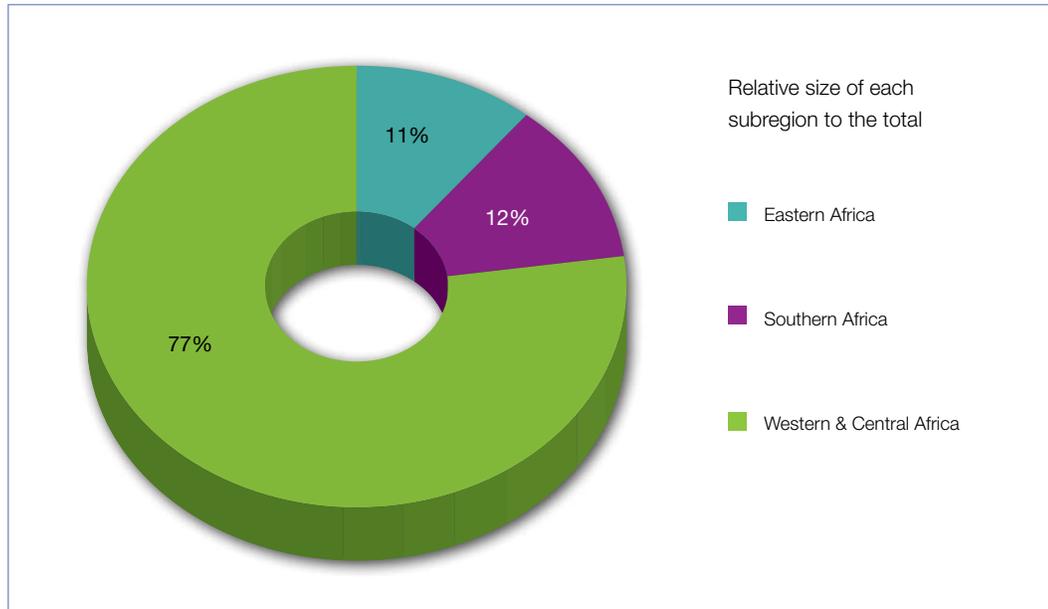
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3.1.1 Key Statistics of Eastern African Utilities

Twenty-eight utilities participated, representing a total population (service area) of 17.9 million. Most of them serve a specific city or municipality, except for the National Water and Sewerage Corporation of Uganda which is a national utility. Three utilities that participated have more than 500,000 people living in their service area.

The combined population of **Addis Ababa, Dar es Salaam, Kampala, and Nairobi** represents 60 percent of the total population in the sample, which means KPIs for these utilities are likely to significantly affect the performance of the whole region.

3.1.2 Key Statistics of Southern African Utilities

Twenty-one utilities participated, representing a total population (service area) of 18.5 million. Most of them

serve regional areas (water boards) or large urban areas, except in the case of Swaziland Water Corporation which is a national utility. Four of the utilities that participated have more than 500,000 people living in their service area.

Utilities in the Southern African region are mainly regional water boards serving large cities and their surroundings, except for Walvis Bay in Namibia, which is a relatively small utility and the only one from Namibia that participated in this study.

Fifty-five percent of the population lives in South Africa, where the three largest utilities are also found: Johannesburg, Pretoria/Tshwane, and Durban/eThekweni, followed closely by Lusaka in fourth position.

Table 4: Eastern African population in service areas by utility and country

Utilities by country	Population in service area (2009) '000
Eastern Africa	
Ethiopia	
Addis Ababa Water and Sewerage Authority	2,854
Dire Dawa Water Supply & Sewerage Authority	310
Harar Water & Sewerage Authority	213
Jimma Town Water Supply and Sewerage Service Enterprise	167
Mekelle Water Supply Service Office	261
Kenya	
Eldoret Water and Sanitation Co. Ltd.	392
Kericho Water and Sanitation Co. Ltd.	119
Kikuyu Water Co. Ltd.	210
Kilifi Mariakani Water and Sewerage Co. Ltd.	698
Kisumu Water and Sewerage Company	600
Malindi Water and Sewerage Co. Ltd.	372
Meru Water and Sewerage Services	85
Mombasa Water and Sewerage Company (MWI)	853
Nairobi City Water and Sewerage Co. Ltd.	3,203
Nakuru Water & Sanitation Services Co. Ltd.	300
Nanyuki Water and Sewerage Co. Ltd.	90
Nyeri Water and sewerage Co. Ltd.	144
Tanzania	
Arusha Urban Water Supply and Sewerage Authority	343
Dar es Salaam Water and Sewerage Corporation	2,648
Dodoma Urban Water Supply and Sewerage Authority	302
Iringa Urban Water Supply and Sewerage Authority	153
Kigoma Ujiji Urban Water Supply and Sanitation Authority	205
Musoma Urban Water and Sewerage Authority	170
Singida Urban Water Supply and Sewerage Authority	82
Songea Urban Water Supply and Sewerage Authority	87
Sumbawanga Urban Water & Sewerage Authority	100
Uganda	
National Water and Sewerage Corporation	2,940
Total	17,901

Most of the water utilities above also provide sanitation services, although this tends to be limited in scale to sewerage (when such networks exist).

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Table 5: Southern African population in service areas by utility and country

Utilities by country	Population in service area (2009) '000
Southern Africa	
Malawi	
Blantyre Water Board	944
Lilongwe Water Board	674
Northern Region Water Board	297
Southern Region Water Board	363
Namibia	
Municipality of Walvis Bay	63
South Africa	
Cascal Operations Pty. Ltd. t/a Silulumanzi	413
City of Tshwane	2,501
eThekweni Water & Sanitation Services	3,585
Johannesburg Water (Pty.) Ltd.	4,000
Swaziland	
Swaziland Water Services Corporation	300
Zambia	
Chambeshi Water and Sewerage Co. Ltd.	256
Eastern Water and Sewerage Co. Ltd. (Chipata)	218
Kafubu Water and Sewerage Co. Ltd.	500
Luapula Water and Sewerage Co. Ltd.	173
Lukanga Water & Sewerage Co. Ltd.	313
Lusaka Water and Sewerage Company	2,300
Mulonga Water and Sewerage Co. Ltd.	375
Nkana Water and Sewerage Company	720
North Western Water Supply & Sewerage Co. Ltd.	223
Southern Water and Sewerage Co. Ltd.	327
Total	18,545

Most of the utilities above, except for the water boards of Malawi, provide some sanitation in the form of sewerage (and sometimes on-site sanitation) services.

3.1.3 Key Statistics of Western and Central African Utilities

Thirty-seven utilities participated, representing a total population (service area) of 113 million (56 percent of which are in Nigeria). This is by far the largest region in terms of population.

Most of the utilities have service areas greater than 1 million population and they are all either regional (as in the case of Nigeria) or national utilities (elsewhere in the region).

Some national water and/or sewerage utilities in the region that have not been included in the study are Liberia, Sierra Leone, Mauritania, Democratic Republic of the Congo, and the Republic of Congo, as they did not respond in time. Except for Mauritania these are all fragile states and will be approached separately when undertaking an assessment of the performance of utilities and when designing WOPs in these countries.

Only two of these utilities are involved in sanitation services:

- The Office Nationale de l'Eau et de l'Assainissement (ONEA) in Burkina Faso.
- The Office Nationale de l'Assainissement (ONAS) in Senegal (which is not represented in the list above as its population is included in that of Sénégalaise des Eaux).

3.2 Definition of KPIs Used for Assessing Utility Performance

Table 7 shows the key technical and financial performance indicators that were used to assess utility performance. Most of these are standard KPIs that are used by IBNET; some, however, were specifically developed in this study to further assess and benchmark the performance of African water utilities and to identify specific themes for which utility-to-utility support through WOP partnerships could be set up.

The definition of each KPI used in this assessment is shown in the Appendixes.

3.3 Technical Performance Assessment and Benchmarking

3.3.1 Water Supply and Sanitation Coverage

The measurement of coverage (and any changes since 2006) for water supply and sanitation services is key to measuring progress against the MDGs and for helping all water sector stakeholders set targets and assess the level of investments required to achieve those targets.

Estimates of water supply and sanitation coverage are derived directly from data provided by the utilities on (a) the total population in the service area; and (b) the total population served by the utility. The USAQ also asked

Table 6: Western and Central African population in service areas by utility and country

Utilities by country	Population in service area (2009) '000
Western and Central Africa	
Benin	
Societe Nationale des Eaux du Benin	3,270
Burkina Faso	
Office National de l'Eau et de l'Assainissement	3,509
Cameroon	
Camerounaise des Eaux	8,300
Gabon	
Societe d'Energie et d'Eau du Gabon	1,222
Ghana	
Ghana Water Co. Ltd.	12,100
Guinea	
Société des Eaux de Guinée	4,920
Mali	
Energie du Mali SA	3,107
Niger	
Societe de Patrimoine des Eaux du Niger	2,509
Nigeria	
Abia State Water Board	289
Adamawa State Water Board	3,387
Anambra State Water Corporation	2,300
Bauchi State Water Board	4,055
Benue State Water Board	4,917
Ebonyi State Water Board	754
Edo State Urban Water Board	2,600
Ekiti State Water Corporation	2,708
Gombe State Water Board	3,202
Imo State Water Corporation	1,200
Jigawa State Water Board	2,000
Kaduna State Water Board	3,711
Katsina State Water Board	1,536
Kogi State Water Board	3,000
Nasarawa State Water Board	1,990
Niger State Water Board	4,279
Ondo State Water Corporation	3,560
Osun State Water Corporation	4,950
Oyo State Water Board	4,690
Plateau State Water Board	2,937
Rivers State Water Board	1,620
Sokoto State Water Board	2,305
Taraba State Water Supply Agency	2,492
Central African Republic	
Société de Distribution d'eau en Centrafrique	920
Senegal	
Societe Sénégalaise des Eaux	6,281
Togo	
Togolaise des Eaux	2,800
Total	113,416

Table 7: Framework of KPIS for assessment of utility performance

Key technical performance indicators	Key financial performance indicators
<ul style="list-style-type: none"> • Coverage of water supply and sanitation services (and, in particular, coverage expansion between 2006 and 2009), with commentary on the degree to which utilities are contributing, or not, to meeting their countries' MDG targets. 	<ul style="list-style-type: none"> • Collection efficiency and collection period, which indicates the % of bills issued which have been collected, as well as the duration (number of days) it takes for the utility to collect these bills.
<ul style="list-style-type: none"> • Nonrevenue water expressed in a variety of ways and assessed against volume of water into supply (in liters per capita per day). 	<ul style="list-style-type: none"> • Operating cost coverage ratio, which is the ratio between total collected revenues and total operating costs, and which indicates the degree to which the utility is able to recover its operating costs from collected revenue.
<ul style="list-style-type: none"> • Metering, expressed as the % connections that are metered, which expresses the degree to which utilities are able to report accurate volumes of water sold (for example, by customer category). 	<ul style="list-style-type: none"> • Unit cost of production, which is refers to unit operational cost, with commentary on outliers, based on treatment options and sources of water used by the utilities.
<ul style="list-style-type: none"> • Bursts and leaks expressed as the number of bursts per km of watermain per annum—and referenced against an international benchmarking system, which indicates the condition of watermains. 	<ul style="list-style-type: none"> • Unit revenue, which is equivalent to the average tariff per m³ of water sold.
<ul style="list-style-type: none"> • Continuity of water supply, expressed in hours per day, which is a key indicator of performance (in particular, poor performance). 	<ul style="list-style-type: none"> • Net profit (or loss), which is the difference between average unit cost of production and average unit revenue (based on volume of water produced).
<ul style="list-style-type: none"> • Unit volume supplied and unit consumption, both expressed in liters per capita per day for individual house connections and kiosks/communal water points. 	<ul style="list-style-type: none"> • Unit volume of subsidized water, which is expressed in liters per capita per day, and which is compared to the internationally accepted benchmark for basic water use of 50 liters per capita per day. Unit volume of subsidized water is also assessed with the implied household size, which is taken as the total population served by house connections divided by the total number of house connections (both of which are provided by the utilities), and which gives an indication of the degree to which households are sharing connections.
<ul style="list-style-type: none"> • Water quality and water quality monitoring, which considers the % of samples that pass a residual chlorine test (not specified) and the frequency of samples made per m³ of water produced. 	
<ul style="list-style-type: none"> • Staff productivity which is usually expressed by the number of staff divided by the number of connections. 	

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utilities to provide information and sanitation services in their service areas (including on-site sanitation) and whether or not they were involved. Additional data on the number of connections by type were also used to elaborate on these findings.

The breakdown of water supply and sanitation coverage indicators by utility and sub region is summarized in the Appendixes. The results by sub region are summarized in the Sections below.

Key findings:

- Coverage of water supply throughout the African region has remained stagnant. Utilities have not been able to increase coverage (whether through individual house connections, shared connections, communal water points or kiosks) sufficiently to exceed population growth. Figure 3 shows water supply coverage (2009) for countries that participated in the assessment. This means that the MDG targets for water supply in most urban areas are likely to be missed. It also means that the number of un-served households in these areas, who are likely to be poorest and most vulnerable, is increasing.
- Despite strong population growth (22 percent from 2006 to 2009), 50 percent of utilities (of various sizes) have reported that they do not have specific targets for increasing coverage in poor settlements: this means that national coverage expansion targets are not developed from the utility-level up and are thus likely to be unreliable. Utilities need a much better understanding of how they reach customers, especially those who are not served by an individual connection.
- Many utilities are unable to assess coverage accurately in their service areas because a large number of households are either sharing connections or using kiosks and communal water points. Thus utilities do not understand the profile of customers whom they serve (Are they all using individual house connections? Do only 50 percent have individual connections and the remainder share or use public standpipes? Do they all use public standpipes?). This basic uncertainty means that utilities are probably not able to develop meaningful expansion plans and investment programs and that any assessment of coverage and progress against the MDGs is also at risk of being unreliable.
- Sanitation is again found to lag behind water supply. Sanitation coverage is considered to include both water-borne sewerage and on-site sanitation (for example, septic tanks and latrines). Overall there seems to have been an increase in sanitation coverage in Eastern (from 28 percent to 41 percent) and Southern African (from 49 percent to 53 percent) regions, at least in the service areas of the utilities that participated (and against population growths reported above). However, in these regions sanitation coverage is still far behind that of water supply, and it is likely that, at this rate, the sanitation MDG targets will also be missed.
- There is little data on sanitation coverage in Western and Central Africa as sanitation services are the responsibility of local government—except for ONEA in Burkina Faso and ONAS in Senegal—and are thus not reported in this assessment. However, it is unlikely that local governments will be managing sewerage networks, so the volume of wastewater going into the environment untreated is significant.
- Utilities are only involved in limited sewerage services (when these networks exist) and still shy away from on-site sanitation service provision at scale. This lack of involvement of utilities is exacerbated by the fact that sanitation in most countries (except South

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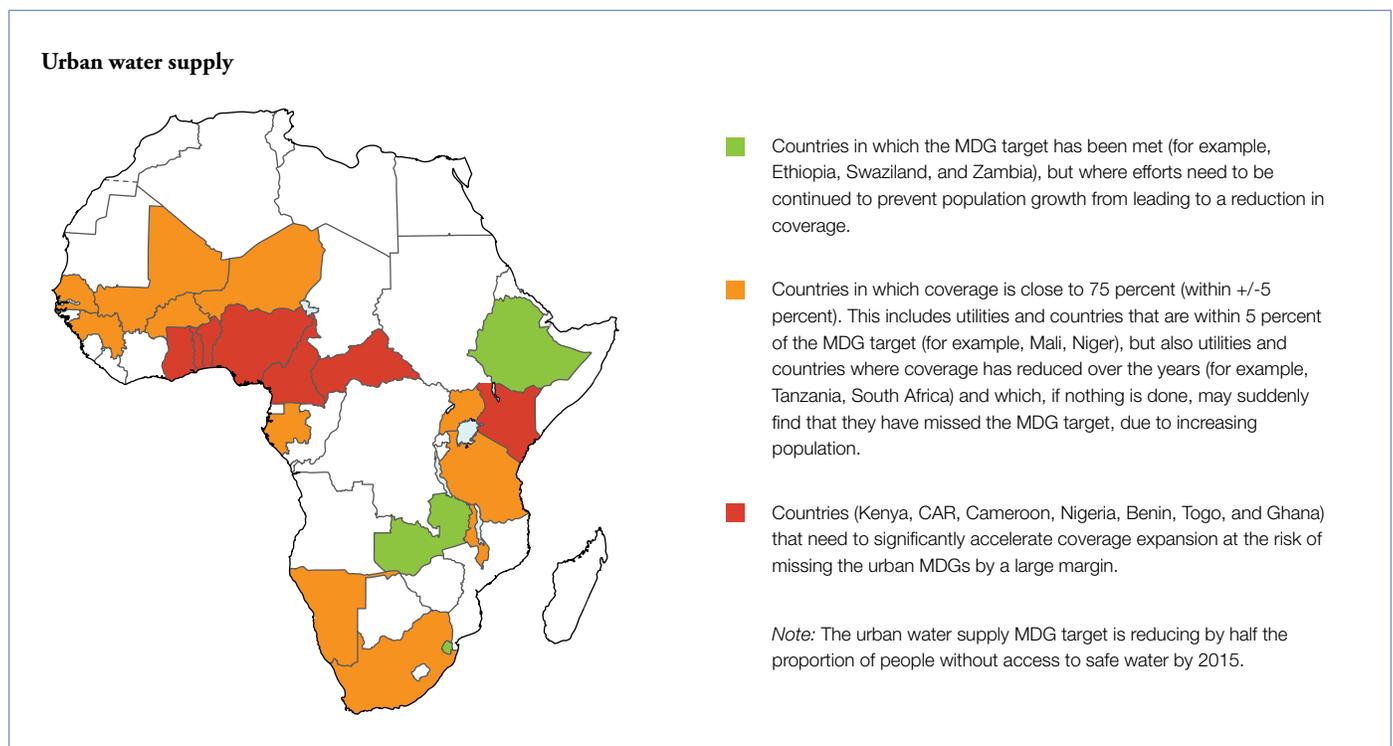
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Africa, Burkina Faso, and Zambia) is the responsibility of municipalities. Only two utilities in Africa have embraced on-site sanitation at scale: eThekweni Water Services (EWS) and ONEA. This has allowed them to significantly expand coverage: from 50 percent to 74 percent for EWS (21 percent points alone from on-site sanitation) and 26 percent to 44 percent for ONEA (with 99 percent of its customers using on-site sanitation).

- Significant investments are required to improve sanitation coverage if the MDGs are to be met. These are to be coupled with clear roles and responsibilities for utilities and local government in urban areas, in particular when there is limited sewerage network coverage.
- A significant volume of water sold is not being collected and treated (67 percent over the region, 84 percent in Eastern Africa, 39 percent in Southern Africa, and 99 percent in Western and Central Africa), causing potential significant environmental pollution and public health hazards. However, it is recognized that a portion of that volume of water is actually going to on-site treatment /infiltration systems.
- There is a urgent need to help utilities (a) develop clear and realistic expansion programs with committed funding streams; and (b) assess actual coverage levels, recognizing that a large number of households simply do not have access to individual house connections and instead must use that of their neighbors' or communal water points /kiosks.

Figure 3: Water supply and sanitation coverage (2009) compared to MDG targets

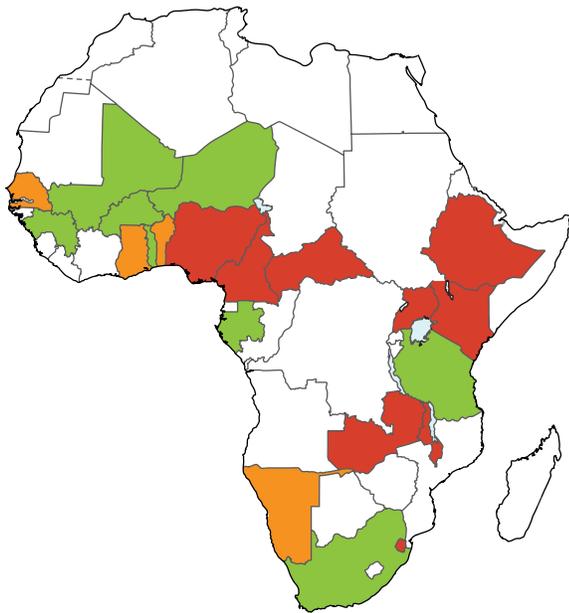


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Urban sanitation



- Countries in which the MDG target has been met (for example, Tanzania, South Africa, Gabon, Niger, Togo, Burkina Faso, Mali, and Guinea), but where efforts need to be continued to prevent population growth from leading to a reduction in coverage.
- Countries in which coverage is close to 50 percent (within +/-5 percent). This includes utilities and countries that are within 5 percent of the MDG target (for example, Namibia, Ghana, and Benin), but also utilities and countries where coverage has reduced over the years (for example, Senegal) and which, if nothing is done, may suddenly find that they have missed the MDG target, due to increasing population.
- Countries (Kenya, CAR, Cameroon, Nigeria, Benin, Togo, and Ghana) that need to significantly accelerate coverage expansion at the risk of missing the urban MDGs by a large margin.

Note: The urban sanitation MDG target is reducing by half the proportion of people without access to adequate sanitation by 2015.

- Utility-to-utility partnerships can help increase coverage of water supply and sanitation services by providing utilities with technical options for increasing coverage, methodologies for liaising with poor communities to develop demand-responsive infrastructure services in these areas, and methodologies for managing and monitoring service expansion programs.

3.3.1.1 Summary of Water Supply and Sanitation Coverage in Eastern Africa

Water supply coverage

Water supply coverage in the region was 59 percent in 2006. It has increased by 4 percent points to 63 percent over the three-year period against a population growth

of 10 percent (3.1 percent annual) and an increase in population served by 18 percent (5.8 percent annual). The significant increase in population served has therefore been absorbed by population growth. This is summarized at the subregional level in Table 8.

The largest increase in coverage took place in Ethiopia (+8 percent points) and Tanzania (+7 percent points) against urban population growths of 8 percent and 6 percent, respectively (which correspond to annual growth rates of 2.7 percent and 1.8 percent, respectively). Uganda's National Water and Sewerage Corporation (NWSC) managed a 3 percent point increase in coverage against a population growth of 23 percent, which corresponds to an annual growth rate of 7.2 percent—and an average growth rate of access to water supply of 8.4 percent. What this means is that all three countries managed to

Table 8: Summary of water supply coverage in the Eastern Africa region

Countries	2006			2009				
	Population in service area ('000)	Population served: water ('000)	% coverage	Population in service area ('000)	% growth in population	Population served: water ('000)	% growth in population served	% coverage
Ethiopia	3,549	2,513	71%	3,843	2.7%	3,054	6.7%	79%
Kenya	6,573	2,803	43%	7,066	2.4%	3,151	4.0%	45%
Tanzania	3,872	2,610	67%	4,088	1.8%	3,020	5.0%	74%
Uganda	2,384	1,675	70%	2,940	7.2%	2,136	8.4%	73%
Subtotal	16,378	9,601	59%	17,937	3.1%	11,361	5.8%	63%

connect customers at a rate that exceeded population growth (a stagnant coverage means that the rate of new connections does not exceed population growth and thus the number of unserved households increases).

The highest increases in water supply coverage was experienced in small to medium sized towns, including Singida (Tanzania) and Nanyuki (Kenya) with 22 percent and 19 percent points, respectively, followed by Arusha (Tanzania) and Kericho (Kenya) with 14 percent and 12 percent, respectively. However, Dar es Salaam and Addis Ababa managed water supply coverage increases of 7 percent and 11 percent points, respectively. The best performance was in Nyeri (Kenya), where coverage increased from 54 percent to 76 percent over the period, against a population growth of 7 percent. Coverage in Kenya, however, has only increased by 2 percent points against a population growth of 6 percent over the period (2.4 percent per annum), and is still one of the lowest in the region with only 45 percent in 2009.

It is, therefore, likely that Ethiopia, Tanzania, and Uganda will be able to meet the MDG for water (59 percent, 78 percent, and 72 percent coverage in 2015, respectively) if they continue to increase the number of water supply

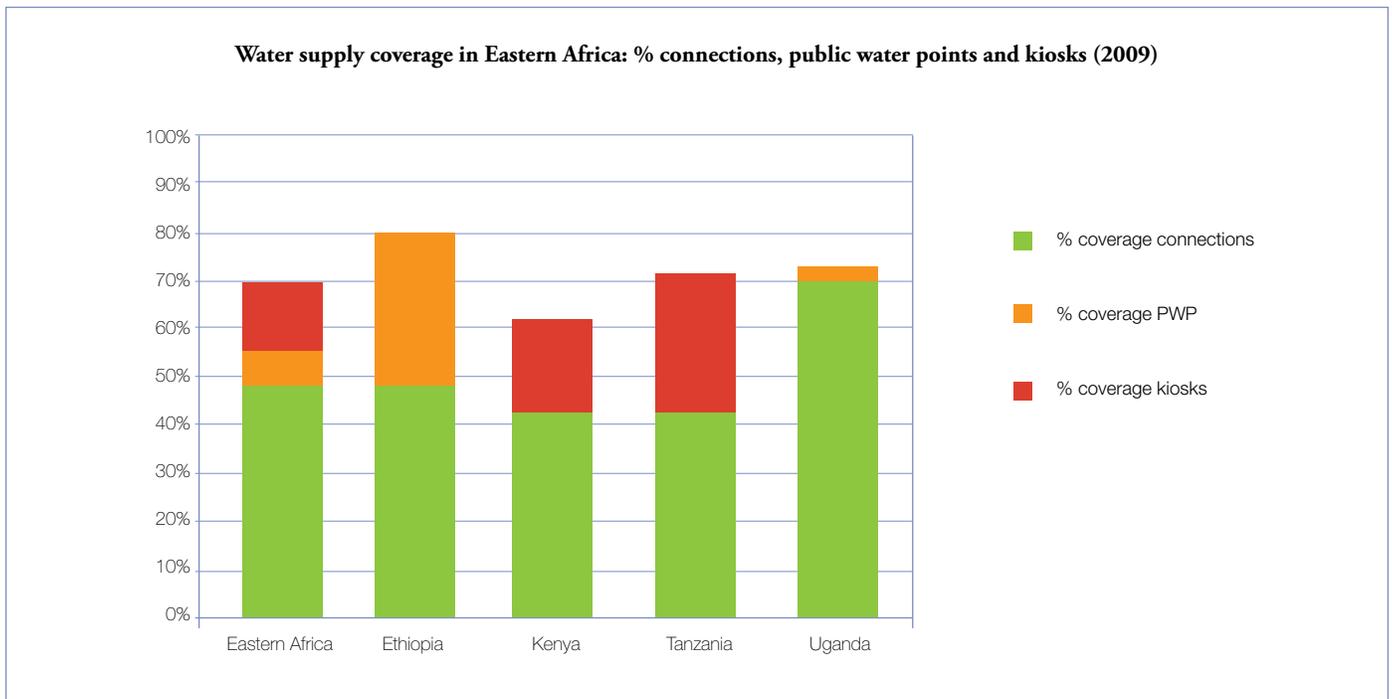
connections at a rate that exceeds urban population growth. However, at this rate Kenya will miss the MDG target (72 percent by 2015) by a big margin. Significant increases in the number of connections (whether individual, shared or via kiosks) are required, particularly in the larger urban centers where most of the peri-urban population growth occurs (Nairobi, Mombasa, Kisumu, Eldoret, Kericho).

Figure 4 shows the levels of service that are used to increase coverage: individual house connections, public water points and kiosks (for 2009), as well as total coverage levels in each country. Ethiopia, Kenya and Tanzania have each relied on significant increase in public water points and kiosks—whereas Uganda seems to have only a limited number of public water points and kiosks in urban areas.

Highest water supply coverage in the region:

- Nyeri Water and Sewerage Company in Kenya with 97 percent.
- Iringa Urban Water Supply and Sewerage Authority in Tanzania with 95 percent.

Figure 4: Components of water supply coverage in Eastern Africa (2009)



Sanitation coverage

Sanitation services in the region are the responsibility of a number of organizations: utilities and local government in large towns and cities (in which there is a sewerage network); local government only in medium and small towns. In some cases too the 'water and sewerage authority' is not (yet) involved in sanitation. It is the most fragmented regional institutional framework in Africa, generally characterized by unclear responsibilities for on-site sanitation. This is summarized in Table 9.

Sanitation coverage, which includes sewerage connections and on-site sanitation (latrines and septic tanks), was 28 percent in 2006, comprising 5 percent coverage for sewerage (assuming households do not share each others' connections) and 23 percent for on-

site sanitation. In 2009 this had increased to 41 percent in total (11 percent and 30 percent for sewerage and on-site sanitation, respectively). This is summarized at the subregional level in Table 10.

Table 10 shows a significant improvement from 28 percent to 41 percent coverage, but also confirms that a significant proportion of the wastewater generated at the household level is not treated nor, in the case of on-site sanitation, is it even stored and biodegraded on site.

All countries show an increase in coverage—except for Tanzania. This means that the utilities in Tanzania have not been able to increase coverage sufficiently to exceed population growth, and that despite the highest percent in the region at 75 percent, the number of unserved households is continuing to increase.

Table 9: Number of utilities by type of sanitation service provided in Eastern Africa

Sanitation services	Number of utilities (%) by type
Sewerage only	39% of utilities (although only partial coverage of these service areas).
On-site sanitation only	11% of utilities, particularly small towns in Ethiopia, as well as Addis Ababa and Dar es Salaam (both of which have very small sewerage networks and/or very few customers).
Both sewerage and on-site sanitation	29% of utilities, principally large cities in Kenya, including Nairobi, Mombasa, Kericho as well as Nyeri Town.
No sanitation services provided (or very limited number of customers)	21% of utilities, principally small towns in Tanzania, Kilifi Mariakani (which is the third-largest utility in Kenya in terms of service area) and Malindi (which has a very few number of sewerage customers).

Table 10: Coverage by type of sanitation service provided in Eastern Africa

Countries	2006							% growth
	Population in service area ('000)	Total population served: sanitation	% coverage sanitation	Population served: sewerage	% coverage sewerage	Population served on-site	% coverage on-site	% coverage
Ethiopia	3,549	631	18%	115	3%	516	15%	3%
Kenya	6,573	795	12%	484	7%	312	5%	2%
Tanzania	3,872	2,933	76%	92	2%	2,842	73%	2%
Uganda	2,384	150	6%	150	6%	-	0%	7%
Subtotal	16,378	4,509	28%	841	5%	3,670	22%	3%
	2009							Population served
Ethiopia	3,843	1,222	32%	188	5%	1,033	27%	25%
Kenya	7,066	2,901	41%	1,453	21%	1,448	20%	54%
Tanzania	4,088	3,055	75%	104	3%	2,951	72%	1%
Uganda	2,940	192	7%	192	7%	-	0%	9%
Subtotal	17,937	7,370	41%	1,937	11%	5,432	30%	18%

Sanitation services in the four capital cities are compared in Table 11 (2009 data). This shows that there is a significant difference in sanitation services in these cities, and also confirms on one hand that on-site sanitation is still the major means of dealing with human waste in large cities (whether these are managed by the utility or by the local government), and on the other that some of the networks are lying dormant with only a limited number of connections—suggesting further that the cost of sewerage connections to customers may be prohibitive (for example, Dar es Salaam).

Highest sanitation coverage in the region:

- Dodoma, Iringa, and Sumbawanga Water and Sewerage Authorities all report coverage in excess of 90 percent (with 90 percent of this coverage being on-site sanitation and only very limited sewerage networks. However, it is not very clear whether the utilities are really involved in on-site sanitation services and, even if so, what component of the sanitation services supply chain they are involved in.

3.3.1.2 Summary of Water Supply and Sanitation Coverage in Southern Africa

Water supply coverage

Coverage of water supply services over the period has remained stationary at approximately 79 percent. Utilities have thus been able to withstand an average population growth rate of 16 percent over the period 2006–2009. This is the best performing region overall but shows disparities at country levels. The summary of water coverage is shown in Table 12.

The greatest increase in coverage took place in Swaziland (+6 percent points) although Zambia achieved a 29 percent increase the number of population served (an additional 974,000 population served) which led to a reduction of coverage (-5 percent points) due to significant population growth (37 percent average, or 11.2 percent per annum).

Table 11: Coverage by type of sanitation service provided in Eastern African capitals

Capital cities	Population ('000)	Length of sewerage network (km)	Total population served: sanitation ('000)	% coverage sanitation	Population served: sewerage ('000)	% coverage sewerage	Population served: on-site ('000)	% coverage on-site
Addis Ababa	2,854	17	1,148	40%	188	7%	960	34%
Dar es Salaam	2,648	195	2,407	91%	17	1%	2,390	90%
Kampala	1,671	N/A	84	5%	N/A	N/A	N/A	N/A
Nairobi	3,203	1,549	1,938	61%	944	29%	994	31%

Table 12: Summary of water supply coverage in the Southern Africa region

Countries	2006			2009			% growth in population	% growth in population served
	Population in service area ('000)	Population served: water ('000)	% coverage	Population in service area ('000)	Population served: water ('000)	% coverage		
Malawi	2,065	1,373	66%	2,278	1,623	71%	3.3%	5.7%
Namibia	54	54	100%	63	63	100%	5.3%	5.3%
South Africa	9,711	7,785	80%	10,499	8,169	78%	2.6%	1.6%
Swaziland	280	250	89%	300	285	95%	2.3%	4.5%
Zambia	3,931	3,372	86%	5,405	4,345	80%	11.2%	8.8%
Subtotal	16,041	12,833	80%	18,545	14,485	78%	5.0%	4.1%

It is likely that all countries (although data for Namibia are limited to one small utility) will achieve the MDGs for water (75 percent coverage by 2015) if the rate of new connections (to any of individual house connections, shared connections, kiosks, and so on) is kept such that it exceeds population growth.

The water boards in Malawi have all increased coverage and managed to exceed population but are just about around the 75 percent mark. Their previous efforts will need to be sustained at scale to further increase coverage. This is especially the case for the Northern Region Water Board which has experienced a 24 percent increase in population to be served, and has managed to increase population served by 43 percent (9 percent points). The best performance in Malawi was shown by the Lilongwe Water Board which increased coverage by 11 percent points (29 percent population served) despite a population increase of 9 percent.

Johannesburg Water has experienced an 18 percent increase in population but this has been followed by an increase in population served of only 1 percent over the

period: overall water supply coverage has reduced from 63 percent to 54 percent over the period. Since it is by far the largest utility in South Africa, this has resulted in the average coverage in the country reducing by 2 percent points from 80 percent to 78 percent, despite increases in coverage from the other three utilities in the assessment (Mbombela/Nelspruit, City of Tshwane/Pretoria and eThekweni Water Services/Durban Metro of 17 percent, 7 percent and 5 percent, respectively).

Highest water coverage in the region:

- City of Tshwane (South Africa) and Kafubu Water and Sewerage Company both report 100 percent.
- Walvis Bay Municipality (Namibia), Swaziland Water and Sewerage Corporation, and Mbombela/Silulumanzi (Casca) in South Africa report more than 95 percent coverage.

Sanitation coverage

Sanitation services in the region are provided by a number of organizations, summarized in Table 13.

Figure 5: Components of water supply coverage in Southern Africa (2009)

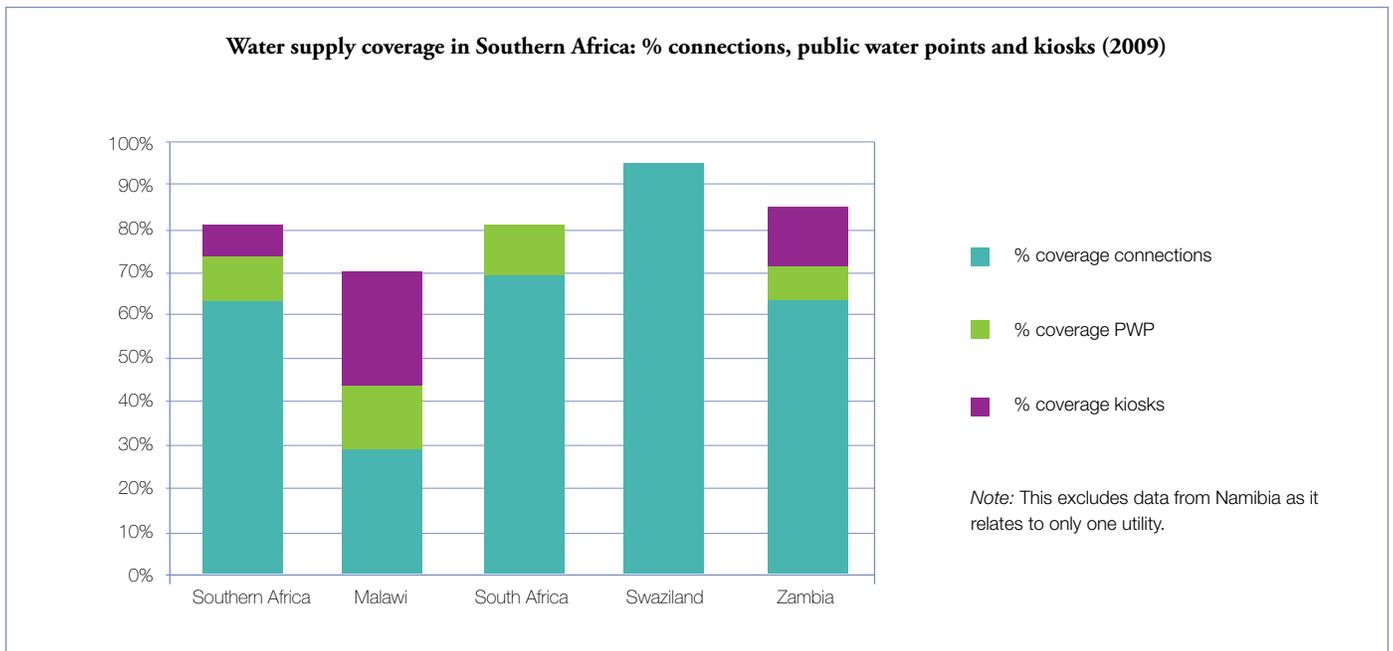


Table 13: Number of utilities by type of sanitation service provided in Southern Africa

Sanitation services	Number of utilities (%) by type
Sewerage only	43% of utilities
On-site sanitation only	None
Both sewerage and on-site sanitation	38% of utilities, including capital cities and large towns, as well as some of the Zambian Water and Sewerage Companies
No sanitation services provided (or very limited number of customers)	19% of utilities—essentially all water boards in Malawi

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Coverage of sanitation services was 53 percent in 2009 (49 percent in 2006), split into 38 percent sewerage connections and 15 percent with on-site sanitation; 77 percent of these households are in South Africa. South Africa is the only country that has managed to significantly increase sanitation coverage over the period, achieving 73 percent coverage. All the other countries are below 50 percent and are likely to miss the sanitation MDG target unless there is a significant drive to increase coverage.

The four South African utilities are all involved in both sewerage and on-site sanitation (although Johannesburg Water has the lowest coverage with only 37 percent of customers connected to sewerage and 17 percent to on-site sanitation services) in 2009. eThekweni Water Services rehabilitated more than 100,000 latrines over

the period (starting in 2007) and is now providing on-site sanitation services, as well decentralized wastewater treatment facilities to a population of 764,000 and sewerage services to double that (2009 data).

In Zambia most of the utilities are also involved in sewerage and on-site sanitation although the split varies: 14 percent of Lusaka Water's customers are connected to sewerage whilst none have on-site sanitation (Lusaka Water does not provide such services). On the other hand 68 percent of Kafubu Water's customers are connected to sewerage and the remaining 32 percent to on-site sanitation.

Swaziland Water Corporation provides 38 percent of its customers with sewerage, and none with on-site sanitation services.

Table 14: Coverage by type of sanitation service provided in Southern Africa

Countries	2006						
	Population in service area ('000)	Total population served: sanitation	% coverage sanitation	Population served: sewerage	% coverage sewerage	Population served on-site	% coverage on-site
Malawi	2,065	-	-	-	-	-	-
Namibia	54	54	100%	54	100%	-	-
South Africa	9,711	6,273	65%	5,091	52%	1,182	12%
Swaziland	280	81	29%	81	29%	-	-
Zambia	3,931	1,824	46%	1,417	36%	407	10%
Subtotal	16,041	8,232	51%	6,643	41%	1,589	10%
2009							
Malawi	2,278	-	-	-	-	-	-
Namibia	63	63	100%	63	100%	-	-
South Africa	10,499	7,706	73%	5,568	53%	2,138	20%
Swaziland	300	114	38%	114	38%	-	-
Zambia	5,405	2,073	38%	1,429	26%	644	12%
Subtotal	18,545	9,956	54%	7,174	39%	2,782	15%

Note: Water boards in Malawi do not provide any sanitation services.

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Sanitation services in the largest utilities¹² in the region are compared in Table 15 by city (2009 data). This shows that there is a significant difference in sanitation services in these cities, but shows that sewerage is the major means of dealing with human waste in large cities (whether these are managed by the utility or by the local government). Sewerage networks therefore appear to be much better utilized than, for example, in Eastern Africa (in terms of number of connections).

Highest sanitation coverage in the region:

- Kafubu, North Western Water Supply and Sewerage Company (Zambia), Walvis Bay (Namibia), and

Mbombela/Nelspruit (Zambia) report 100 percent coverage.

- Pretoria (City of Tshwane) and Durban Metro (eThekweni Water Services) have both managed to significantly increase coverage: Pretoria by connecting more households to the sewerage network (and a corresponding reduction in the number of people using on-site sanitation); Durban Metro, as explained above, has significantly increased coverage by taking on more than 100,000 latrines serving a population of 764,000 (and EWS has also constructed small decentralized sewage treatment plants).

Table 15: Coverage by type of sanitation service provided in Southern African capitals and large cities

Large cities	Population ('000)	Length of sewerage network (km)	Total population served: sanitation ('000)	% coverage sanitation	Population served: sewerage ('000)	% coverage sewerage	Population served: on-site ('000)	% coverage on-site
Blantyre	944	-	-	-	-	-	-	-
Lilongwe	674	-	-	-	-	-	-	-
Pretoria	2,501	7,676	2,485	99%	2,091	84%	394	16%
Durban	3,585	7,396	2,665	74%	1,901	53%	764	21%
Johannesburg	4,000	10,191	2,143	54%	1,481	37%	662	17%
Kafubu	500	923	500	100%	340	68%	160	32%
Lusaka	2,300	490	236	10%	236	10%	-	-
Nkana	720	440	374	52%	368	51%	6	1%

¹² Most of these utilities cover large municipal areas, except for Blantyre and Lilongwe Water Boards that cover regional areas of Malawi.

3.3.1.3 Summary of Water Supply and Sanitation Coverage in Western and Central Africa

Overall coverage of water supply services in the region has reduced from 55 percent to 52 percent in the period 2006–2009, with concerns of consistency of reporting for most of the Nigerian utilities, and reduction of 7 percent coverage in Senegal, most likely due to a significant population growth of 24 percent in the urban areas. Nevertheless, if the figures reported by Nigerian utilities are excluded, water supply coverage for the region is still very low with a reduction from 65 percent to 62 percent.

The water supply coverage figures for the region are summarized in Table 16 by country.

Figures for Burkina Faso show that the country has increased water supply coverage by 12 percent and sanitation coverage by 70 percent from 26 percent to 44 percent (with 99 percent of the urban population in the country using on-site sanitation). This is an excellent improvement and testimony to the dedicated new connection fund set up by the Government of Burkina Faso.

Ghana's performance, on the other hand, despite Ghana Water Company contracting out O&M to an international private operator, has remained stationary at 55 percent with a population growth rate of 10 percent in three years (3.2 percent average per annum). The rate of new connections in this case has not been sufficient to exceed population growth.

Other countries have also managed to exceed significant population growth rates: Benin (3.3 percent), Guinea (3.5 percent), Mali (5.1 percent), Nigeria (5.8 percent), Senegal (7.4 percent), and Togo (5.4 percent). This has meant that coverage expansion in those countries has

either increased only slowly or, in the case of Senegal, actually reduced (95 percent in 2006 to 88 percent in 2009)—despite significant efforts to increase coverage.

Highest water coverage:

Ekiti State, Niger State and Abia State Water Boards in Nigeria report 100 percent water supply coverage, but this should be checked by the utility managers because these utilities supply a majority of communal water points, and therefore the actual degree of coverage of these communal water points/kiosks is difficult to estimate.

The highest increase in coverage is shown by ONEA in Burkina Faso, suggesting that the company's new connection policy and fund have been very effective at not only giving households access to water supply services, but also exceeding population growth. Senegal was already showing 95 percent coverage in 2006 but due to significant population growth between 2006 and 2009, and despite significant expansion, has seen a reduction in coverage to 88 percent.

Figure 6 illustrates the range and distribution of water supply coverage in Sub-Saharan Africa in 2009.

3.3.2 Nonrevenue Water

NRW is one of the most relevant factors when considering utility performance and a major topic for WOP as it expresses the amount of water lost (principally through leaks and through metering and billing errors) by utilities—that is, which represents a cost to the utility but contributes nothing to the utility's revenue stream. Typically, technical losses (leaks) are much expensive to reduce than commercial losses (metering and billing errors), so the focus of utilities is always to achieve zero

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Table 16: Summary of water supply coverage in the Western and Central African region

Countries	2006			2009			% growth in population	% growth in population served
	Population in service area ('000)	Population served: water ('000)	% coverage	Population in service area ('000)	Population served: water ('000)	% coverage		
Benin	2,970	1,575	53%	3,270	1,860	57%	3.3%	5.7%
Burkina Faso	3,054	1,832	60%	3,509	2,518	72%	4.7%	11.2%
Cameroon	N/A	N/A	N/A	8,300	3,500	42%	N/A	N/A
Gabon	1,216	931	77%	1,222	933	76%	0.2%	0.1%
Ghana	11,000	6,050	55%	12,100	6,655	55%	3.2%	3.2%
Guinea	4,434	3,175	72%	4,920	3,530	72%	3.5%	3.6%
Mali	2,680	1,854	69%	3,107	2,212	71%	5.1%	6.1%
Niger	2,343	1,586	68%	2,509	1,819	72%	2.3%	4.7%
Nigeria	54,400	26,204	48%	64,483	29,139	45%	5.8%	3.6%
CAR	854	304	36%	920	324	35%	2.5%	2.1%
Senegal	5,070	4,835	95%	6,281	5,504	88%	7.4%	4.4%
Togo	2,394	1,297	54%	2,800	1,536	55%	5.4%	5.8%
Subtotal	90,415	49,643	55%	113,421	59,530	52%	52%	52%

Figure 6: Box plot of water supply coverage in Sub-Saharan Africa (2009)

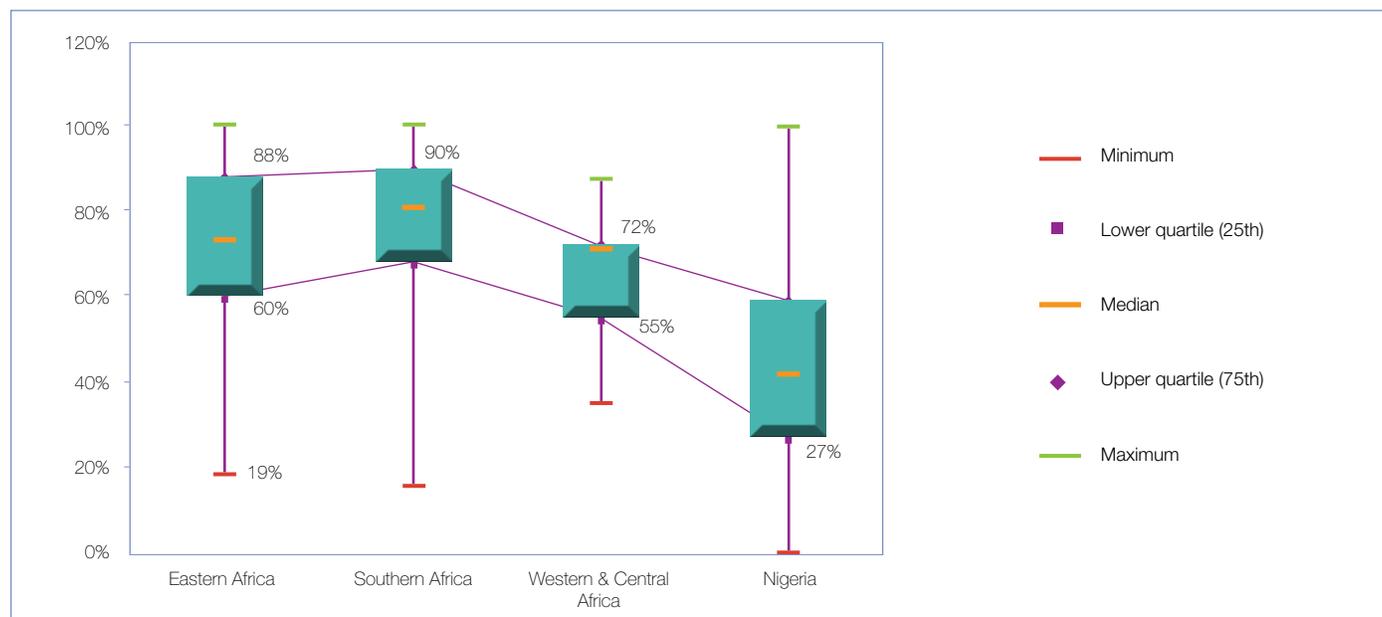
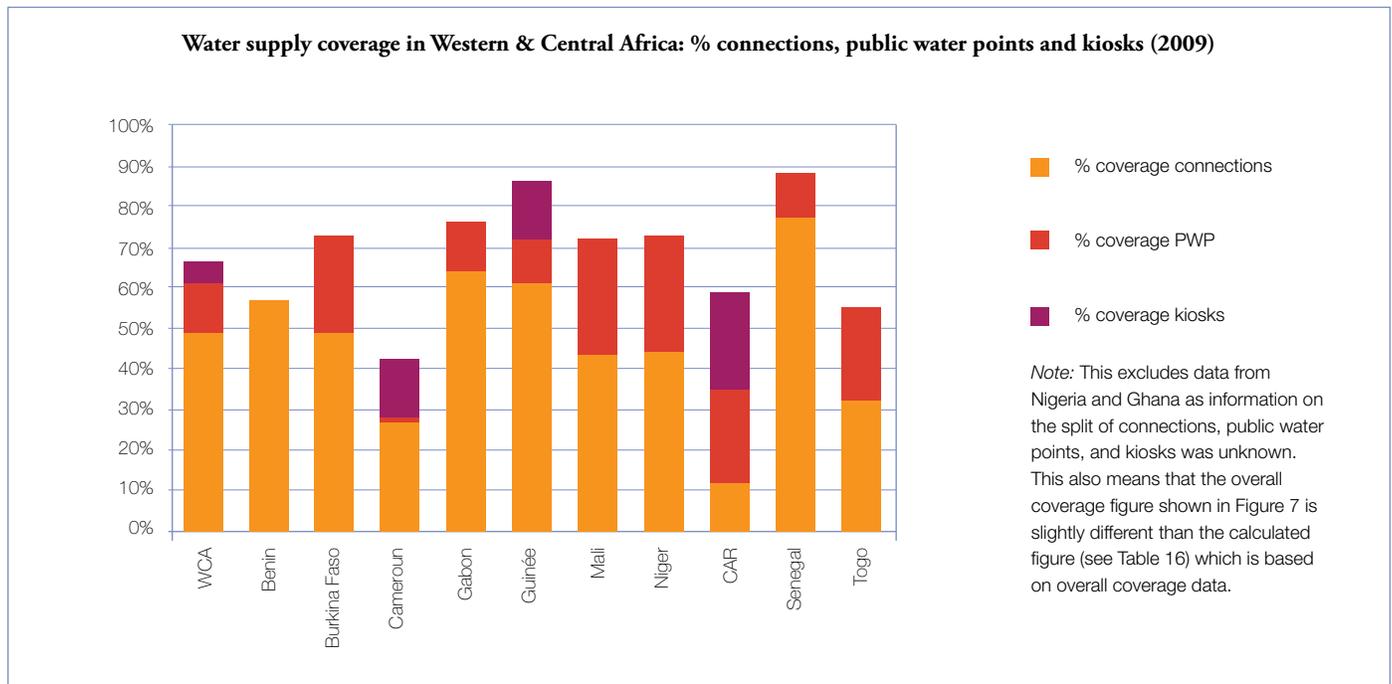


Figure 7: Components of water supply coverage in Western and Central Africa (2009)



commercial losses prior to addressing capital intensive technical losses.

Part of this 'lost' water can be retrieved by appropriate technical and managerial actions. It can then be used to meet currently unsatisfied demand (and hence increase revenues to the utility), or to defer future capital expenditure to provide additional supply (and hence reduce costs to the utility).

WOP to date has been focusing on helping utilities better understand the level and quantity of NRW, and thus has focused on improving management practices. This has included reducing the apparent (or commercial) losses, normally associated with (a) meter under registration; (b)

customer metering; and (c) customer database errors (resulting in bills being sent to wrong customers). WOP has also helped utilities implement real (or technical) loss reduction activities such as district metering and zoning, night flow analysis, and so on, to help utilities assess their real losses.

NRW by utility is shown in the Appendixes. The overall summary of nonrevenue water by subregion is presented below.

Key findings:

- Overall, there has been a 33 percent increase in water produced but the level of NRW (in percent

terms) has been stagnant (also at 33 percent). This means that a third of the additional water produced has, in fact, been lost.

- The only region that has been able to increase production and reduce losses was Eastern Africa (by 8 percent and 14 percent, respectively). All the other regions have significantly increased production (Southern Africa by 60 percent) but this has led to correspondingly high increases in sales (53 percent in total) and therefore a relatively stagnant level in percentage of NRW.
- Despite the above: nonrevenue water expressed in m³/day has remained constant for Eastern Africa (+1 percent), but has increased by 72 percent for Southern Africa and 34 percent for Western and Central Africa.
- Africa wide this represents financial losses of some \$580m—with a similar split as above (mostly in

Southern African and Western and Central African regions).

- These figures, however, should be seen in context: they are likely to increase significantly with increased metering and increased continuity of supply, but reduce with improved condition of water mains (and associated reductions in bursts and leaks). These indicators are discussed in more detail in subsequent Sections of the report.

3.3.2.1 Summary of Nonrevenue Water in Eastern Africa

NRW has slightly reduced (in percent terms) over the region (from 44 percent to 41 percent), except in Uganda where it has increased from 30 percent to 36 percent. It is the only region in Africa that has seen an increase in the volume produced (although slight) AND a higher increase in volume of water sold (14 percent).

Table 17: Summary of nonrevenue water by subregion (2006 to 2009)

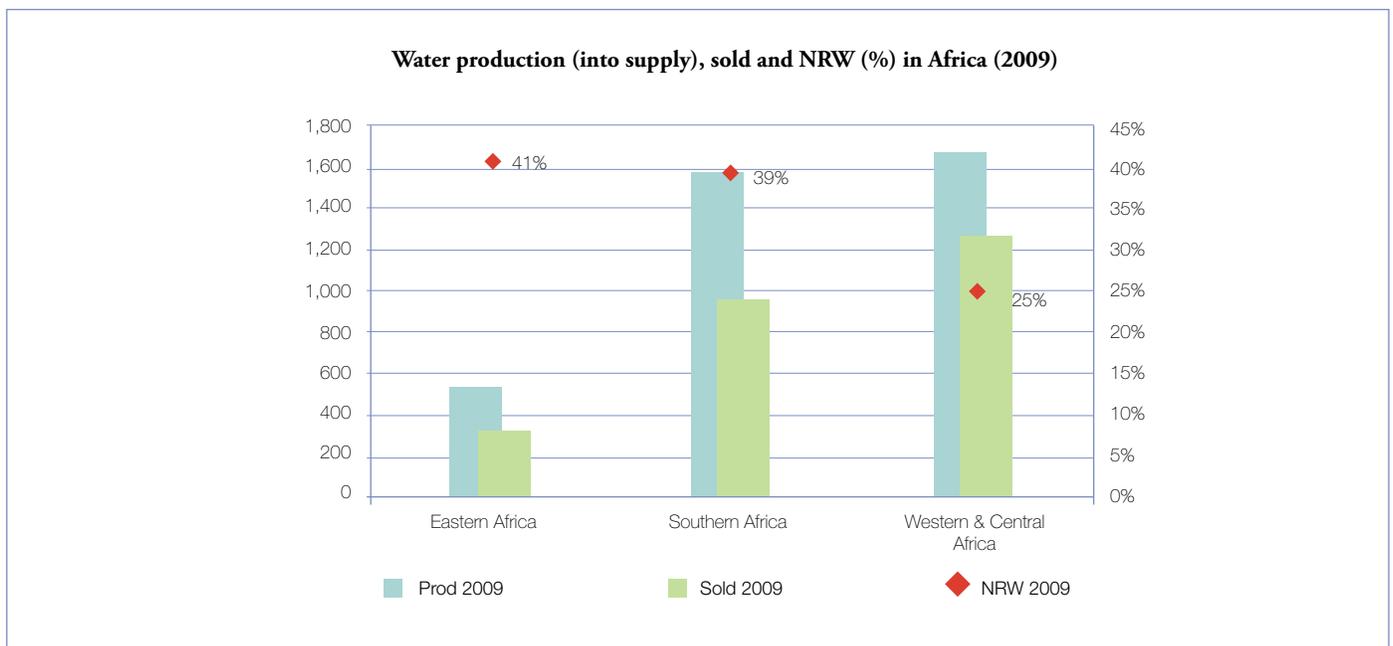
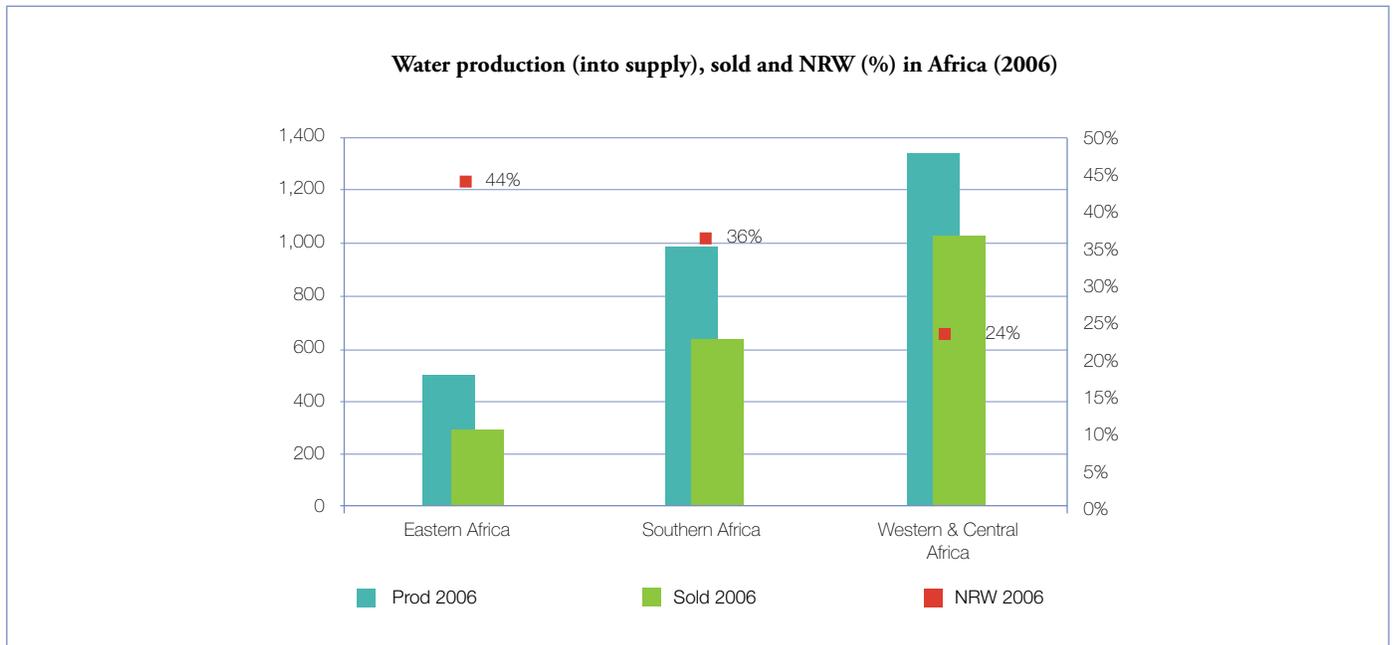
Countries	Total volume of water into supply (Mm ³ /year)		% growth in production	Total volume of water sold (Mm ³ /year)		% growth in sales	Nonrevenue water (%)		Nonrevenue water ('000 m ³ /day)		Nonrevenue water (lcpd)	
	2006	2009		2006	2009		2006	2009	2006	2009	2006	2009
Central Africa	106	132	25%	77	92	19%	28%	31%	81	111	20	25
Eastern Africa	496	537	8%	278	318	14%	44%	41%	595	599	58	46
Southern Africa	988	1,576	60%	633	967	53%	36%	39%	973	1,670	94	115
Western Africa	1,224	1,539	26%	939	1,160	24%	23%	25%	780	1,039	17	20
Total	2,814	3,784	35%	1,927	2,537	32%	32%	33%	2429	3,419	35	41

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Figure 8: Volume of water produced, sold, and % lost (2006 and 2009)



Note: These figures exclude Nigeria.

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This means additional sales have involved a significant proportion of water that has been saved (that is, reduced leakage or improved management of losses).

NRW figures expressed as water losses per capita per day also confirm that there has been a reduction in the region, most notably in Kenya where average water losses have reduced from 112 losses per capita per day to 60, with Meru WSC reducing this from 103 to 22 losses per capita per day. However, this is due in part to the increase in coverage in Nairobi. Only National Water in Kampala has seen a slight increase from 28 to 32 losses per capita per day, but this is the lowest level of NRW expresses in losses per capita per day.

NRW figures expressed in liters per connection per day are interesting but should be treated with caution—since utilities have varying degrees of coverage from individual connections (since a proportion of the population

served uses public water points). Thus, Dire Dawa WSA and Mekelle WSA in Ethiopia are of similar size (in terms of population served and volumes of water produced and sold), but Dire Dawa has 1,500 connections and Mekelle 21,000—with Mekelle achieving a significant reduction in NRW (percent). Water losses expressed in liters per connection per day, therefore, vary significantly (1,623 for Dire Dawa and 53 for Mekelle).

The performance of the utilities serving the four capitals—Nairobi, Dar es Salaam, Addis Ababa, and Kampala—is summarized in Table 18. Whilst NRW figures expressed as percent of water produced are similar (in the range of 40 to 50 percent), there is significant variance in NRW figures expressed as losses per capita per day (32 for Kampala and more than twice that for Nairobi). This variance is caused in part by the increase in new connections.

Table 18: Nonrevenue water for four capital cities of Eastern Africa

Capital city	NRW (%)		NRW ('000 m ³ /day)		NRW (losses per capita per day)	
	2006	2009	2006	2009	2006	2009
Nairobi	46%	40%	196	167	197	79
Dar es Salaam	54%	51%	124	126	74	67
Addis Ababa	40%	41%	96	111	36	39
Kampala	41%	44%	51	62	28	32

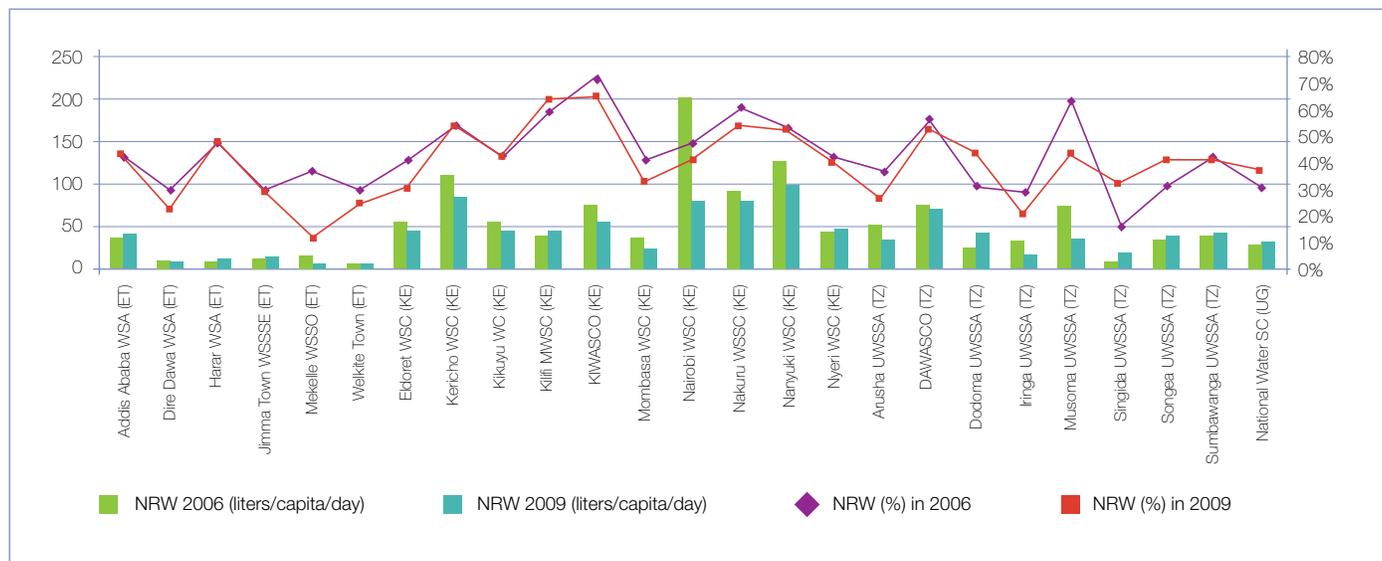
Note: Figures for Kampala obtained from the National Water and Sewerage Corporation (Uganda).

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Figure 9: Nonrevenue water summary of Eastern African utilities



From the above, the following observations can be made:

- In general there has been a reduction in NRW across the region; however, some utilities have experienced increases in percent NRW: Kilifi Mariakani (KE), Dodoma, Singida and Songea (TZ) as well as National Water (UG). All these also experienced increases in NRW (losses per capita per day) which suggests that high NRW in these utilities was combined with low coverage increase.
- The greatest reduction in NRW (percent) was achieved by Mekelle (ET), Arusha (TZ), and Musoma (TZ).
- The greatest reduction in NRW (losses per capita per day) was in Nairobi—for a corresponding small reduction in NRW (percent). This highlights that the population served was largely increased (and correlates well with an increase in coverage for Nairobi from 33 percent to 45 percent).

3.3.2.2 Summary of nonrevenue water in Southern Africa

NRW (percent) has largely remained the same over the period (36 percent to 39 percent). The significant increase in water supply access in the region suggests that utilities have not been able to really convert volumes of water saved into additional revenue—instead there seems to have been a large increase in production.

Countries	NRW from 2006 to 2009			
	2006	2007	2008	2009
Ethiopia	40%	38%	41%	39%
Kenya	46%	39%	40%	40%
Tanzania	49%	42%	48%	46%
Uganda	30%	33%	34%	36%

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Figure 10: Nonrevenue water (%) by country in the Eastern African region

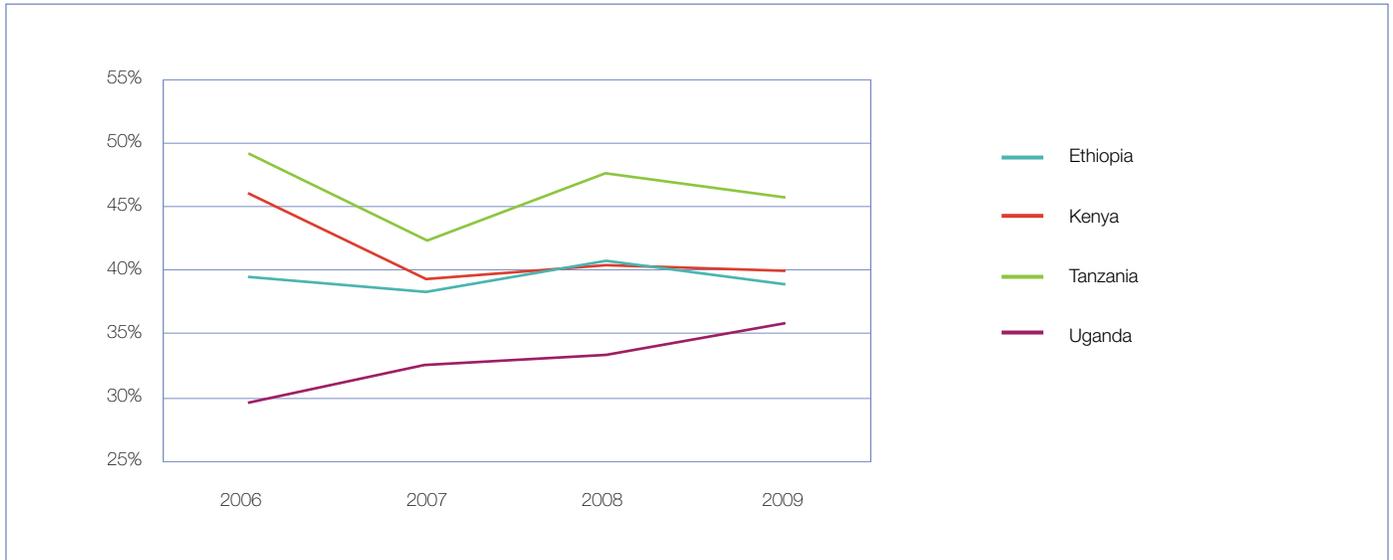
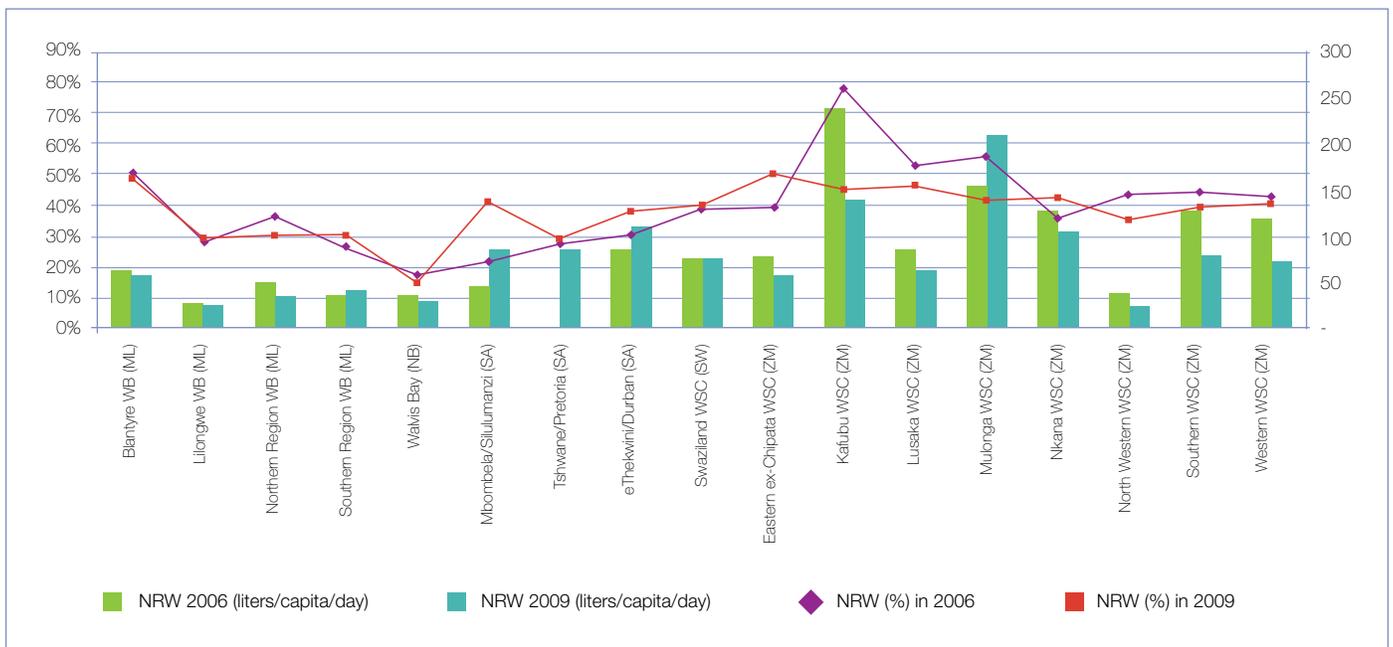


Figure 11: Summary of nonrevenue water for Southern African utilities



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The greatest reduction in NRW, expressed as percent of total production and losses per capita per day losses per capita per day is by: Kabufu WSC (Zambia). Two cases stand out: Mbombela (Nelspruit) and eThekwinini (Durban) both have experienced increases in NRW (percent and losses per capita per day).

Eastern ex-Chipata WSC (Zambia) has experienced an increase in NRW (percent) but a reduction in NRW as losses per capita per day, suggesting that it significantly increased production (and therefore leakage) as well as doubled its customer base. All in all, this has led to a reduction in losses per capita per day.

3.3.2.3 Summary of Nonrevenue Water in Western and Central Africa

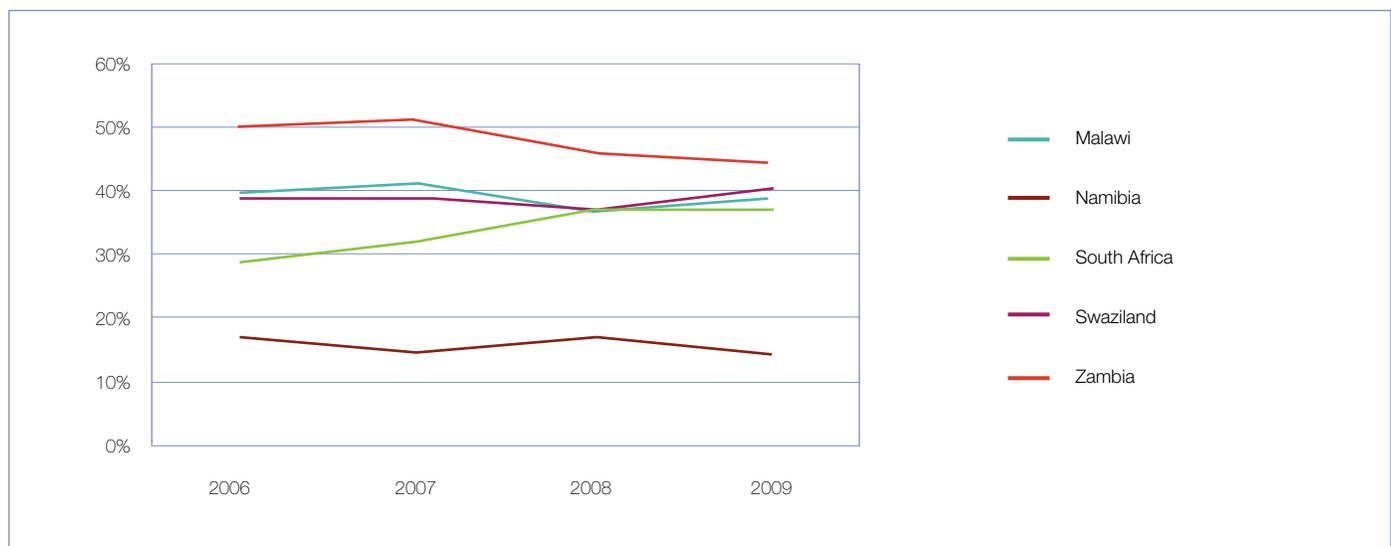
Overall NRW (percent) in the region has increased slightly (3 percent) despite a large variation in individual utility performance: 52 percent for GWCL (Ghana) despite the

management contract with Aqua Vitens Rand Limited), and 16 percent for SPEN (Niger) which also has a private operator.

Some of the data reported by Edo, Kogi and Sokoto State Water Boards in Nigeria, with 10, 3, and 5 percent NRW, respectively, need to be reviewed. It is possible that most of the Nigerian utilities that have only a limited number of individual connections are underreporting population served and volumes sold, which may affect both coverage and NRW figures.

Countries	NRW from 2006 to 2009			
	2006	2007	2008	2009
Malawi	40%	41%	37%	39%
Namibia	17%	15%	17%	14%
South Africa	29%	32%	37%	37%
Swaziland	39%	39%	37%	40%
Zambia	50%	51%	46%	44%

Figure 12: Nonrevenue water (%) by country in the Southern African region



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Figure 13: Summary of nonrevenue water for Western and Central African utilities

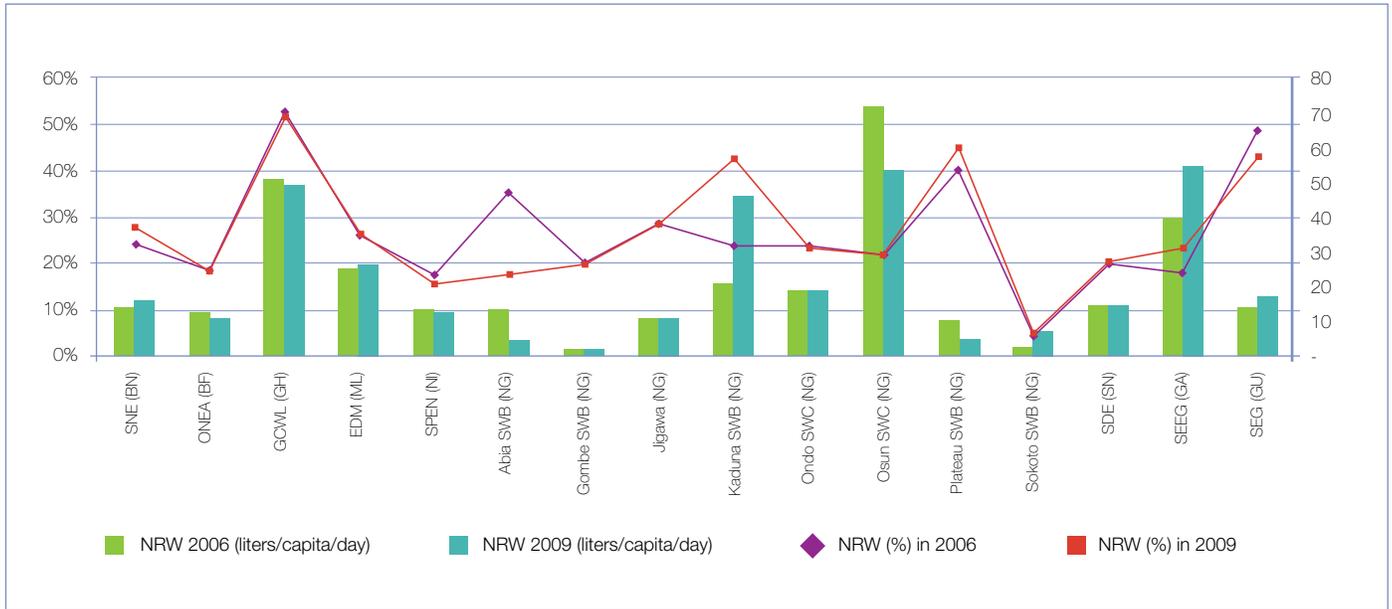
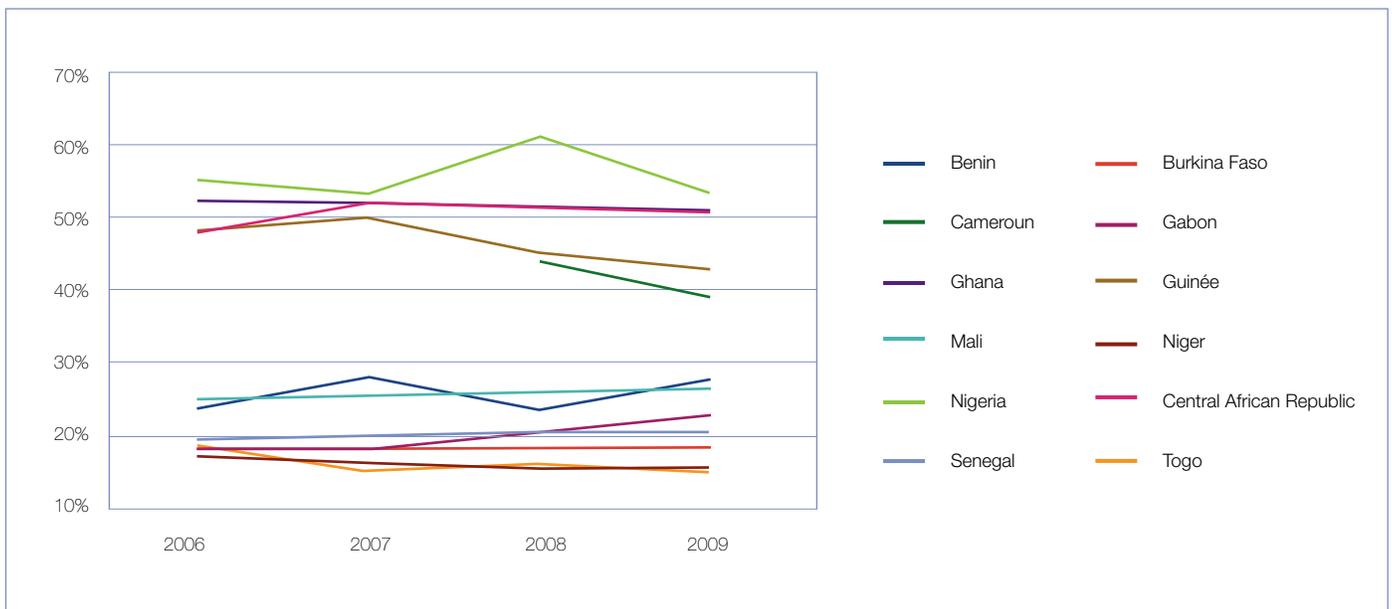


Figure 14: Nonrevenue water (%) by country in the Western and Central African region



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Countries	NRW from 2006 to 2009			
	2006	2007	2008	2009
Benin	24%	28%	24%	28%
Burkina Faso	18%	18%	18%	18%
Cameroun			45%	40%
Gabon	18%	18%	21%	23%
CAR	48%	52%	51%	51%
Ghana	53%	52%	52%	52%
Guinea	48%	50%	46%	43%
Mali	25%	25%	26%	27%
Niger	17%	17%	15%	16%
Nigeria	56%	54%	62%	54%
Senegal	20%	20%	21%	21%
Togo	19%	15%	16%	15%

Abia State Water Board in Nigeria has managed a significant reduction in NRW (both percent and losses per capita per day). Figures reported by Gombe and Plateau State Water Board in Nigeria would suggest that the utilities is overreporting the number of population served as (a) overall NRW (percent) is high; and (b) NRW

(losses per capita per day) is very low (less than 10 losses per capita per day in 2009). These need to be checked.

The summary table shows that three groups of utilities have emerged:

- Those with NRW ranging from 15 percent to 21 percent, and can be considered to be performing excellently: Togo, Niger, Burkina Faso, and Senegal.
- Those with NRW ranging from 22 to 30 percent, considered to be performing well, but where improvements should still be possible: Benin, Gabon, and Mali.
- Those with NRW ranging from 40 percent to 55 percent and where significant improvements are required: Cameroon (although this has improved from 45 percent in 2008 to 40 percent in 2009), Ghana, CAR, Guinea, and Nigeria.

Utilities are ranked for NRW performance by utility size in the following Sections.

3.3.2.4 Nonrevenue Water: Top 5 Ranking by Utility Size (2009)

Table 19: NRW ranking of large metropolitan areas

Sl. no.	Utility	NRW (%)		NRW (lcpd)	
		2006	2009	2006	2009
1	Togolaise des Eaux (Togo)	19%	15%	7.87	5.75
2	Société de Patrimoine des Eaux du Niger	17%	16%	13.09	12.31
3	Office National de l'Eau et de l'Assainissement (Burkina Faso)	18%	18%	12.32	11.07
4	Gombe State Water Board (Nigeria)	20%	20%	1.81	1.81
5	Sénégalaise des Eaux (Senegal)	20%	21%	14.46	14.36

Average: 45 losses per capita per day; Median: 48 losses per capita per day.

Table 20: NRW ranking of secondary cities

Sl. no.	Utility	NRW (%)		NRW (lcpd)	
		2006	2009	2006	2009
1	Lilongwe Water Board (Malawi)	28%	29%	26.16	24.00
2	Mombasa Water and Sewerage Company (Kenya)	40%	31%	36.53	23.07
3	Nkana Water and Sewerage Company (Zambia)	35%	42%	125.22	106.5
4	Ebonyi State Water Board (Nigeria)	24%	42%	288.39	586
5	Kafubu Water and Sewerage Company (Zambia)	78%	45%	238.38	137

Average: 93 losses per capita per day; Median: 53 losses per capita per day.

Table 21: NRW ranking of large towns

Sl. no.	Utility	NRW (%)		NRW (lcpd)	
		2006	2009	2006	2009
1	Mekelle Water Supply Service Office (Ethiopia)	36%	11%	14.84	4.99
2	Luapula Water and Sewerage Company Limited (Zambia)	-	15%	-	48.72
3	Abia State Water Board (Nigeria)	35%	18%	13.99	4.30
4	Iringa Urban Water and Sewerage Authority (Tanzania)	28%	20%	31.58	15.41
5	Dire Dawa Water Supply and Sewerage Authority (Ethiopia)	28%	22%	10.28	7.89

Average: 63 losses per capita per day; Median: 43 losses per capita per day.

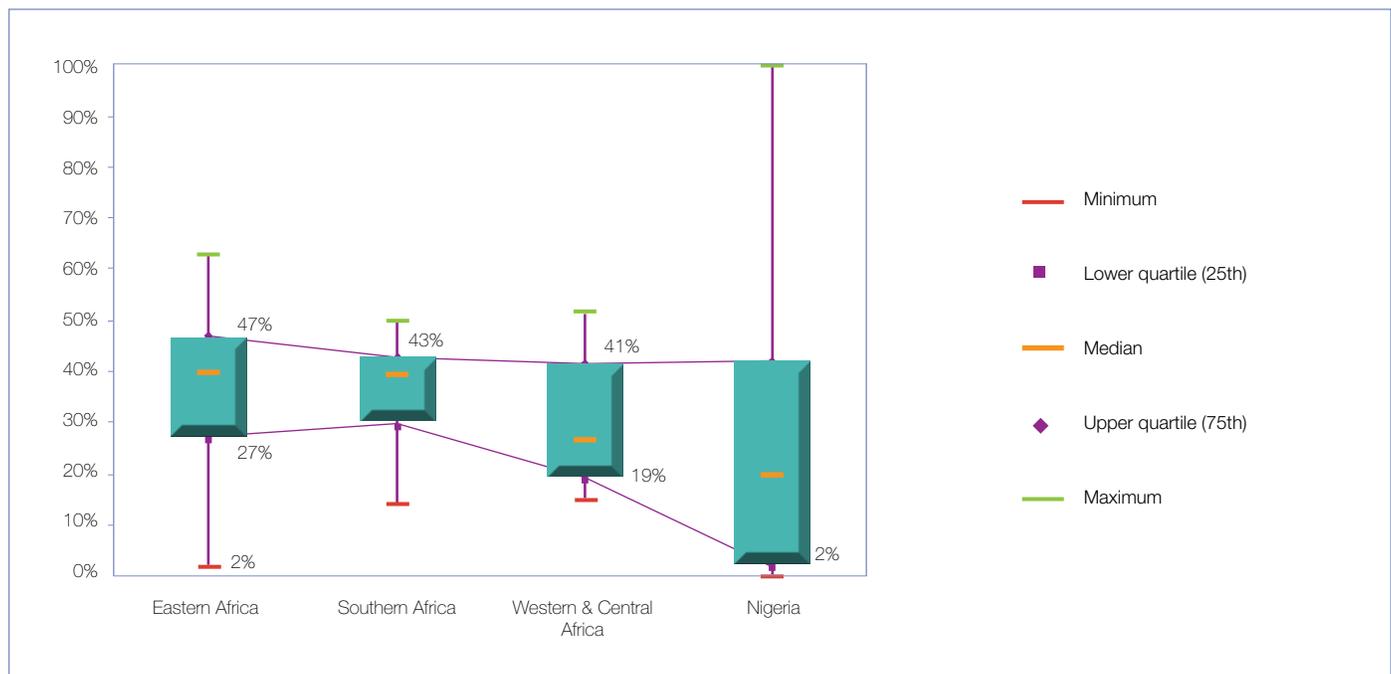
Table 22: NRW ranking of small towns

Sl. no.	Utility	NRW (%)		NRW (lcpd)	
		2006	2009	2006	2009
1	Malindi Water Company Limited (Kenya)	24%	2%	13.24	0.81
2	Municipality of Walvis Bay (Namibia)	17%	14%	35.51	29.57
3	Welkite Town Water Supply and Sewerage Enterprise (Ethiopia)	28%	24%	5.07	5.58
4	Meru Water and Sewerage Services (Kenya)	30%	24%	30.35	21.94
5	Singida Urban Water and Sewerage Authority (Tanzania)	16%	31%	7.73	18.88

Average: 52 losses per capita per day; Median: 26 losses per capita per day.

A box plot summary of NRW across the region is shown in Figure 15.

Figure 15: Box plot summary for nonrevenue water in the Sub-Saharan region (2009)



3.3.3 Continuity of Supply

Continuity of supply (which is measure of unplanned interruptions) is a key indicator of utility performance as it is directly linked with most other indicators, including but not limited to nonrevenue water, bursts and leaks, water quality, cost of production, and unit consumption, and has an overall effect on customer satisfaction and willingness to pay. Utility managers generally consider that poor continuity of supply is a result of inadequate financing for increasing water supply capacity; however, international and African experiences shows that continuity of supply could be achieved by sound management of infrastructure, where the emphasis is not only on asset

creation, but rather on asset management and service delivery.

Most utility managers, however, concur that it is difficult to measure continuity of supply, in particular in large cities where some rationing occurs, but is expected to happen mostly in poorer neighborhoods, due to the fact that utilities are incentivized to concentrate on serving high income customers.

The problem is exacerbated in cities such as Accra, Dar es Salaam, and Nairobi in which a large number of households have installed roof tanks or underground storage tanks to cope with supply discontinuity. These

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individual storage tanks have become an integral part of urban water supply systems in Sub-Saharan Africa.

However, it also means that supply to poor households that cannot afford to install such storage tanks—which may purchase water from kiosks and are more likely to live in areas which are rationed—is interrupted whilst water fills up the tanks of the non-poor.

Some possible causes and consequences of poor continuity of supply are presented here and illustrate the fact that it is intrinsic to poorly performing water supply operations.

The key performance data on continuity of supply are shown in the Appendixes, by utility, country, and subregion. Where possible, the average represents the weighted average by volume of water sold.

Key findings:

- Poor continuity of supply is endemic in all subregions and across the size of utilities—with an overall average (by weight of population served) of less than 16 hours per day in 2009. In fact, some of the largest utilities are also some of the worst performing.
- Utilities are generally not aware of the real impact of poor continuity both in terms of the average number of hours per day (where water is available at customers' taps) AND the number of households that have intermittent supply. Individual storage tanks that are designed to curb poor continuity of supply are ubiquitous and are a fact of life in many African cities.

Table 23: Possible causes and consequences of poor continuity of supply

Possible causes	Consequences
<ul style="list-style-type: none">• Inadequate water resources and lack of production capacity.	<ul style="list-style-type: none">• The negative network pressures created by discontinuous supply can compromise water quality and damage assets (especially meters).• Intensive rationing programs that are likely to disproportionately affect the poor as the utility focuses on high consumers.
<ul style="list-style-type: none">• High losses due to poor condition and performance of the assets.	<ul style="list-style-type: none">• Customer dissatisfaction and reduced willingness to pay for services.• Vandalism in areas of the network where this occurs affects continuous water supply.
<ul style="list-style-type: none">• Poorly designed transmission, storage, and distribution infrastructure with a strong reliance on pumping/energy.	<ul style="list-style-type: none">• Utility is at risk of becoming redundant as customers (domestic and nondomestic) look for alternative sources.• Increasing number of individual storage tanks that further exacerbate the problem as they increase demand.

- None of the utilities that have reported poor continuity have also reported a intermittent supply for a large proportion of customers: in fact, no utility has reported more than 25 percent of customers with intermittent supply (for example, Mombasa Water reports seven hours per day in 2009 but only 10 percent of customers have intermittent supply).
- If utilities were to increase continuity of supply (assuming there was enough water supply capacity and storage), this would lead to a corresponding increase in NRW, and might also only marginally increase the volume of water sold to customers. Thus it is likely that financial sustainability would be further eroded as the utilities are not able to recover any revenue from increased losses.
- It is considered that discontinuity of supply is creating a significant disincentive for utilities to expand into unserved areas where the poor live. With a fixed volume of water (that is, no CAPEX spent on supply

increases), utilities are incentivized to concentrate on serving non-poor households that are likely to want to pay more for water.

Continuity of supply is summarized in Table 24 and Figure 16 for all four subregions.

3.3.3.1 Continuity of Supply in the Eastern Africa Region

The weighted average for continuity of service has been stable over the period: 16.8 hours per day in 2006 and 16.9 hours per day in 2009.

Only six of the 28 utilities in the region report providing continuous (24 hours per day) service in 2009: Addis Ababa, Eldoret, Malindi, Meru, Nyeri, and Arusha.¹³

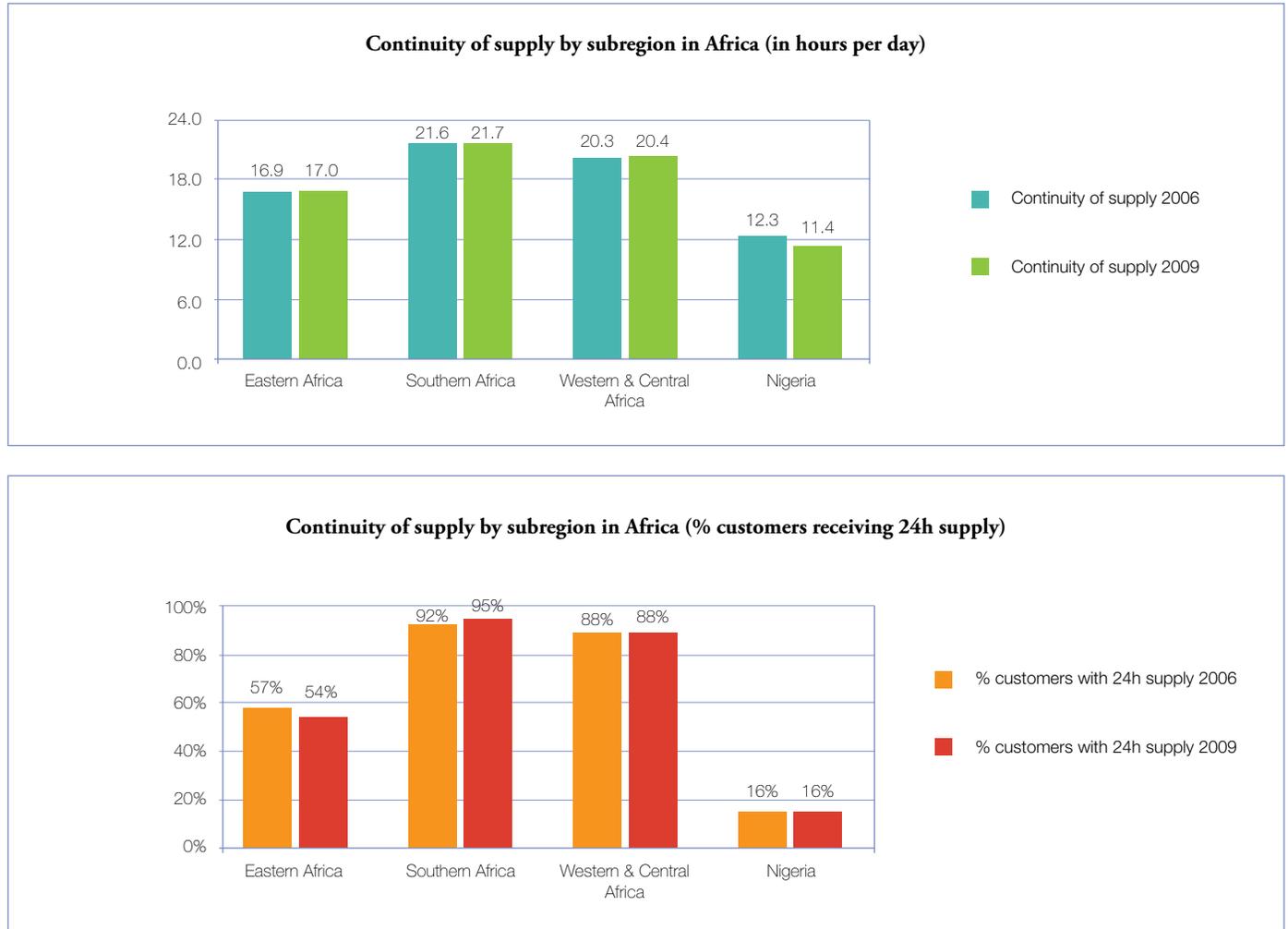
The other capital cities, Nairobi, Dar es Salaam, and Kampala, in fact, provide only 12-hour per day supply.

Table 24: Continuity of supply and number of customers with intermittent supply by subregion

Regions	Population served ('000)		Continuity of supply (hours per day)		Number of customers with intermittent supply ('000)		% customers with 24h supply	
	2006	2009	2006	2009	2006	2009	2006	2009
Eastern Africa	10,307	13,099	16.9	17.0	4,441	5,987	57%	54%
Southern Africa	12,888	14,580	21.6	21.7	1,018	775	92%	95%
Western and Central Africa	26,402	30,067	20.3	20.4	3,201	3,551	88%	88%
Nigeria	28,969	32,190	12.3	11.4	24,274	27,015	16%	16%
Total	78,567	89,937	17.1	16.9	8,660	10,313	89%	89%

¹³ This has, however, not been confirmed with customers.

Figure 16: Summary of continuity of supply across the subregions



Six utilities provide water less than 12 hours per day: Dire Dawa, Harar, Mombasa, Nairobi, Dar es Salaam, and Singida.

Two utilities are performing very poorly on the continuity of supply indicator: Mombasa (7 hours per day) and Singida (6 hours per day).

The best increase in performance in the region was

realized by Nyeri Water and Sewerage Company, which increased supply from 20 hours per day in 2006 to 24 hours per day in 2009. Similar increases were also realized by Nanyuki Water and Sewerage Company, with 14 hours to 18 hours per day between 2006 and 2009.

However, Dodoma Urban Water Supply and Sewerage Authority experienced a reduction from 24 hours to 20 hours per day in the same period.

3.3.3.2 Continuity of Supply in the Southern African Region

The weighted average for continuity of supply has been stable between 2006 and 2009 at 21.7 hours (21.5 hours in 2006). This is the best region, with some of the best performing utilities found in South Africa.

Although there has been some improvement, none of the utilities in Zambia is able to deliver 24-hour supply—whereas all four utilities in South Africa can.

Only one utility in Malawi delivers 24-hour supply—Lilongwe Water Board. However, on average there has been a deterioration of continuity of service among the utilities in Malawi, probably due to a combination of low increase (6 percent) in water production, 18 percent increase in coverage and a water network in poor condition.

Two utilities are performing very poorly: Luapula and Western WSC in Zambia, with only 7 hours and 8 hours of water per day in 2009, respectively.

3.3.3.3 Continuity of Supply in the Western and Central African Regions

The weighted average in the region has increased from 20.3 hours to 20.4 hours per day from 2006 to 2009 (excluding Nigeria).

Seven out of the 10 utilities in the region (excluding Nigeria) are reporting 24-hour supply: SEEG (Gabon), Ghana Water Company, EDM (Mali) and SDE (Senegal), Camerounaise des Eaux and Togolaise des Eaux, and Edo State Water Board in Nigeria. All of these are national water utilities except for Edo State WB which is a regional water board. In addition, SEEG, SDE and CDE

are managed by private operators (with lease contracts), whilst Ghana Water Company is also managed by a private operator, but under a management contract.

The only national utilities that do not deliver 24-hour supply are SONEB (Benin)—no data reported; ONEA (Burkina Faso)—23 hours; SPEN (Niger)—increasing from 20 in 2006 to 22 hours in 2009; and SEG (Guinea Conakry)—with 8 hours per day since 2006.

Only one of the Nigerian utilities has 24-hour supply. In fact, 13 out of the 22 that completed this question supply less than 12 hours per day—with eight of these delivering less than 8 hours per day. On average, continuity of supply in Nigeria has reduced from 12.3 to 11.4 hours per day, with only 16 percent of customers benefiting from water supply for 24 hours per day.

Figure 17 presents a box plot summary of continuity of supply in Sub-Saharan Africa (2009).

3.3.4 Meter Penetration (Metering Ratio)

The best practice is that all customers should be metered and that water balances be undertaken at the lowest most appropriate levels (for example, the district meter area) using the results of customer meters (output) and district meters (input).

The key performance data on meter penetration are shown in the Appendixes, by utility, country, and subregion.

Key findings:

- Only a small proportion of utilities are able to report (a) total number of meters by customer type; AND (b) the condition of these meters (that is, that the meters are operating). Data on metering levels for each utility by subregion are included in the Appendixes, but also summarized in Figure 18.

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Figure 17: Box plot summary of continuity of supply in the Sub-Saharan region (2009)

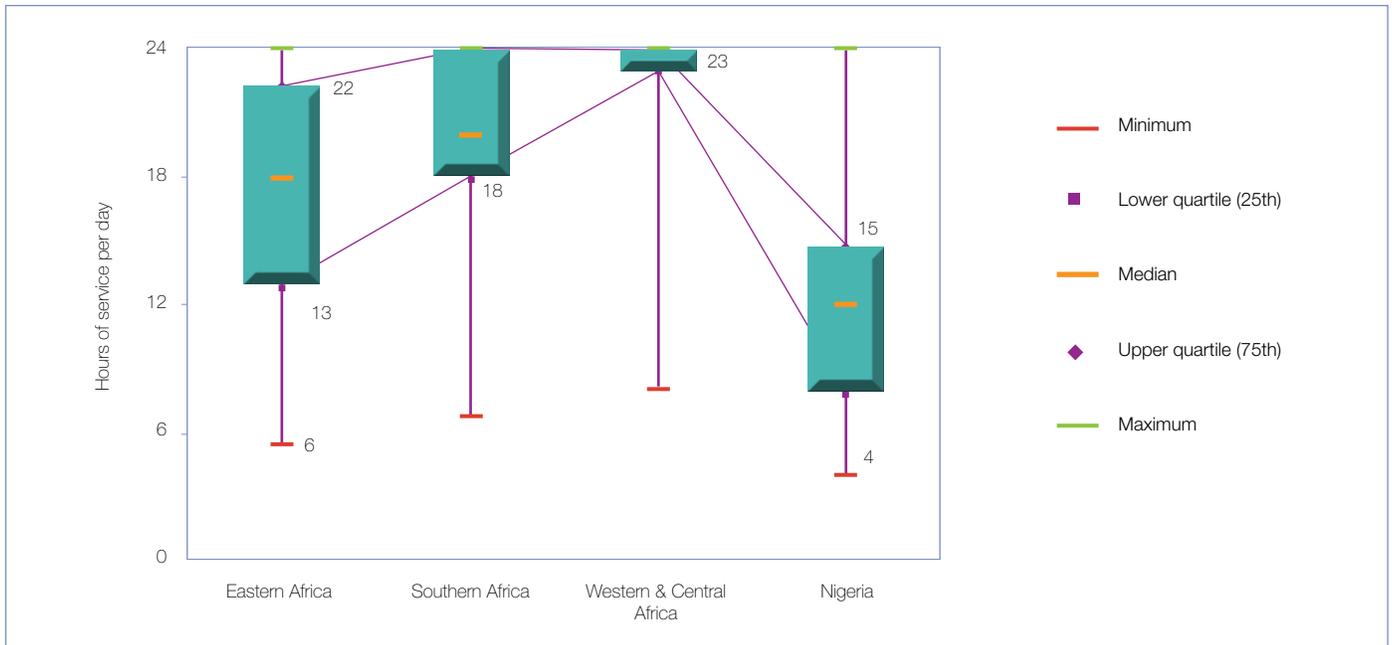
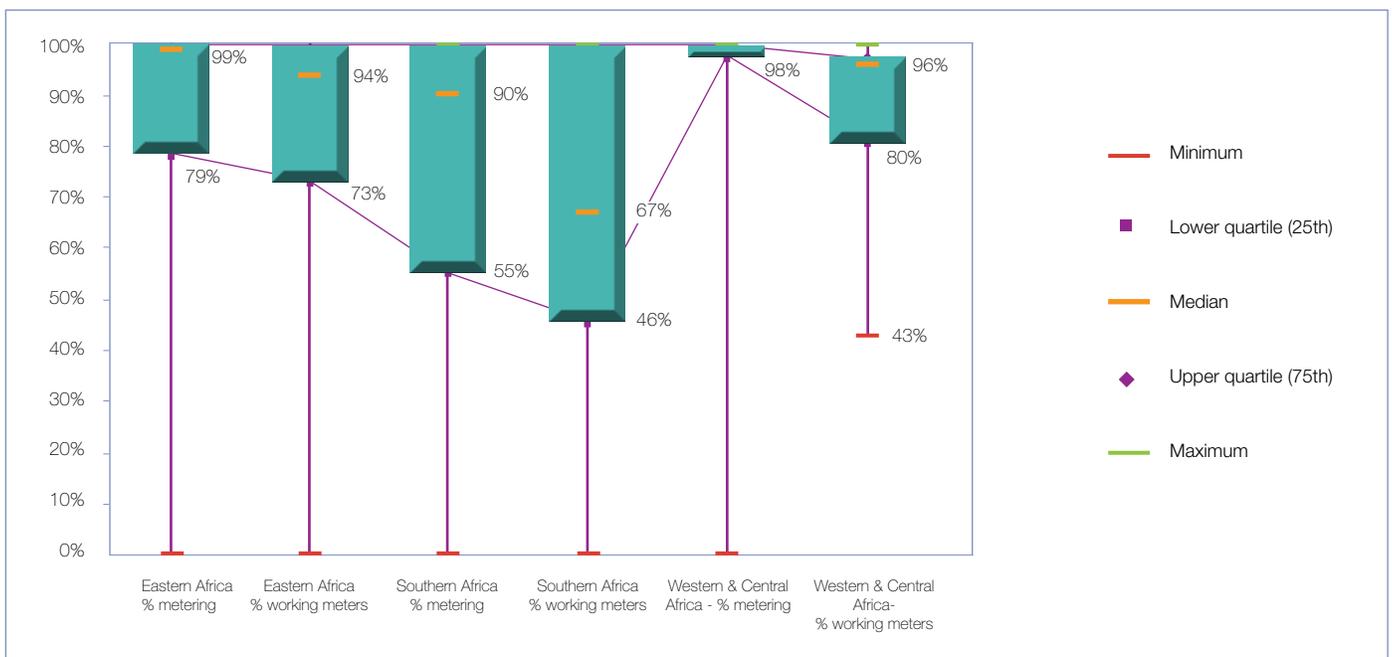


Figure 18 Box plot of % metering and % meters in good condition in the Sub-Saharan Africa region (2009)



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- Mali, Burkina Faso, Senegal, Niger, Gabon, and Benin all show 100 percent metering, and have also shown some of the best NRW performance. This clearly shows that 100 percent metering is a key component of NRW reduction and management. Guinea Conakry reports 88 percent metering. The condition of meters is also highest among these utilities with 96 percent of meters reported to be in good condition.
 - There is strong correlation between percent metering and percent NRW: utilities that have comprehensive metering programs are able to monitor and thus plan for NRW reduction.
 - Overall the Eastern African region performs better than the Southern African region—with 99 percent metering and 90 percent metering median values, respectively. The condition of meters also appears to be better in Eastern African than Southern Africa. The overall performance hides excellent performance from Kisumu Water and Sewerage Company (Kenya) which increased metering from 96 percent to 100 percent from 2006 to 2009, and the proportion of meters in good condition from 51 percent to 91 percent. Similarly, in Dar es Salaam the proportion of meters in good condition was increased from 63 percent to 78 percent from 2006 to 2009.
 - Utilities in Zambia have also managed to increase both metering AND the condition of their meters from 2006 to 2009. Particular examples include Lusaka Water (40 percent to 55 percent metering, and 40 percent to 60 percent of meters in good condition) and Mulonga Water (22 percent to 71 percent metering, and 22 percent to 50 percent meters in good condition).
 - Utilities in Nigeria have generally not reported (a) any metering; and (b) the condition of their meters—
- except for: Ebonyi State Water Board: 25 percent metering and 75 percent of meters in good condition; Osun State Water Board: 15 percent metering and 2 percent of meters in good condition; and Oyo State Water Board: 13 percent metering and 0 percent (or unknown) of meters in good condition. This is in stark contrast with the systematic metering policy implemented in francophone West African countries (where many of the utilities are managed by private operators).
- If utilities have no meters then it is likely that they cannot report volumes produced and volumes sold, ensure that accurate bills are sent to clients, accurately assess customer demand and plan for water supply capital investment schemes to increase supply. They are also unable to report and manage NRW effectively.
- The range of metering and percent of meters in good condition over the Sub-Saharan Africa region is illustrated in Figure 18 (although figures for Nigeria have not been included to the very low number of (a) utilities that report having any metered connections; and (b) utilities that report on the condition of their meters—except for the three mentioned above).

3.3.5 Bursts and Leaks

The analysis of bursts and leaks on water mains is primarily an indicator of the condition of water mains (and fittings), but also of the ability of the utility to identify, attend to, and repair these leaks.

Although this indicator necessitates that utilities actively and continuously look for leaks (to repair the mains and thus reduce overall technical losses), it is a useful benchmark across the region, particularly in areas in which water mains material, soil, and construction (main-laying) dates are broadly similar.

Table 25: Interpretation of the condition of pipe material from pipe burst rates

Burst rate (number of bursts per km of water main per annum)	Significance
... < 0.1	Pipe material in excellent condition with 100% of useful life remaining.
0.1 < ... < 0.2	Pipe material in good condition, typically with 75% of its useful life remaining.
0.2 < ... < 0.6	Pipe material in acceptable condition but only 50% of useful life remaining. Replacement required within 10 to 30 years (depending on material).
0.6 < ... < 1.0	Pipe material in poor condition with only 25% of useful life remaining. Replacement within 10 years.
... > 1	Unacceptable condition. Derelict. Pipe material has failed and its useful life has expired. Urgent replacement required.

The number of bursts and leaks is divided by the total length of watermains, both of which are reported by the utilities. The condition of watermains can be interpreted, from burst rates per km per annum, using Table 25.

This approach is used to assess the condition of water mains (a similar system can also be developed to assess performance) in different regions of a water supply network (for example, at district meter area level), by material and diameter. Utility managers can, therefore, obtain useful information on the condition of a particular pipe material, and make informed decisions on capital investment (for example, replacement). By looking at burst rates by location, pipe material and diameter utilities are able to determine whether a particular pipe material (for example, asbestos cement or ductile iron pipes) needs replacing as this pipe material may have exceeded its useful asset life (irrespective of the actual age of the pipe or material in question).

Key findings:

- A significant number of utilities exhibit excessive burst rates that are greater than 1 per km per annum, which suggests that the water mains are likely to be in very poor condition and in need of urgent replacement. However, it is also likely that utilities are unaware of the actual length of pipes which they possess or manage, which can significantly affect the value of the burst rate per km per annum.
- The average burst rate in the Eastern African region is the highest with more than 5 per km per annum in 2009; the Southern Africa region with 2.6 (up from 0.3), and the Western and Central (excluding Nigeria) with 2.37 (up from 2.24) in 2009. It is likely that an analysis of bursts by pipe material and diameter would generate a broader range of bursts.

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- There is significant variance in the burst rates across the regions—this could be due to uneven reporting of bursts (for reasons explained earlier related to the fact that utilities are not actively looking for bursts—which will lead to an under-representation of the burst rates), lack of knowledge of the total length of mains but also to utilities' inability to manage the below-ground assets effectively.
- Utilities which report the highest burst rates are also those which have the highest level of NRW. This illustrates the fact that controlling but also actively looking for leaks is the cornerstone of reducing losses, which could start at the lowest appropriate level (for example, district meter areas; zoning meters), by analyzing the rate of pipe bursts and leaks by pipe material and diameter. It is likely also that utilities whose level of NRW is high but whose number of bursts per km per annum is low (for example, Chambeshi) are significantly underreporting bursts—or have a large number of illegal connections.
- There seems to be no correlation between burst rates (per km per annum) and NRW expressed as $\text{m}^3/\text{km}/\text{day}$, which may point to the fact that many utilities simply do not know the length of watermains which they possess or manage. In addition it is likely that utilities which combine high $\text{m}^3/\text{km}/\text{day}$ and low burst/km/annum are likely to be significantly underreporting the number of leaks, and thus unlikely to be undertaking any form of active leakage control.
- All the above means that significant investments are required in rehabilitating watermains and helping utilities better manage their assets (for example, through asset management training and asset management systems). Improved asset management mostly is a priority over capital investment, and is required prior to or in parallel with

capital investments geared more generally towards network and coverage expansion.

Data of individual average utility burst rates are included in the Appendixes.

The average burst rates (by utility and region) are illustrated in the following Sections and compared to a burst rate = 1, above which water mains are normally deemed to be in unacceptably poor condition.

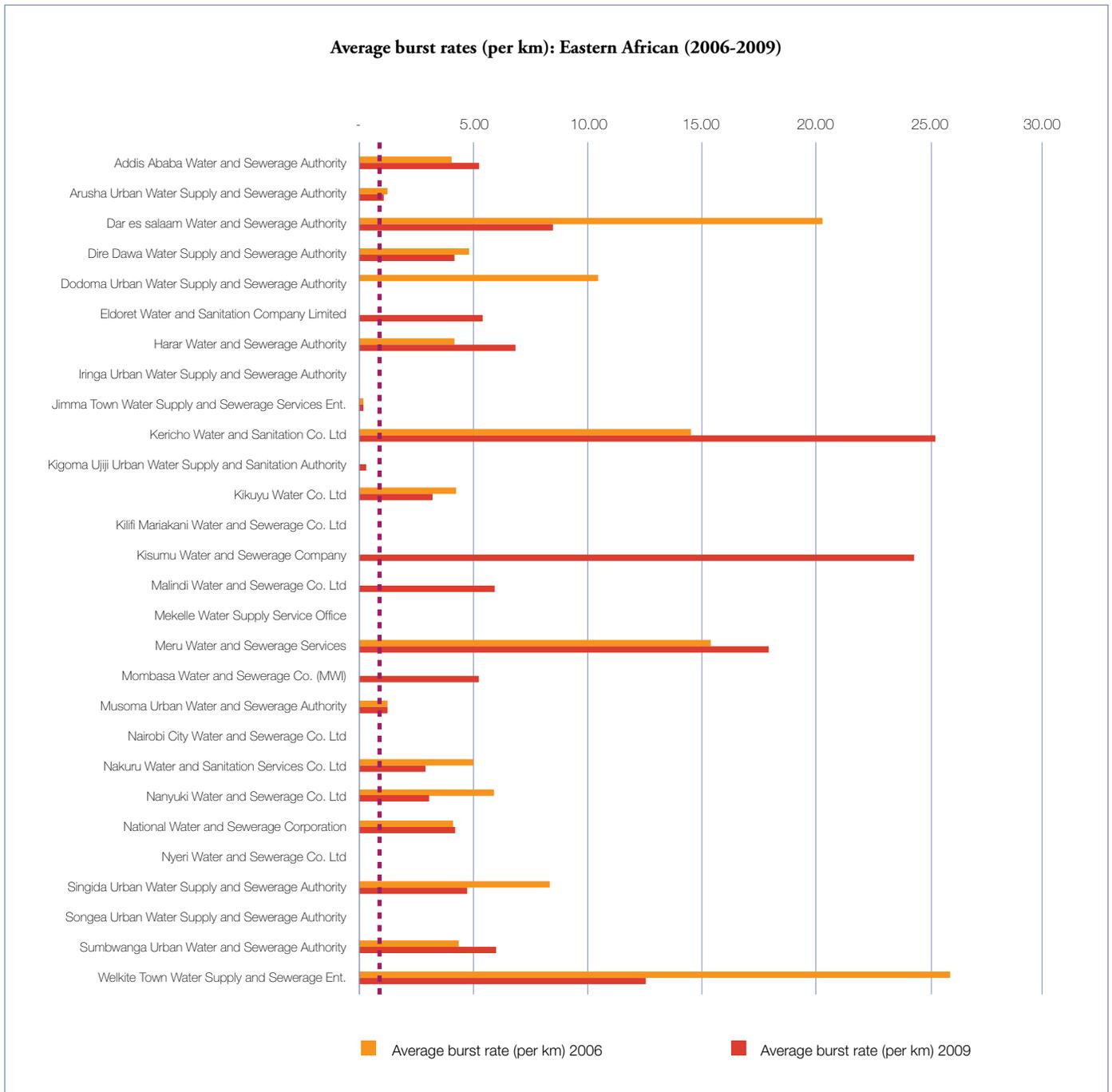
3.3.5.1 Summary of Burst Rates in the Eastern Africa Region

From Figure 19 and considering the table linking bursts and leaks with the condition of water mains, it seems that Dar es Salaam, Kericho, Kisumu, Meru, and Welkite are significantly underreporting the length of water mains, as the calculated burst rates seem to be excessive (in excess of 15 per km per annum).

In addition, most utilities in the region, including Arusha, Dar es Salaam, Dodoma, Harrar, Kigoma, Kikuyu and Kilifi Mariakani, Meru, Musoma, Nairobi, Nakuru and Nanyuki, Nyeri, National Water, and Songea seem to be underreporting the number of bursts or leaks on water mains per annum because the level of NRW reported by the utilities does not seem to match the reported number of bursts: these utilities should be reporting many more bursts and leaks, but they are probably not aware of these.

This is shown in the summary figure by comparing burst rates and NRW (percent). A strong correlation between burst rates and NRW (percent) is likely to indicate that the utility is actively looking for bursts and leaks and, therefore, that the total number of bursts is likely to be close to that which was reported in the USAQ.

Figure 19: Average burst rates in the Eastern African region

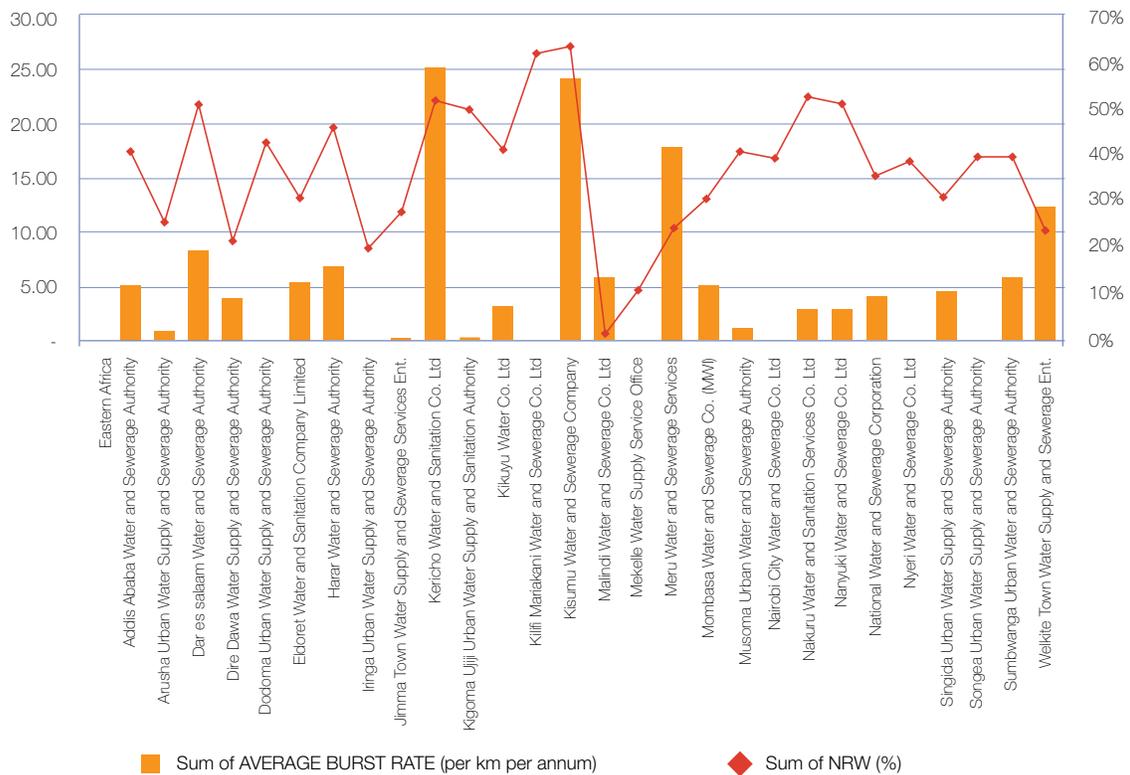


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Bursts rates (/km/annum) and NRW (%): Eastern Africa 2009



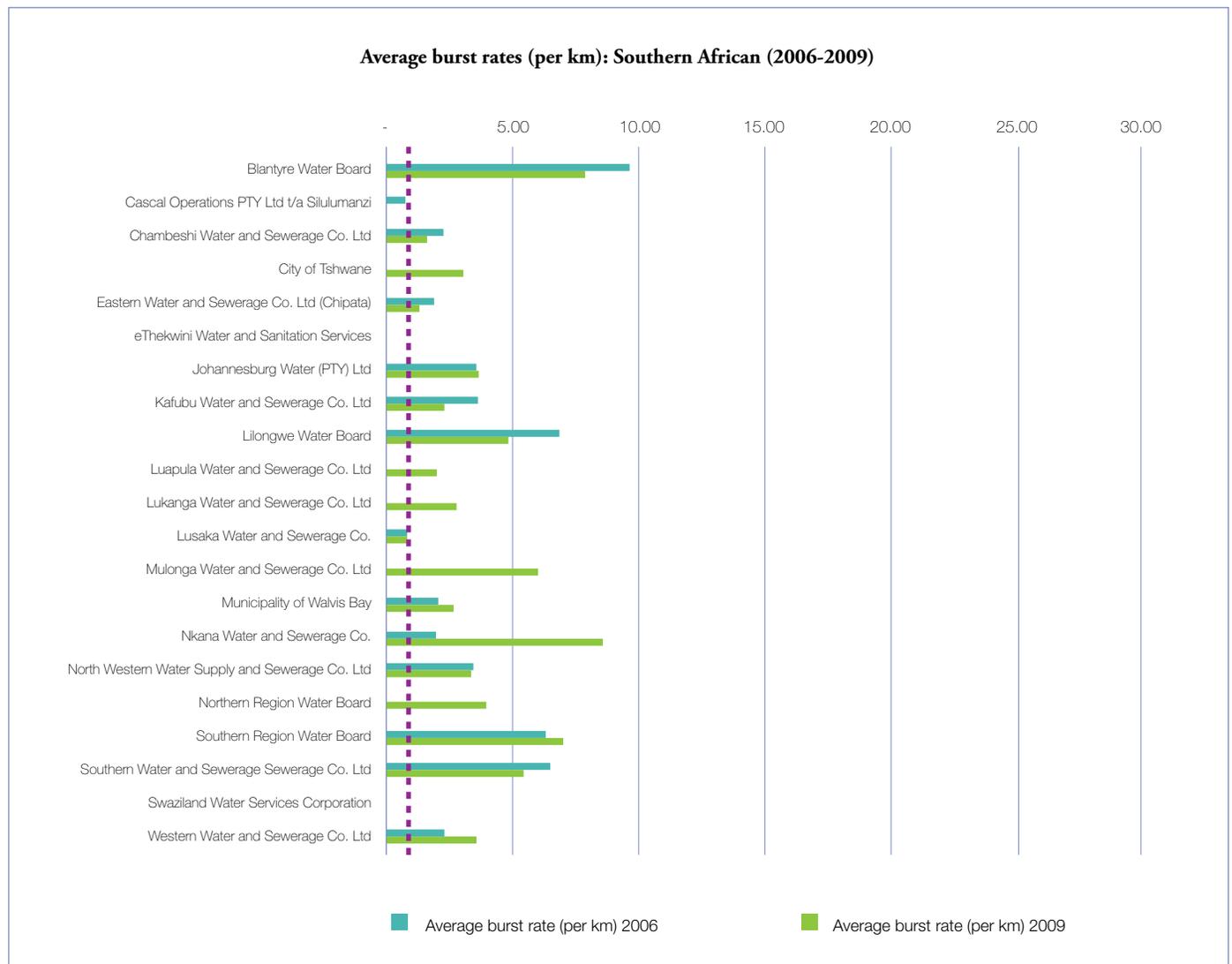
- High burst rate and high level of NRW: Kericho, Kisumu only.
- Low burst rate and low level of NRW: Dire Dawa, Eldoret, Malindi, National Water, Welkite.
- No correlation between burst rates and level of NRW: Addis Ababa, Arusha, Dar es Salaam, Mombasa, Musoma, Nakuru, and Nanyuki. These utilities are unlikely to be looking actively for leaks.

3.3.5.2 Summary of Burst Rates in the Southern Africa Region

Overall, the number of bursts (and therefore the burst rate) in the Southern Africa region is much lower than in the Eastern Africa region. The range of burst rates is also much lower, with highest burst rates reported by Blantyre Water Board (7.5 per km in 2009).

Mbombela/Sililumanzi (South Africa), Eastern WSSC,

Figure 20: Average burst rates in the Southern African region



Lukanga WSSC, Lusaka WSSC (Zambia) have among the lowest burst rates in the region. Johannesburg and Tshwane in South Africa seem to have a relatively high burst rate (3.5 to 4 per km per annum).

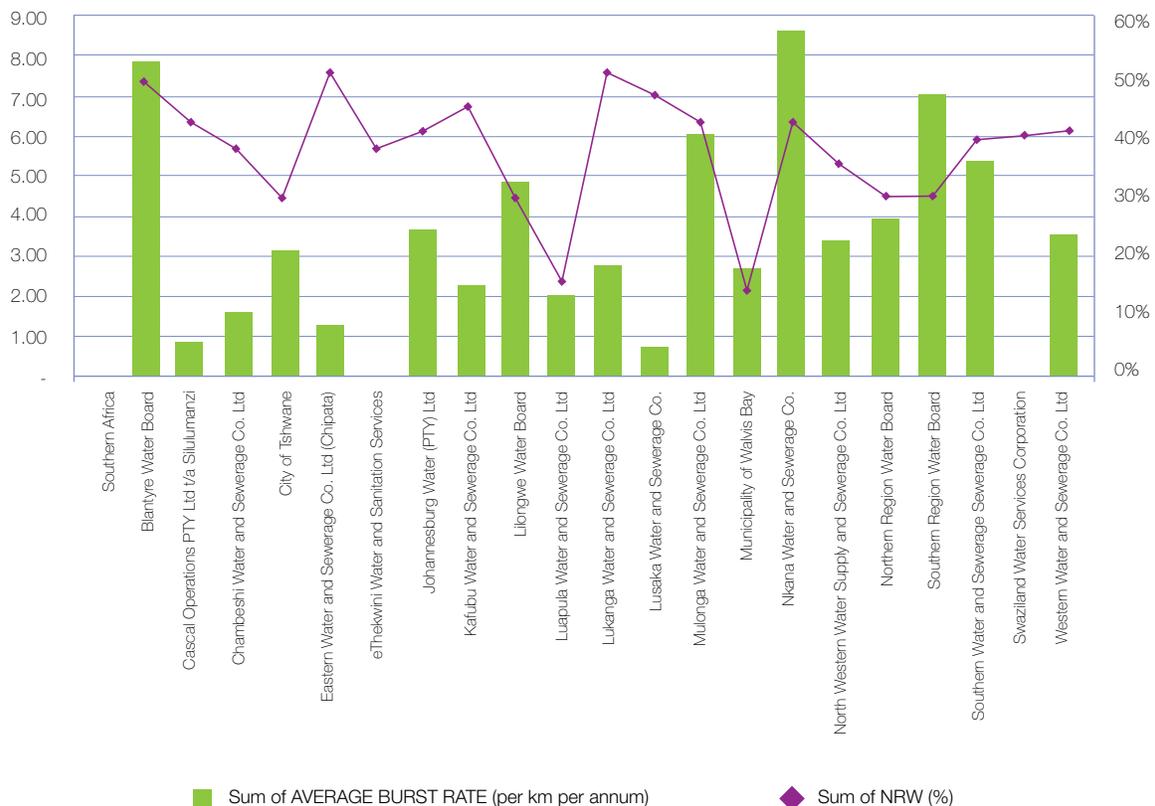
Comparing the average burst rate with the level of NRW gives an indication on the likelihood that the utility is actively looking for and repairing leaks. This is illustrated on the next page.

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Bursts rates (/km/annum) and NRW (%): Southern Africa 2009



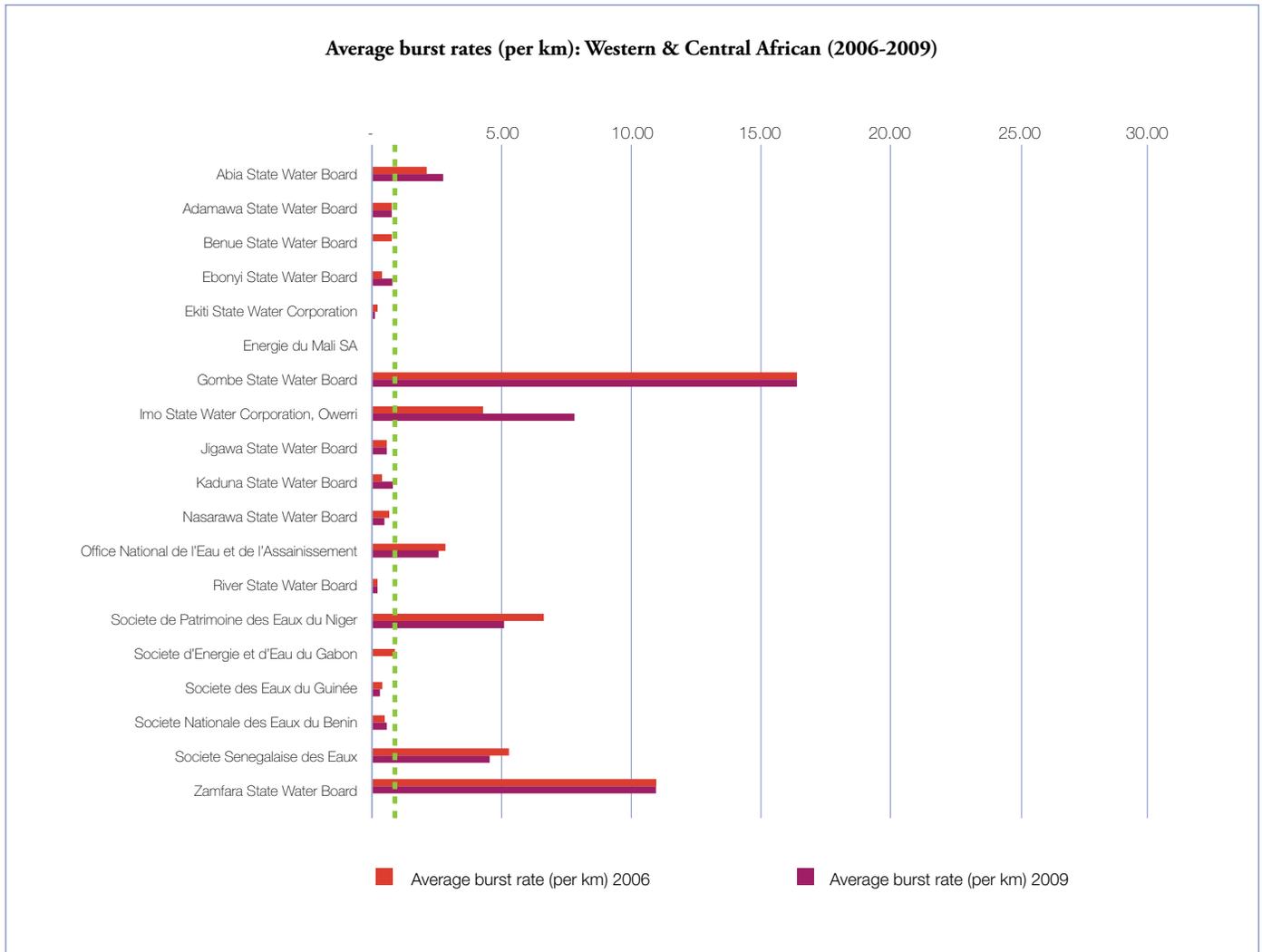
From this, it seems a number of utilities appear to have a strong correlation between average burst rates and level of NRW:

- High burst rate and high level of NRW.
- Low burst rate and low level of NRW.
- No apparent correlation suggesting no active leakage control.

3.3.5.3 Summary of Burst Rates in the Western and Central Africa Region

There is only strong correlation between burst rates and the level of NRW for the francophone Western African utilities. This is mostly for Nigerian utilities, Guinea-Conakry, Benin, and Centrafrique seem to be underreporting bursts. No data were obtained from SEEG (Gabon) or Ghana Water Company.

Figure 21: Average burst rates in the Western and Central African region



Only a few utilities seem to be reporting well correlated levels of bursts/leaks and NRW: SPEN in Niger, SDE in Senegal, ONEA in Burkina Faso, and Abia State Water Board in Nigeria. CDE in Cameroon also has a relatively high burst rate that matches a high level of NRW. This is illustrated on the next page.

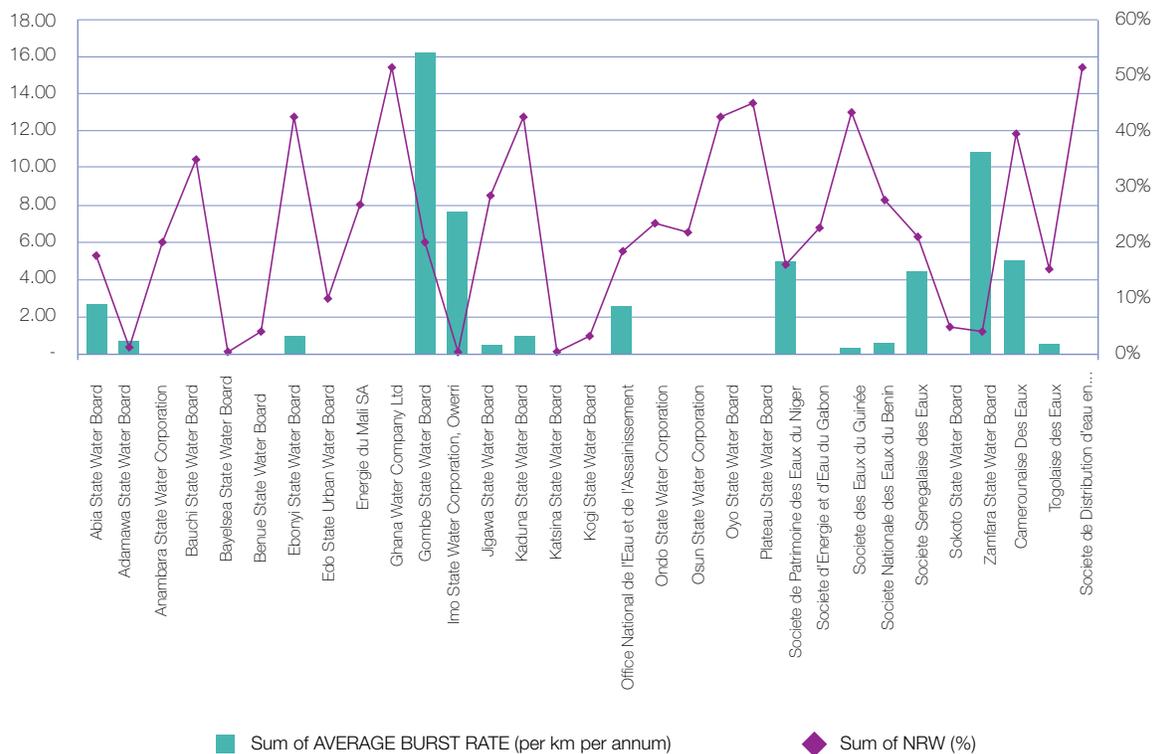
Figure 22 presents a summary of the bursts and leaks across the Sub-Saharan Africa region. However, the figures for Nigeria are not represented because the number of reported bursts is too low as the utilities are likely to be significantly underreporting the bursts and leaks.

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Bursts rates (/km/annum) and NRW (%): Western & Central Africa 2009



3.3.6 Water Quality and Water Quality Monitoring

Water quality is an important aspect of water supply services and is regulated at local, national, and international levels. The indicator which is used in this assessment compares:

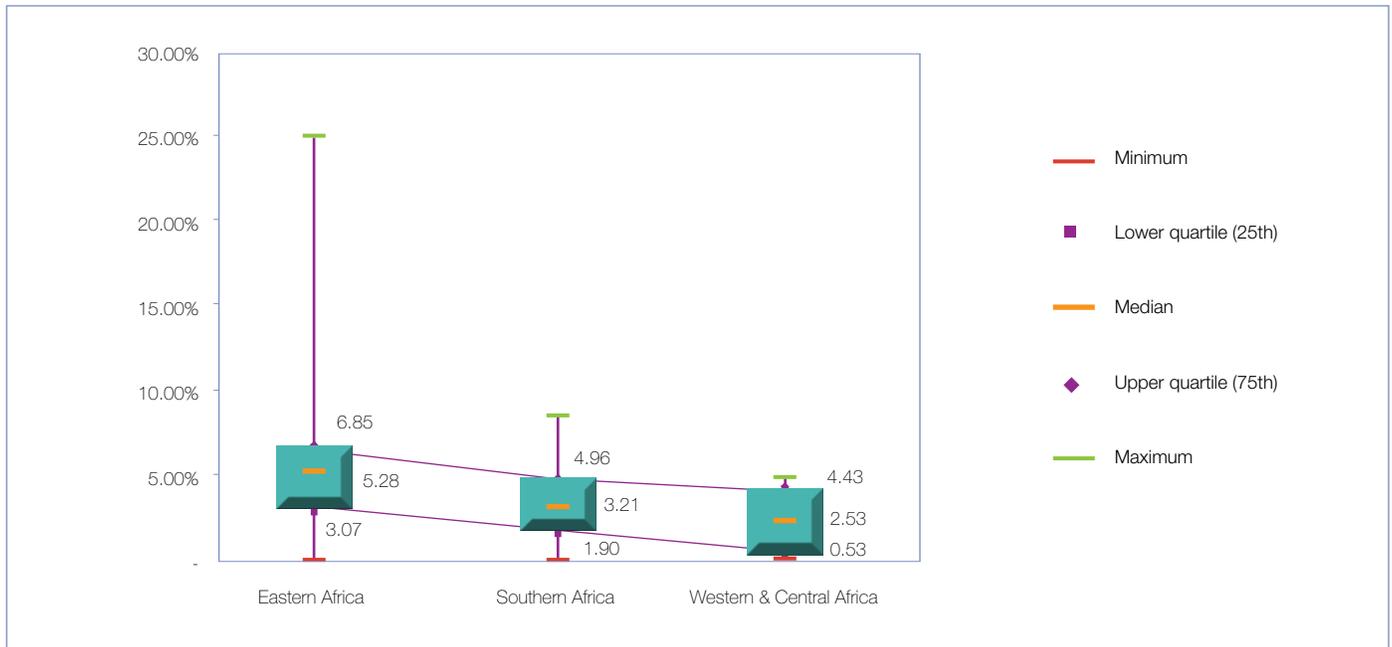
- The percentage of water samples that pass the residual chlorine test (which is a standard parameter for water utilities worldwide).
- The number of water quality tests undertaken per m³ of treated water distributed (that is, the frequency of testing).

The USAQ provides no information on the location of the sampling points (for example, treatment plant, distribution system, customer's tap) but the percent tests passing the residual chlorine test provides a good assessment of overall water quality. The frequency of testing is also only useful when it is benchmarked. The regional assessments are illustrated in the Appendixes.

Key findings:

- Generally, there has been an improvement in water quality (from 92 percent to 96 percent) when this is expressed as percent tests passing weighted by volume, that is, the volume of water that fails the tests has reduced from 4 percent to 8 percent, although

Figure 22: Box plot of bursts and leaks in the Sub-Saharan Africa region (2009)



the total number of tests passing has remained the same at 97 percent. This is good progress but there is still a lot of room for improvement, particularly in Eastern Africa (92 percent passing by volume) and Western and Central Africa (93 percent passing by volume).

- There has been a big improvement in Nigeria, with Ebonyi, Imo, Kaduna, Osun and Plateau State Water Boards all reaching more than 90 percent tests passing. The best improvement, however, has been at Eldoret (Kenya): the proportion of water quality samples passing the residual chlorine test has increased from 46 percent to 94 percent from 2006 to 2009. National Water in Uganda and DAWASCO in Tanzania only had 90 percent of their water quality tests passing in 2009.

- Many large utilities, including Addis Ababa Water, Nairobi Water, City of Tshwane, Luapula (Zambia), Ghana Water, EdM (Mali), SPEN, SONEB, SDE, and many in Nigeria (Benue, Gombe, Katsina, Kogi, Niger, and Oyo States), did not provide any quality data in the USAQ. The weighted averages, therefore, do not include these utilities.
- The indicator tracking the number of samples taken per m³ of water produced shows great variation across utilities and regions and needs to be treated with caution. Nevertheless, regulators should prescribe and monitor clear standards of reporting (in particular, frequency) that are implemented and audited.

- The benchmark for sampling is considered to be one sample for every 1 m³ of water produced. This is currently the regional weighted average of the francophone Western African countries.
- There is strong opportunity for WOP Africa to assist in improving water quality by facilitating the development (by utilities and their partners) of risk-based water quality safety plans as well as focusing investment on rehabilitation and upgrade of water production and distribution infrastructure.

The summary of water quality tests by subregion (expressed as percent of tests passing, weighted by volume), and the frequency of water quality tests (expressed as the volume of water (m³) between each sample) is shown in Figure 23.

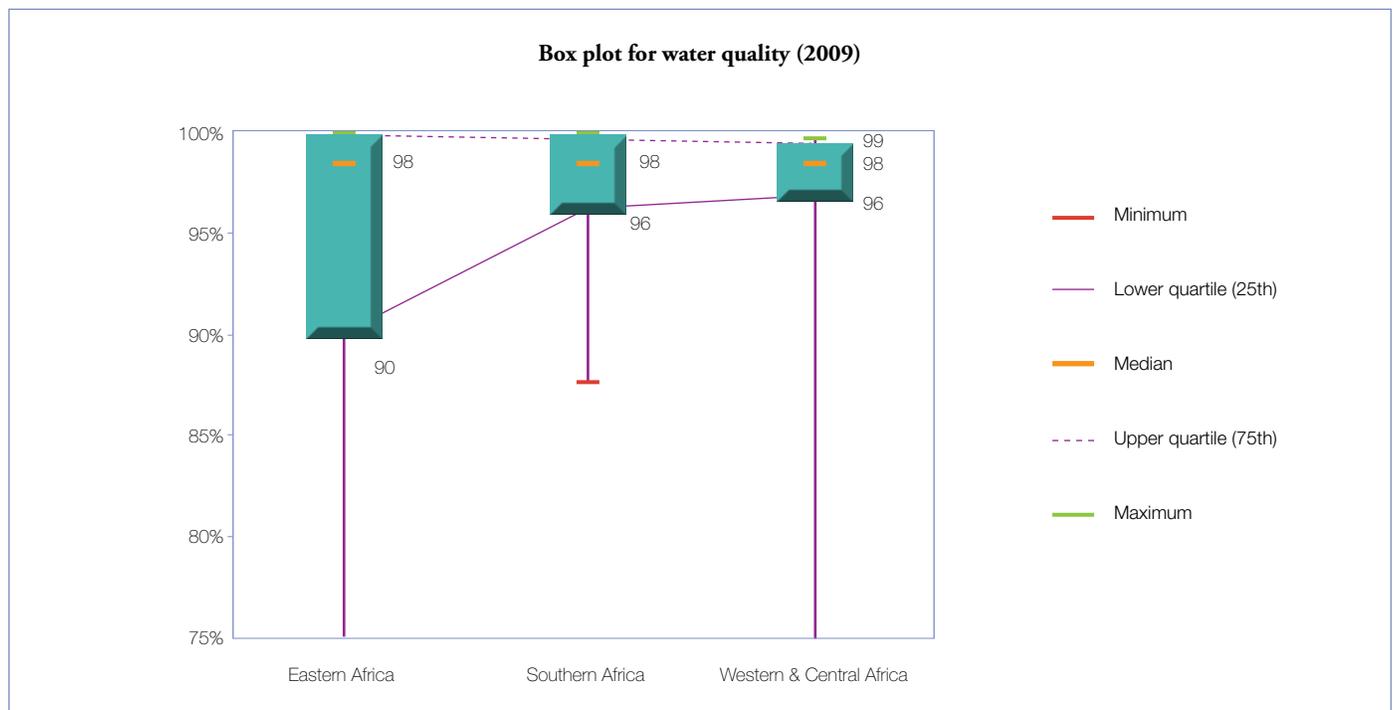
Table 26 shows the percent of water quality samples passing the residual chlorine test, weighted by volume of water produced. This is to reflect the large range of utility sizes.

3.3.6.1 Summary of Water Quality and Water Quality Monitoring for Eastern African Utilities

Water quality:

On average, only 5 percent of samples taken in the region in 2009 appear to have failed the basic residual chlorine test. However, 8 percent of samples have failed by volume. Although there has been an increase from 89 percent to 92 percent over the period, this is still poor performance. Although there has been a general

Figure 23: Summary of water quality tests for Sub-Saharan Africa (2009)



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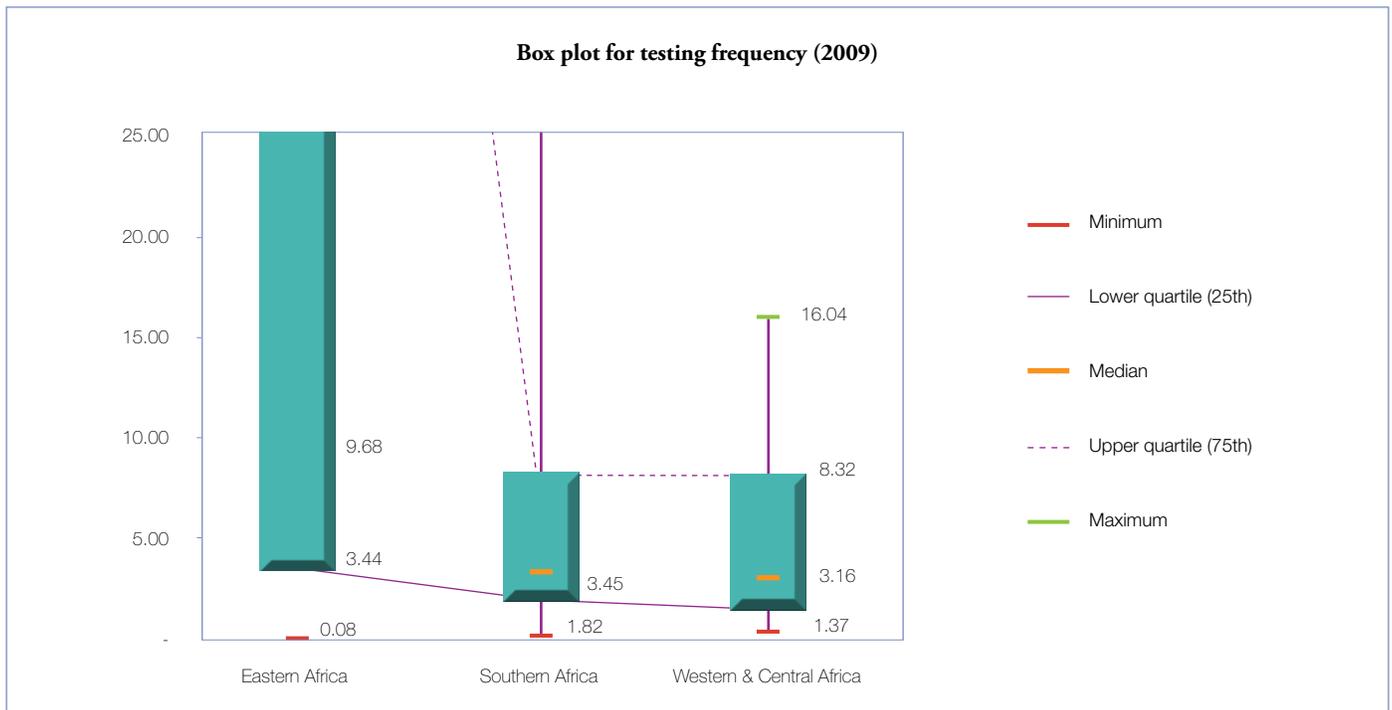


Table 26: Summary of water quality tests by subregion

Regions	Water quality tests passing chlorine tests (% by volume)	
	2006	2009
Eastern Africa	89%	92%
Southern Africa	96%	98%
Western and Central Africa	91%	93%
Nigeria only	94%	98%
Overall	92%	96%

increase in the percent of samples passing the test, Kilifi Mariakani has experienced a reduction from 100 percent in 2006 to 85 percent in 2009. The largest increase in performance appears to be in Eldoret where the percent

of samples passing the residual chlorine test increased from 46 percent to 94 percent.

The only utilities which report 100 percent in 2006 and 2009 are Dodoma, Iringa, Jimma Town, Kericho, Singida, and Songea. These utilities provide services to predominantly large towns.

Water quality data from the capital cities are patchy: no data were provided by Addis Ababa and Nairobi; Dar es Salaam reported an increase of 89 percent to 90 percent of samples passing the residual chlorine test from 2006 to 2009, and National Water in Uganda from 91 percent to 92 percent. When added to the other indicators of performance such as coverage and continuity of supply, this illustrates that significant operational improvements are required before even increasing coverage to unserved areas.

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Water quality monitoring:

There is a significant variation in the frequency of water quality sampling, which suggests that the drinking water quality standards are unclear or weakly enforced (or both).

The average is the lowest in Africa with one sample for every 2.27 m³ of water produced. However, the range of values is also the largest in Africa, from more or less streaming sampling in Nyeri with one sample taken every 0.44 m³, to 1,441 m³ in Arusha, and 807 m³ in Nakuru.

By contrast, Dar es Salaam, Eldoret, Kericho, and Kisumu take one sample for every 7.2 m³, 15.3 m³, 3.3 m³, and 0.1 m³ of drinking water produced.

3.3.6.2 Summary of Water Quality and Water Quality Monitoring for Southern African Utilities

Water quality:

There has been a significant improvement in the total number of samples passing the residual chlorine test in the region over the period, from 92 percent in 2006 to 98 percent in 2009. In addition, the percent of tests passing the residual chlorine test, weighted by volume of water produced, has increased from 96 percent to 98 percent.

The only utilities that reported 100 percent of samples passing the chlorine test in 2009 are Blantyre, Lilongwe, Lusaka, and Nkana.

The highest increase came from Johannesburg Water, from 93 percent to 98 percent; Nkana Water and Sewerage Company (Zambia), from 84 percent to 100 percent; and Western Water and Sewerage Company (also in Zambia), from 72 percent to 97 percent.

Two utilities in the region reported a reduction in performance from 2006 to 2009: Mulonga (Zambia), 100 percent to 95 percent; and Eastern Water and Sewerage Company (also Zambia), 93 percent to 88 percent.

Water quality monitoring:

The range of frequencies is the narrowest in Sub-Saharan Africa; however, eThekweni and Walvis Bay are outliers with only one sample for every 85 m³ and 60 m³ of water into supply, respectively. Some utilities, in particular the ones in South Africa, purchase water in bulk. Therefore, in such situations the bulk water supplier is responsible for all water quality analysis immediately downstream from the treatment works. It is understood that those utilities, therefore, focus their own water quality monitoring to areas of the network which are susceptible to water quality deterioration, such as long lead lines or dead ends. Water quality reporting in that case reflects the specific areas of the network in which water quality is likely to be poorer.

However, although the range is narrower the average is still high at one sample every 5 m³ of water produced, with Johannesburg showing 8, Cascal 7, and Lusaka 15.

3.3.6.3 Summary of Water Quality and Water Quality Monitoring for Western and Central African Utilities

Water quality:

There has been a slight reduction in water quality performance in the region—from 99 percent in 2006 to 97 percent in 2009 (figures for Nigerian utilities are excluded), although a number of large utilities have

not reported any figures (EdM, Bauchi, Ghana Water Company, Gombe, SPEN, SONEB, and so on). In addition, there has been a slight increase in the percent of tests passing by volume, from 91 percent to 93 percent.

Only SEG in Guinea has reported a significant drop, from 100 percent to about 65 percent.

There has been a significant improvement reported by the utilities in Nigeria, in particular Ebonyi, Imo, Kaduna, and Osun (to a lesser extent)—all reaching more than 90 percent of tests passed in 2009.

The lowest performance in 2009 is from Jigawa State Water Corporation and SEG in Guinea.

Water quality monitoring:

The range of water quality monitoring frequencies is much broader than in Eastern Africa (0.33 in SEEG up to more than 2,500 m³ in Ebonyi, Kaduna, and Oyo State Water Boards). This may discredit the good performance described above.

The average monitoring frequency for the francophone Western African utilities is one sample for every cubic meter of water produced. This is considered to be the benchmark. However, the average hides marked variations in sampling frequency: in 2009 SEEG took one sample every 0.3 m³ whilst SDE took one sample every 16 m³. In 2009 SEEG took 243,362 samples, ONEA 55,732, and SDE 8,701.

The average frequency in Nigeria is also high at one sample for 231 m³ of water produced, which is much lower than the regional average and much lower than the benchmark.

3.3.7 Staff Productivity

Staffing ratio (also referred to as staff productivity) is a recognized international KPI that is usually expressed as the number of staff per 1,000 connections. The international accepted benchmark for water utilities is less than 6 staff per 1,000 connections. However, this indicator is well suited for utilities whose customer base is connected exclusively to individual connections, not really to utilities in Sub-Saharan Africa whose customers also use shared connections and kiosks.

Key findings:

- Staff productivity has improved: The overall average for the Sub-Saharan Africa region has reduced from 6.1 to 5.5 from 2006 to 2009. The international benchmark for water utilities is about 6 per 1,000 connections.
- Despite the strong regional average there are large variations in staffing ratio both across countries and across regions:
 - The Eastern African region has the average highest ratio (meaning the least efficient): Despite the regional average increase of 6.7 to 7 staff per 1,000 connections the range is the largest in the Sub-Saharan region (with 117 and 324 staff per 1,000 connections in Dire Dawa and 324 in Welkite in 2009).
 - The Southern African region has experienced a slight increase as well from 3.4 to 3.8 staff per 1,000 connections from 2006 to 2009. The most efficient utilities are the ones in South

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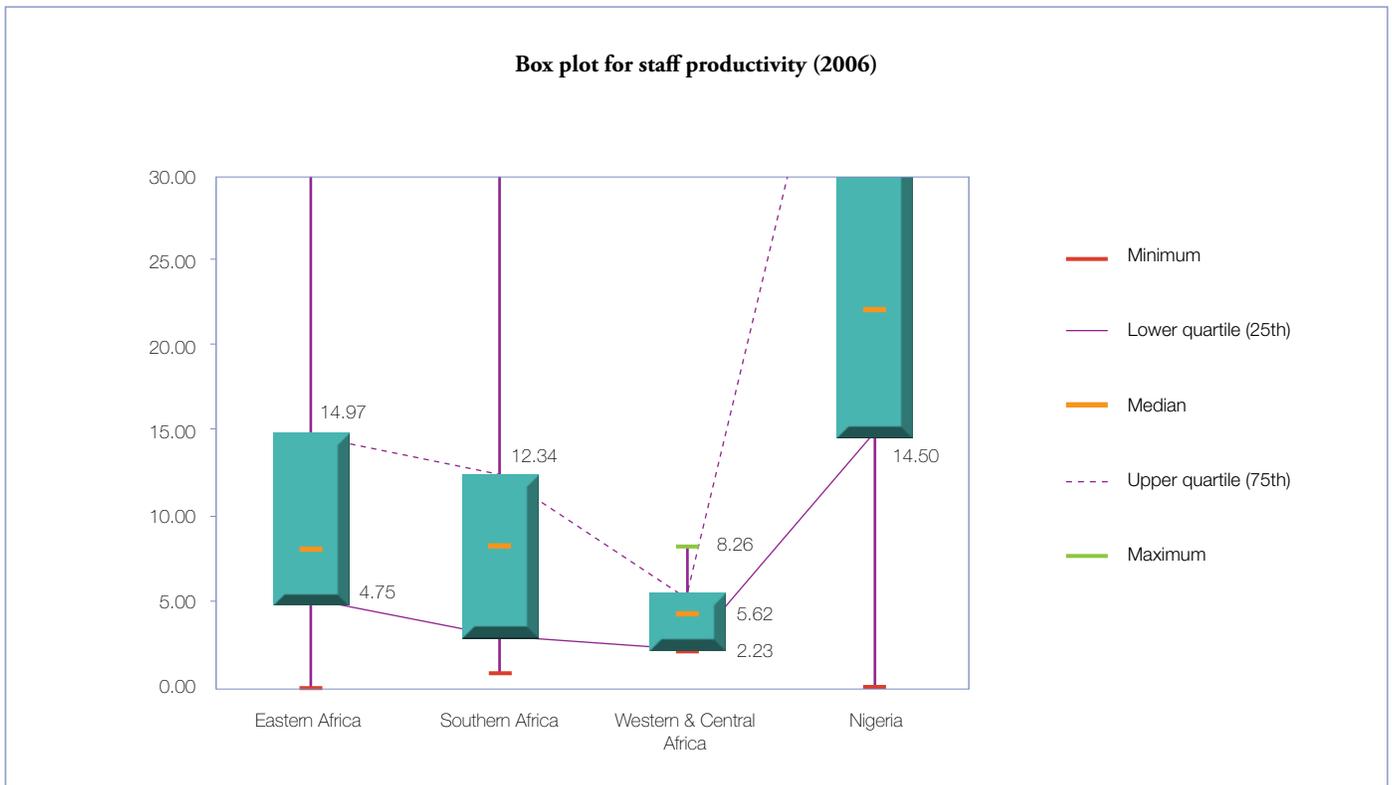
Africa (eThekweni: 2.0 to 2.9; Johannesburg: 0.9 to 0.9). The ratio is higher in Malawi (with more than 13 staff per 1,000 connections in Blantyre and Lilongwe) and Zambia.

- o The Western and Central African region (excluding Nigeria) has the lowest ratio, meaning that utilities there are the most efficient in terms of staff, with a reduction from 4.6 to 3.8 staff per 1,000 connections from 2006 to 2009.

- o Nigeria has also achieved a significant reduction from 13 to 10 staff per 1,000 connections from 2006 to 2009. However, where data are available, the variation in staff productivity is the largest (average).

Staff productivity for the Sub-Saharan Africa region is summarized in Figure 24.

Figure 24: Box plot of staff productivity for the Sub-Saharan Africa region (2006 and 2009)



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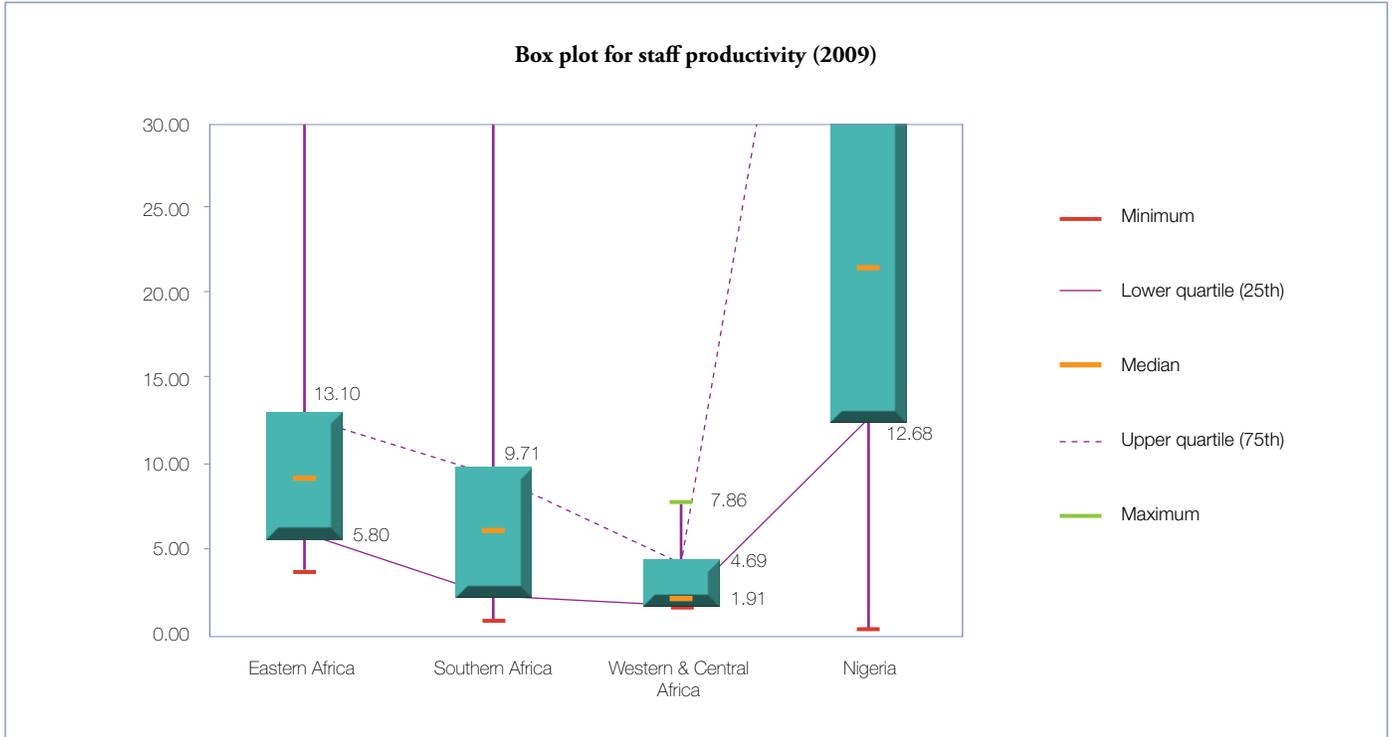
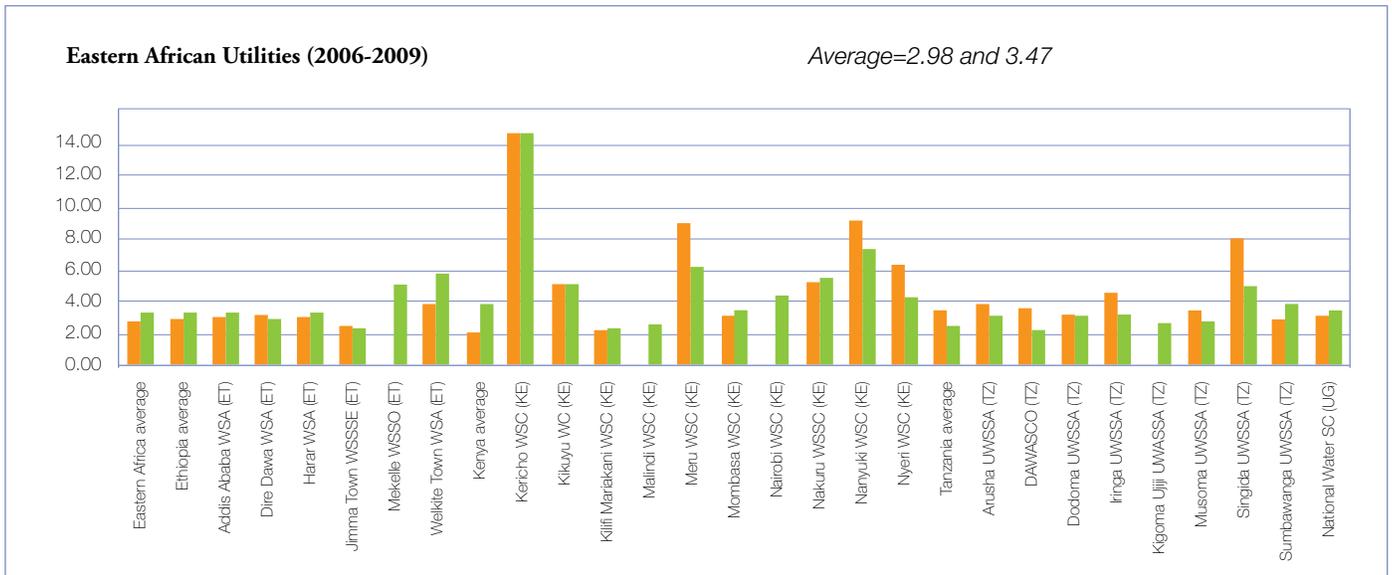


Figure 25: Staff productivity in the Eastern Africa region



3.3.7.1 Staff Productivity for Eastern African Utilities

The average has increased from just less than 3 to 3.5 staff per 5,000 population served, with a significant outlier being Kericho WSC (more than 25 and increasing). Meru, Nanyuki, Nyeri, and Singida all had ratios greater than 6 but have reduced over the period (Figure 25).

- Blantyre WB in Malawi.
- Swaziland WSC.
- Kafubu WSC in Zambia.
- Luapula WSC in Zambia.
- Mulonga WSC in Zambia.

3.3.7.2 Staff Productivity for Southern African Utilities

The average has also increased from about 3.8 to 4.3 over the period—with a general tendency to reduce staff numbers (despite the increasing average, due to unreported data for 2006). (Figure 26).

Utilities that still appear to have large staff productivity ratios include:

3.3.7.3 Staff Productivity for Western African Utilities

The average for the region is the smallest in Africa, with 1.9 in 2006 and 1.7 in 2009. It is the only one that has reduced over the period. The highest ratios are all reported by Nigeria's water utilities: Abia State, Ebonyi State, Gombe State, Kaduna State, Ondo State, Sokoto, Taraba, and Yobe (although the national average is close to 2). SEEG in Gabon also has one the highest ratios (Figure 27).

Figure 26: Staff productivity in the Southern African region

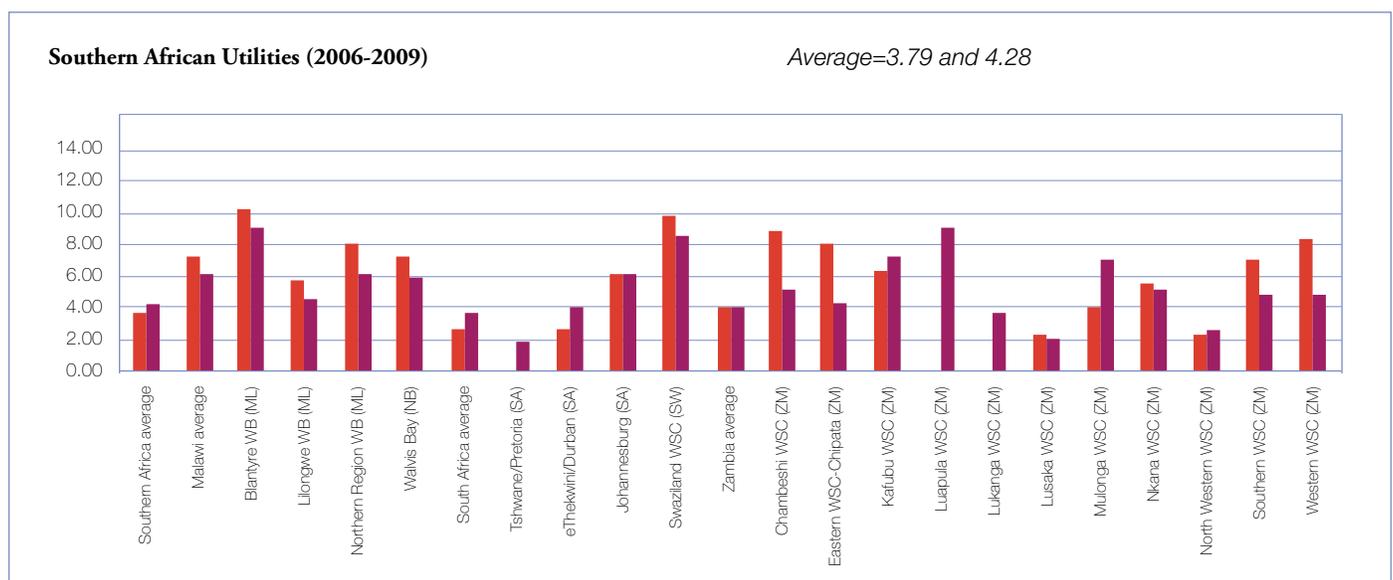
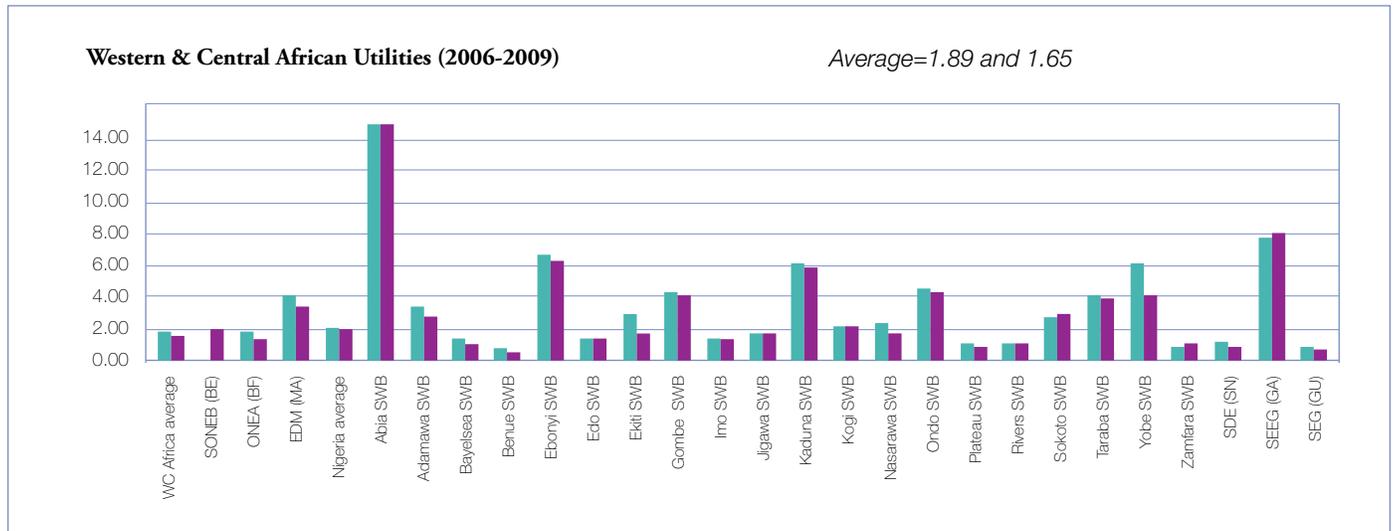


Figure 27: Staff productivity in the Western and Central African region



3.4 Financial Performance Indicators

3.4.1 Collection Efficiency and Collection Period

Collection efficiency is a key performance indicator that relates to the utility's ability to collect revenue from the bills it has issued to customers. Collection period is the time it takes to collect the average bill. Utilities that were not able to report both the value of water bills and the revenue collected have not been included in this assessment. This is particularly the case for the mostly small utilities in South Africa that are municipal water department, and whose revenue collected is often not dissociated (or ring-fenced) from the overall municipal revenue.

Key findings:

- Overall the figures look reasonable—but strong performance is driven by the sheer volume of bills and collected revenues in South Africa, where performance is excellent (see Table 28) and the very low volume of bills and collected revenues in Nigeria, where performance is generally poor (where there are available data). Table 27 shows that of the \$1.7 billion dollars collected from customers in 2009, 60 percent of that amount (\$1 billion) was collected in South Africa alone.¹⁴
- Generally there has been an improvement in collection efficiency and collection period for all subregions (see Table 28). There are, however, marked differences within each of the regions:

¹⁴ However, many of the smaller utilities in South Africa, which are municipal water departments whose budget is included in the overall municipal budget, were not able to report on collected revenue (separately from municipal revenue). They were not included in the study.

Table 27: Breakdown of amounts billed and revenues collected by region

Regions	Total bills issued (\$m)		Total revenues collected (\$m)	
	2006	2009	2006	2009
Eastern Africa	139	176	130	161
Southern Africa	995	1,027	982	1,019
of which South Africa	894	902	896	908
Western and Central Africa	338	530	324	501
Overall	1,473	1,734	1,435	1,680

Table 28: Summary of collection efficiency (%) and collection period (days)

Regions	Collection efficiency (%)		Collection period (days)	
	2006	2009	2006	2009
Eastern Africa	94%	91%	144	136
Southern Africa	99%	99%	260	199
Excluding South Africa	85%	89%	172	117
Western and Central Africa	96%	94%	102	73
Overall	97%	97%	213	154

o In Eastern Africa average collection efficiency has slightly reduced from 94 percent in 2006 to 91 percent in 2009, despite improvements in Addis Ababa: Nairobi Water has reduced from 100 percent in 2006 to 87 percent in 2009 (and constitutes approximately one-third of total revenue collection in the region).

o In Southern Africa average collection efficiency has remained stagnant at 99 percent. Of note, the four large South African utilities collect 100 percent (and sometimes more from one year

to the next) of bills issued. The performance of Zambian utilities varies significantly: Chambeshi from 65 percent to 83 percent; Kafubu from 76 percent to 84 percent, North Western from 104 percent to 121 percent (the highest in the region); and Nkana from 80 percent to 79 percent. There is considerable room for improvement in Zambia.

o In Western and Central Africa (excluding Nigeria), performance has also remained stagnant at 96 percent. All the utilities in the francophone region have collection efficiencies greater than

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90 percent and are mostly managed by private operators. The lowest performance is shown by SEG Guinea (from 87 percent to 72 percent) and Ghana Water Company (96 percent to 79 percent), although SPEN Niger has also seen a reduction from 97 percent in 2006 to 87 percent in 2009

- Nigerian utilities are unable to collect revenues effectively: collection efficiency (for those utilities that do collect revenue from customers) has reduced from 72 percent in 2006 to 46 percent in 2009, with chronic poor performance in Benue and Taraba States. In addition, some of the utilities do not have water tariffs and thus do not issue any bills to customers as they are paid through direct government transfers. The analysis of collection efficiency in Nigeria is therefore difficult.
- Utility managers in all regions have confirmed that nonpayment or late payment of bills by government institutions is significantly affecting their performance. For instance, whilst KIWASCO in Kenya has managed to achieve a collection efficiency of 100 percent, it is still dogged by a collection period of 500 days, which is due to government nonpayment. This is characteristic of many utilities in the Sub-Saharan region.
- Utilities in francophone West Africa that are managed by a private sector operator mostly report zero days for collection period¹⁵ as they have no accounts receivable. This is due to the fact that there is political willingness to keep these accounts receivable as low as possible, and usual clauses in the PSP contracts towards the financial equilibrium of the contracts:

operators and public agencies therefore agree on the payment of existing and reimbursement of past debt.

- The three WOP workshops showed that collection of water bills from public agencies is still a pervasive problem and one where WOPs could help once the political will is present.

A box plot summary of collection efficiency is shown in Figure 28.

3.4.1.1 Collection Efficiency and Collection Period for Eastern Africa Utilities

Generally, there has been an improvement in both collection efficiency and collection period in the region. However, some utilities, as shown in Figure 29, are still unable to collect their bills on time.

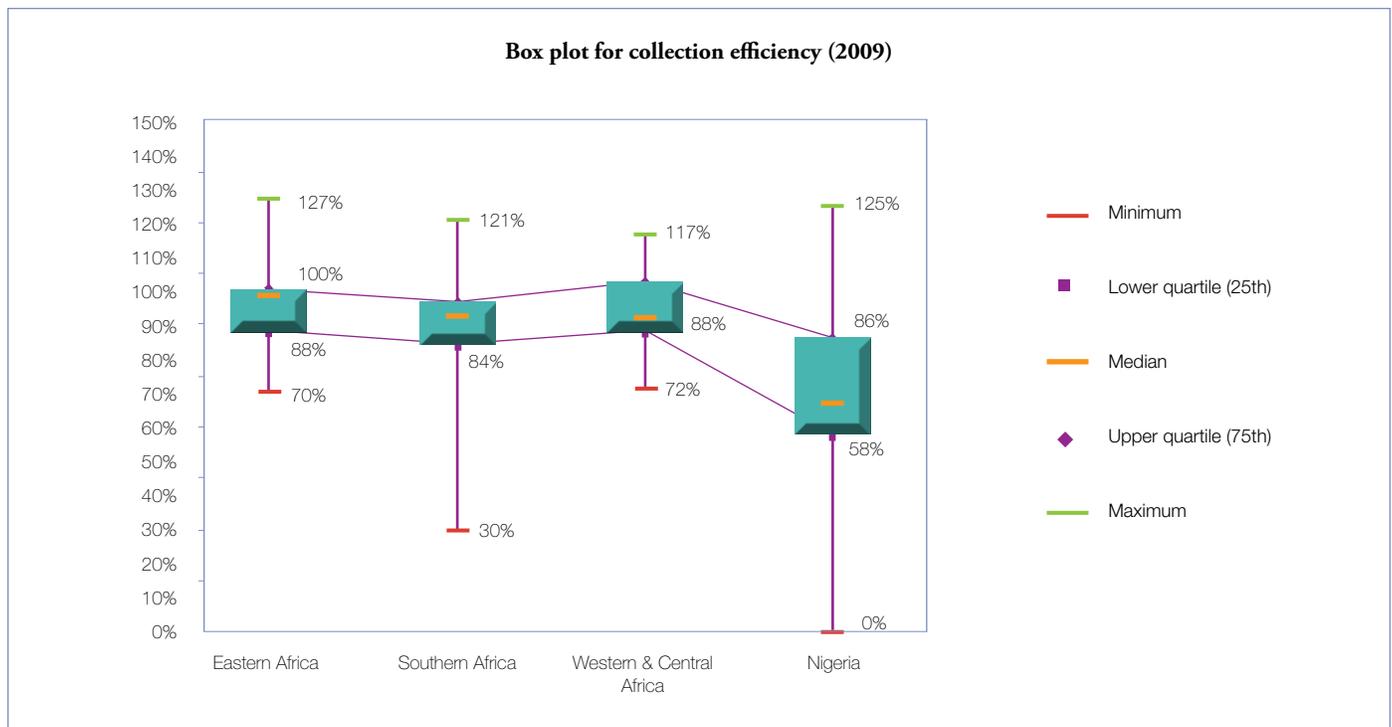
The utilities with the best (that is, shortest) collection periods are those in Ethiopia: these also have excellent billing collection efficiency (in excess of 100 percent, thus catching up on previous years' arrears).

Billing collection efficiency has improved for most of the utilities in the region, except for Kericho and Nairobi Water.

KIWASCO has achieved a collection efficiency of 100 percent: however, the collection period is still one of the longest in the whole of Africa at 500 days (which is about 15 months). This causes significant impact on KIWASCO's financial sustainability.

¹⁵ The only utilities in Western and Central that report collection periods greater than one day are Ghana Water Company (372 days in 2009) and SONEB in Benin (199 days).

Figure 28: Box plot summary of collection efficiency in Sub-Saharan Africa (2009)



Musoma UWSSA and Iringa UWSSA in Tanzania have both managed to significantly reduce their collection periods: 50 percent reduction for the former and down to next to zero for the latter.

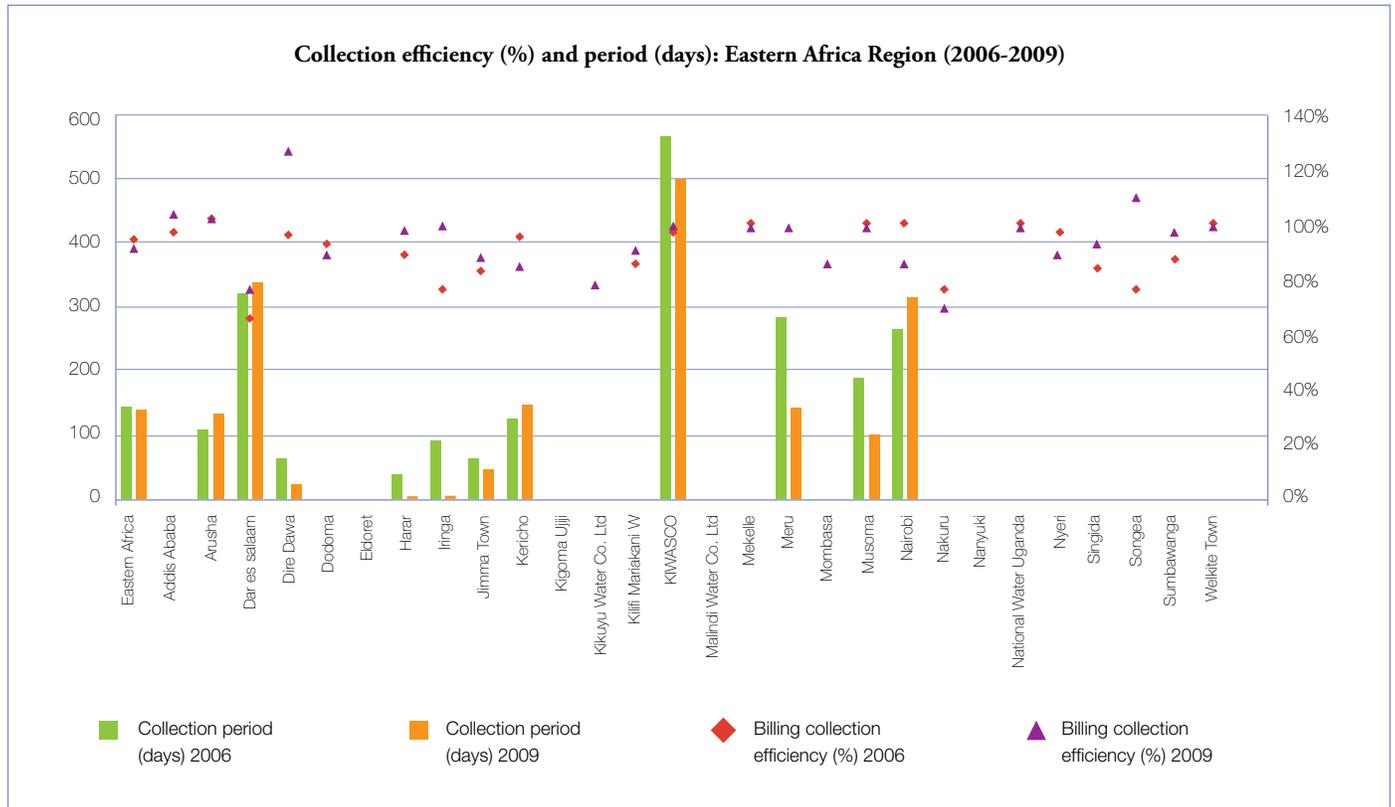
However, DAWASCO is still affected by long collection periods (in excess of 300 days) and the lowest collection efficiency in the region (despite an improvement of 66 percent in 2009 to 77 percent in 2009).

The other capital cities have also experienced increasing collection periods—suggesting that government is still failing to pay its bills on time.

3.4.1.2 Collection Efficiency and Collection Period for Southern African Utilities

Most utilities in the region have been able to reduce collection periods—except for Lusaka which reports an increase of 20 days. Despite this improvement some of the utilities are still showing collection periods in excess of 300 days: Johannesburg (South Africa), Chambeshi WSC and Nkana WSC Zambia. In fact, whilst the South African utilities have the best collection efficiency ratios (weighted by amount bill and collected) they also have the worst collection periods (in particular, Johannesburg with 336).

Figure 29: Collection efficiency and collection period for Eastern Africa utilities



The most efficient utilities in 2009 are eThekweni Water Services (Durban), Lusaka Water, North Western WSC, Southern WSSC, and Swaziland Water Corporation: these report both more than 100 percent collection efficiency and some of the shortest collection periods (with Southern WSSC and Swaziland Water Corporation achieving 40- and 60-day collection periods, respectively). See Figure 30.

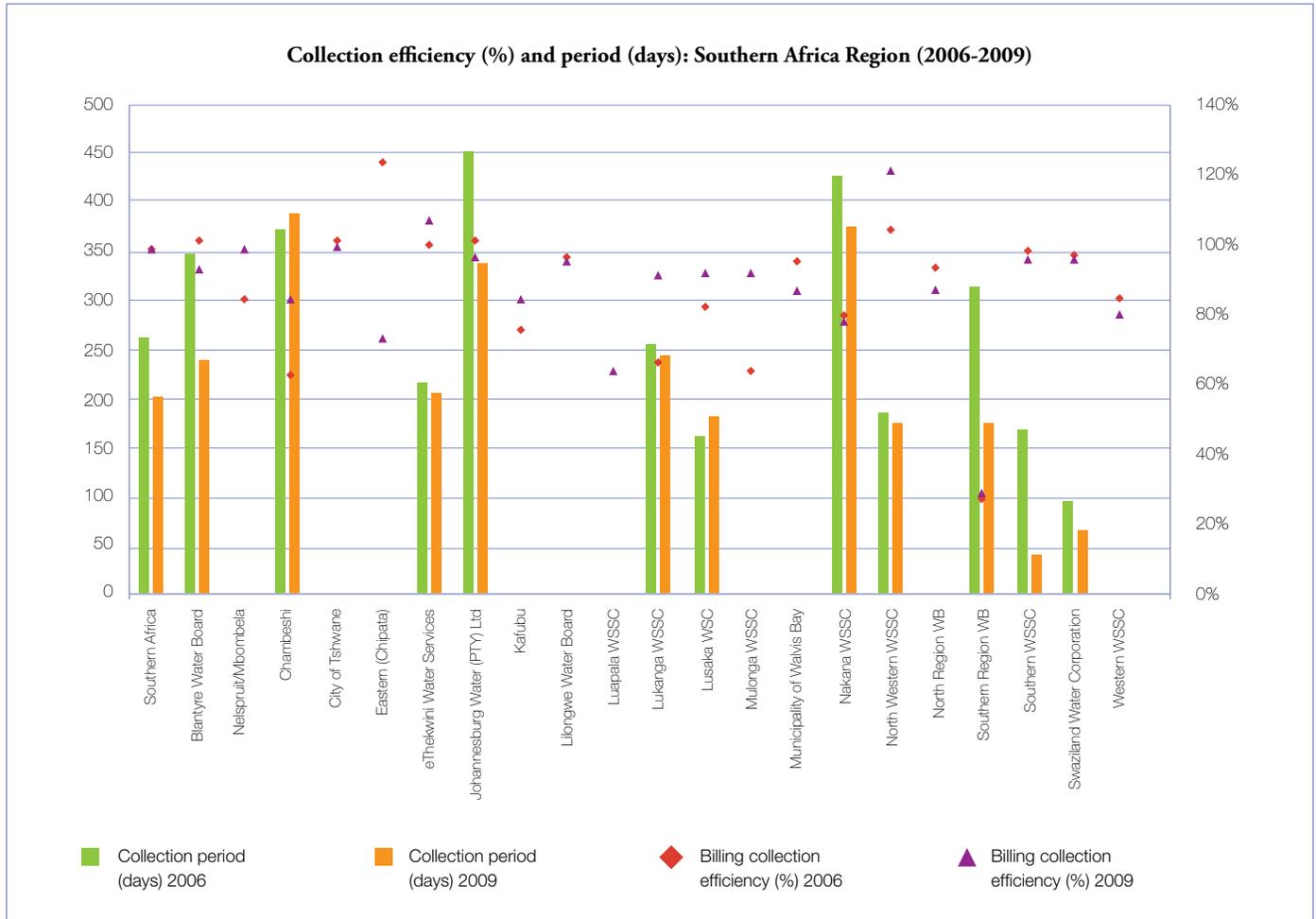
3.4.1.3 Collection Efficiency and Collection Period for Western and Central African Utilities

All utilities in the region are large: either regional (in the case of Nigeria) or national (in the other Western

and Central African countries). Collection efficiency is generally strong, with reported figures consistently greater than 90 percent—but only ONEA (Burkina Faso) manages to recover more than 100 percent in a short collection period. SDE also has a very short collection period, but a collection efficiency of approximately 95 percent. See Figure 31.

Only three utilities in Nigeria have reported data which can be used to assess billing collection efficiency and collection period: Abia, Kaduna, and Kogi State Water Boards. This shows low collection efficiency (88 percent, 60 percent and 83 percent, respectively) and high collection period (generally increasing too).

Figure 30: Collection efficiency and collection period for Southern African utilities



The strongest utilities in terms of billing collection efficiency are ONEA (Burkina Faso) and SEEG (Gabon), although a significant amount of arrears was collected in 2006 by Adamawa State Water Board, prompting a collection ratio of 271 percent (which is not illustrated on this graph). Osun State Water Board also reports collection periods in excess of 1,500 days in 2009.

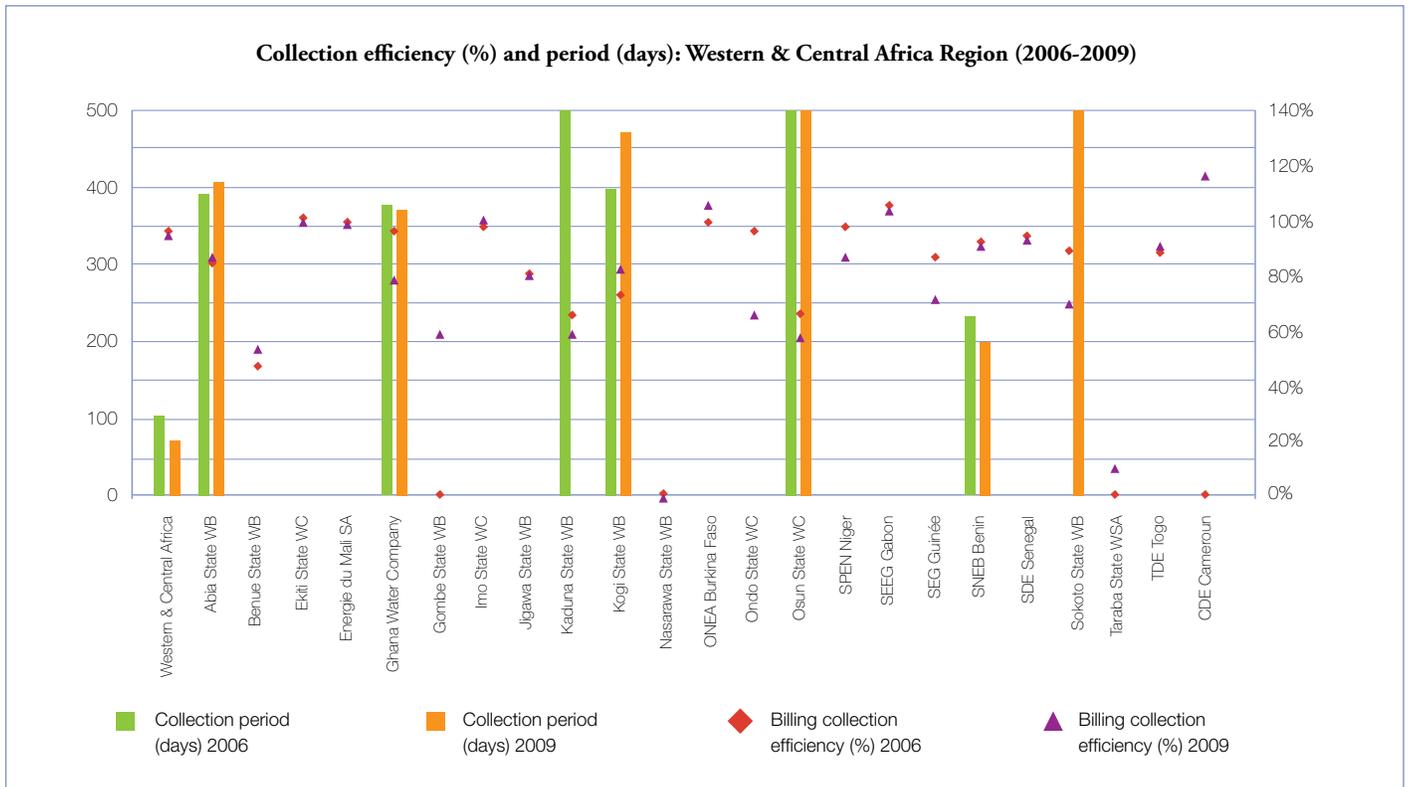
The performance of SEG in Guinea has decreased: collection efficiency has reduced by about 15 percent to 70 percent and collection period increased from 60

to 120 days. It is the same with Ghana Water Company: collection efficiency reduction of 20 percent to less than 80 percent and a stagnant collection period at about one year.

3.4.1.4 The “Overall Efficiency Indicator”

A useful indicator was developed and used at WOP1 stage. This measures the volume of water produced for which a utility is able to recover revenue was termed the “overall efficiency indicator” (OEI).

Figure 31: Collection efficiency and collection period for Western and Central African utilities



It is calculated as: $[(1-NRW) \times \text{collection efficiency}]$ and is expressed in percent.

For example: an efficient utility might be considered as having 20 percent NRW and 100 percent collection efficiency; that would generate an OEI of $(1-20\%) \times 100\% = 80\%$. The upper limit of OEIs is, therefore, about 80 percent. This is different from the cost recovery indicator discussed later in Section 3.4.2, in that it does not look at the ratio of revenues over costs, but only if revenue is collected for a given amount of water sold.

This indicator appears to be useful as it is intuitive. However, it does not, according to a number of utility managers during the WOP workshops, provide an

overall assessment of the technical, financial, and commercial challenges that utilities face. For instance, it does not represent the degree of cost recovery, the length and condition of the network or affordability of water bills.

Box 6: What are the likely impacts of low OEIs?

- High average cost per m³ of water sold.
- Either an increase in tariffs (to cover the above) or increased subsidies or both.
- Inability to sustain and/or extend services to the poor.

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Table 29 illustrates a traffic light system developed to assess and benchmark utility performance using the OEI.

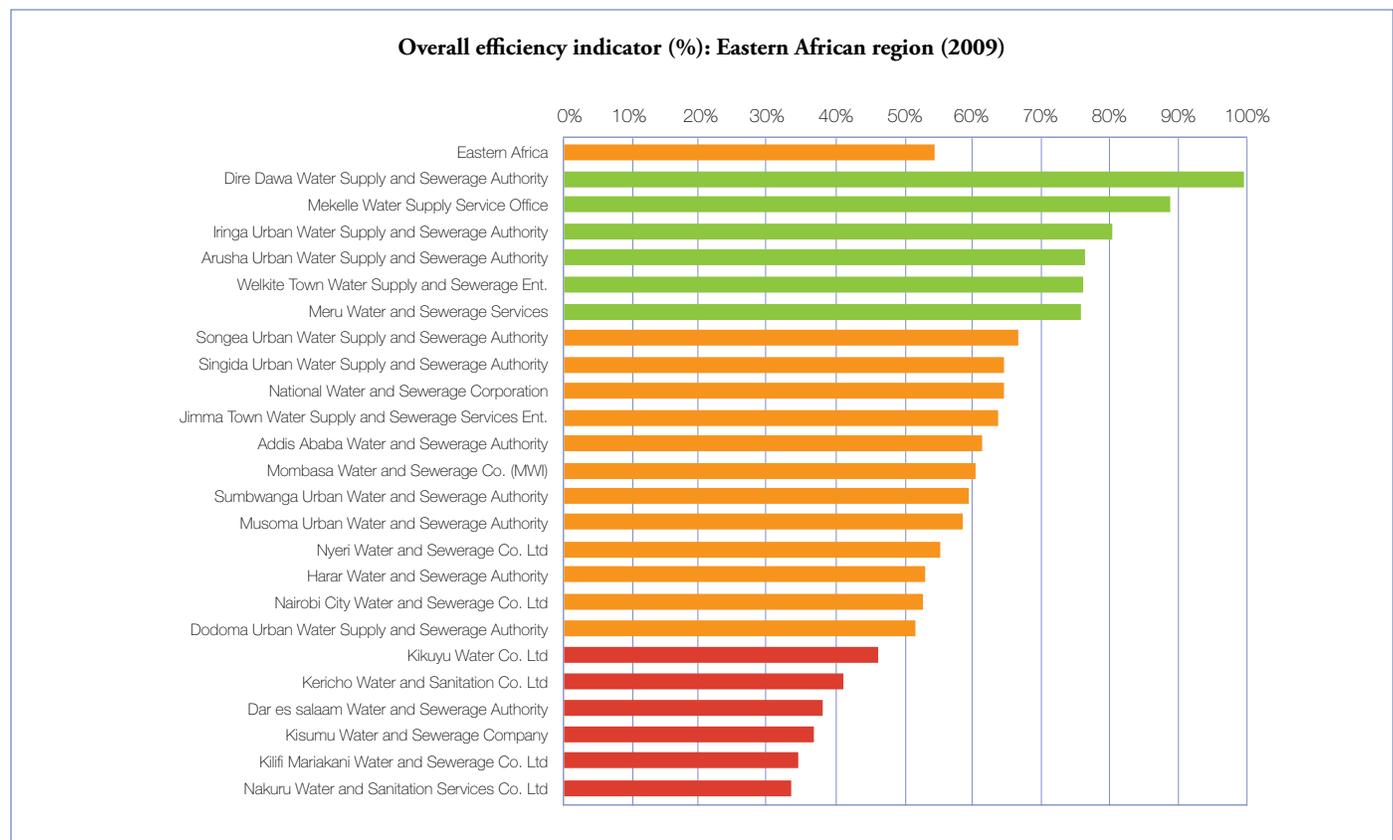
The three graphs below illustrate that only a very few of the utilities that responded are, in this case, efficient

or approaching 80 percent (See Figures 32, 33, 34, and 35). A box plot summary of the overall efficiency indicator in Sub-Saharan Africa is shown in Figure 36.

Table 29: Traffic light system for the Overall Efficiency Indicator

Benchmark	NRW	Collection efficiency	OEI	Benchmarking range
Good	20%	90%	72%	Greater than or equal to 70%
Acceptable	30%	85%	60%	Between 50% and 70%
Poor	40%	80%	48%	Less than 50%

Figure 32: Summary of overall efficiency in Eastern Africa (2009)



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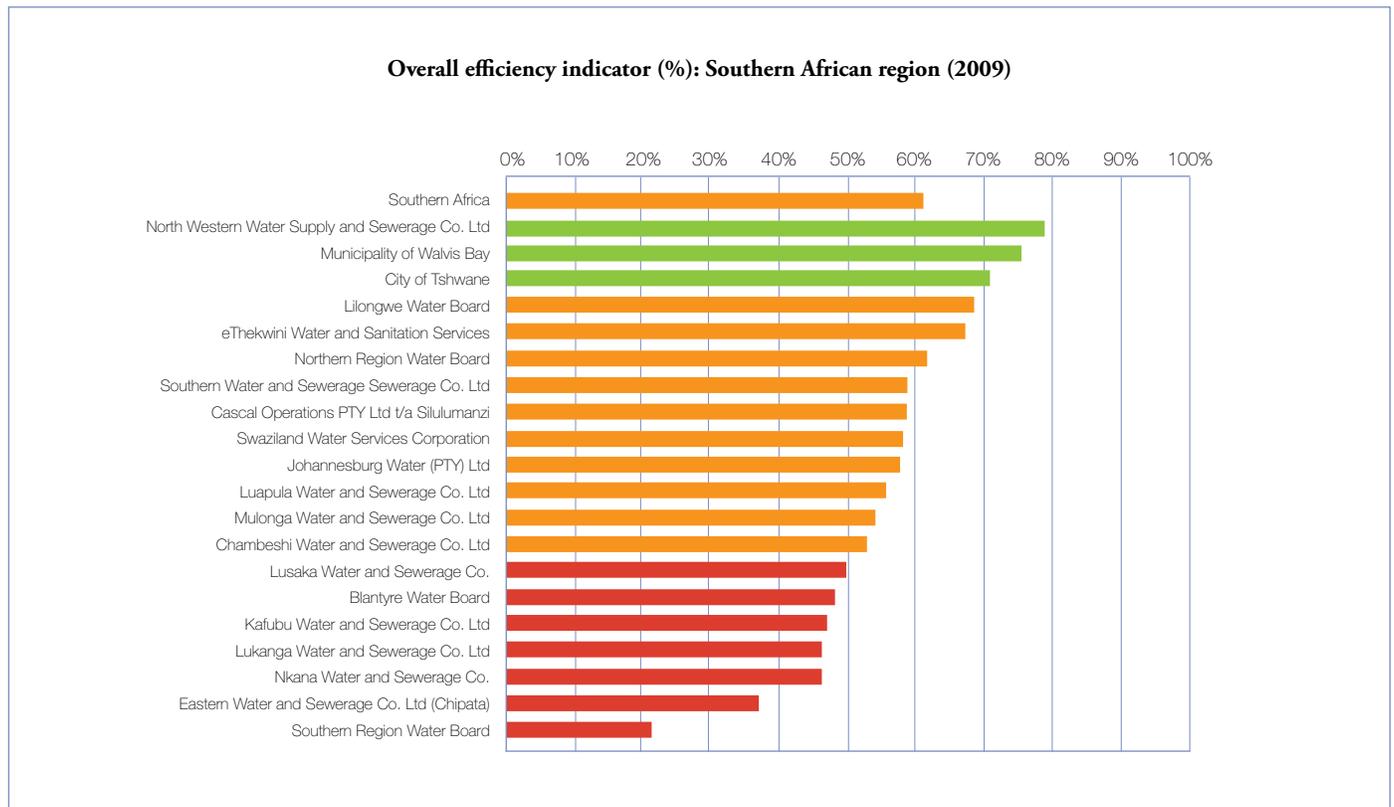
The special case (OEI greater than 80 percent) for Dire Dawa and Mekelle (both in Ethiopia) in 2009 is explained as follows:

- Dire Dawa had a very high collection efficiency (127 percent) and a low level of losses (22 percent).

- Mekelle had a high collection efficiency (100 percent) and a very low level of losses (11 percent).

Hence, their level of OEIs were correspondingly higher than 80 percent.

Figure 33: Summary of overall efficiency in Southern Africa (2009)



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Figure 34: Summary of overall efficiency in Western and Central Africa (2009)

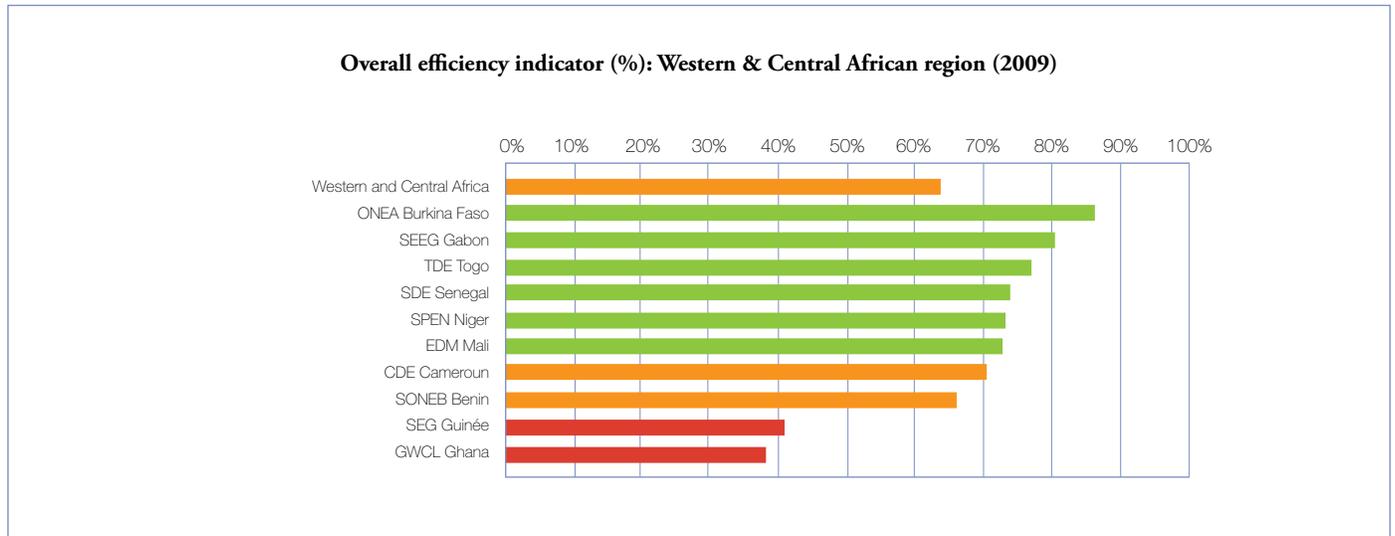
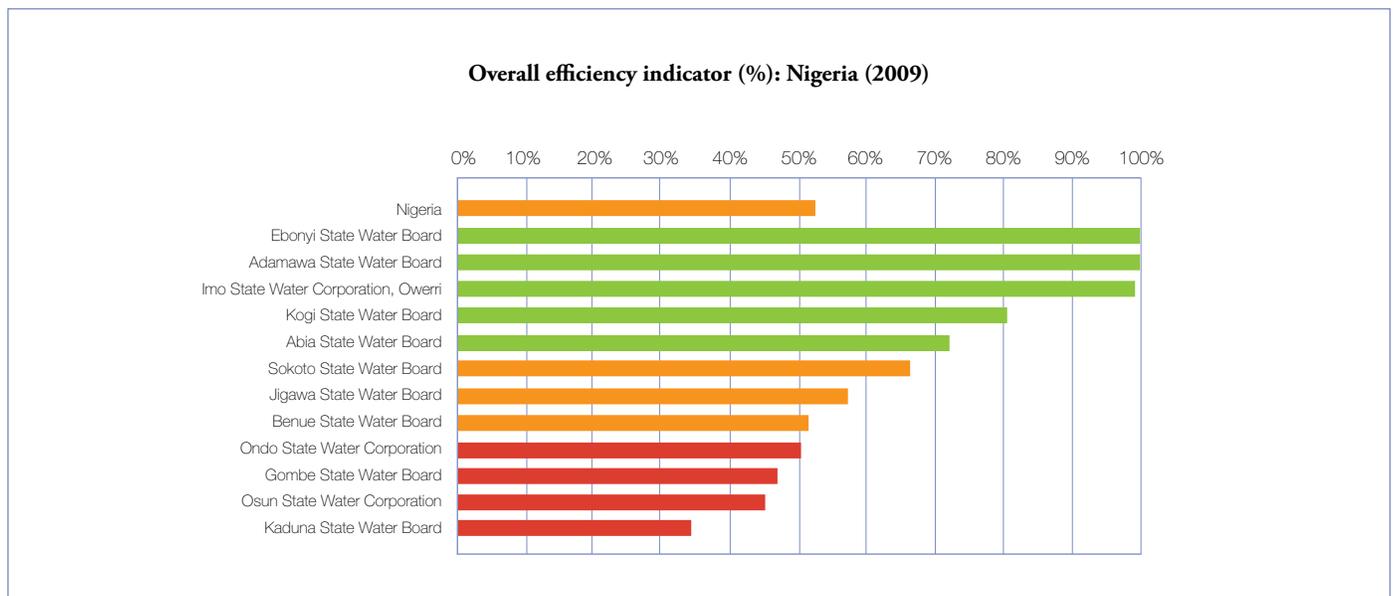
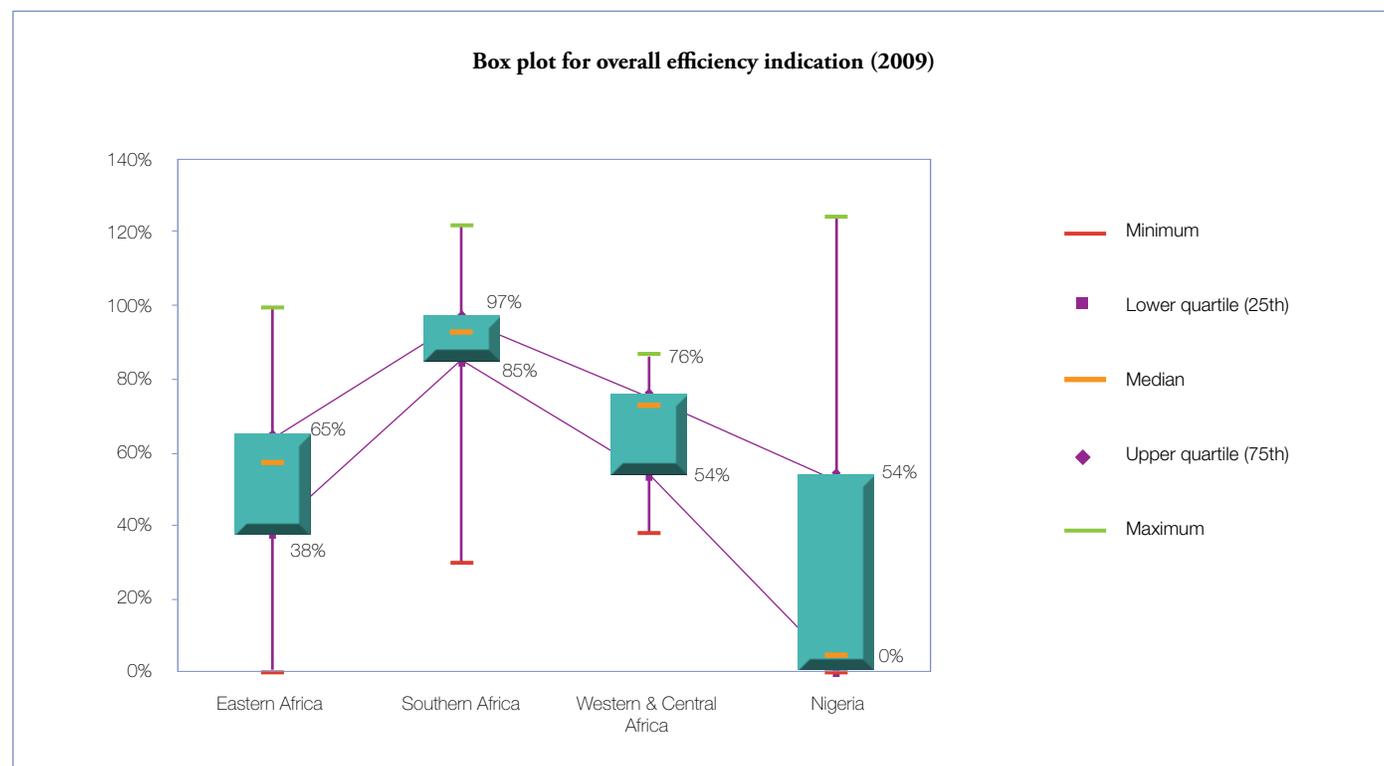


Figure 35: Summary of overall efficiency in Nigeria (2009)



Many of the Nigerian utilities have not been able to report NRW (percent) and collection efficiency (percent) so they have not been included in these figures.

Figure 36: Box plot summary of the Overall Efficiency Indicator in Sub-Saharan Africa (2009)



3.4.2 Operating Cost Coverage Ratio (OCCR)

The assessment of the ability of a utility to recover operating costs from customers' bills is a major aspect of utility performance assessment, and a key performance indicator. The internationally accepted norm is that operating cost coverage ratios (OCCRs) should be in the range of 130 percent to 160 percent, with an allowance for asset rehabilitation and replacement, as well as debt payment. This excludes capital investment in expansion, additional water production, and so on.

The responsibility for capital investment is usually the responsibility of government. However, in some cases,

in particular in francophone Western and Central Africa in which national utilities have leases or concession contracts with the central government, responsibility for capital investment rests at least in part with the operator. In these circumstances the operators are responsible for significant rehabilitation (and some extensions) and thus ensure that these costs are recovered (in part) through customer tariffs. Therefore, in these francophone West African countries the OCCRs are much higher (in the 200 percent to 230 percent range) than in other regions where operators are not responsible for investing in rehabilitation and expansion. However, a significant proportion of that revenue collected by the private operator is handed back to the asset owner (that is, government) as a lease fee.

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This analysis is based on information that was submitted by the utility managers themselves. No independent assessment has, therefore, been made of the adequacy of the level of expenditure on O&M, or whether assets were being managed and operated appropriately. Therefore, no analysis of the breakdown of O&M expenditure has been undertaken.

Key findings:

- Generally, OCCR performance has improved over the period—from 100 percent to 103 percent, although this is still well below the international benchmark of 130 percent to 160 percent. The data also show a wide variation in the calculated levels of OCCR, both across subregions and within countries.
- This Section of the utility self-assessment questionnaire has been the most difficult to complete completely and consistently, as a large number of utilities were not able to report billed amounts, collected revenues, AND operational costs. This is particularly the case in South Africa—where the majority of small to medium sized service providers are municipal departments whose water and sanitation budgets are included in the overall municipal budget, making retrieving such data difficult.
- It is assumed that utilities that are not able to report billing, revenue collection, and OPEX costs consistently are likely to be unable to manage their assets well as they do not have comprehensive management information systems.
- Utilities that have significantly increased coverage through dedicated social connection funds that are exclusively financed through tariff surcharges and

that subsidize 100 percent of the cost of connection (for example, Senegal,¹⁶ Burkina Faso, and Gabon) have the highest OCCRs. This is also true of Uganda although the level of OCCR is within 130–160 percent but customers are still expected to pay a connection fee.

Countries	OCCR	
	2006	2009
Eastern Africa	116%	103%
Ethiopia	140%	98%
Kenya	117%	92%
Tanzania	81%	86%
Uganda	131%	134%
Southern Africa	94%	89%
Malawi	62%	74%
Namibia	97%	102%
South Africa	98%	89%
Swaziland	91%	102%
Zambia	53%	85%
Western and Central Africa	118%	152%
Benin	128%	179%
Burkina Faso	207%	218%
Gabon	312%	263%
Ghana	86%	91%
Guinea	40%	69%
Mali	187%	195%
Niger	113%	106%
Nigeria	19%	15%
CAR	109%	100%
Senegal	214%	208%
Togo	38%	41%
Grand Total	100%	103%

¹⁶ In Senegal, all new connections under the social connection fund are funded by SONES, the asset owner.

Figure 37: OCCR summary by country and subregion

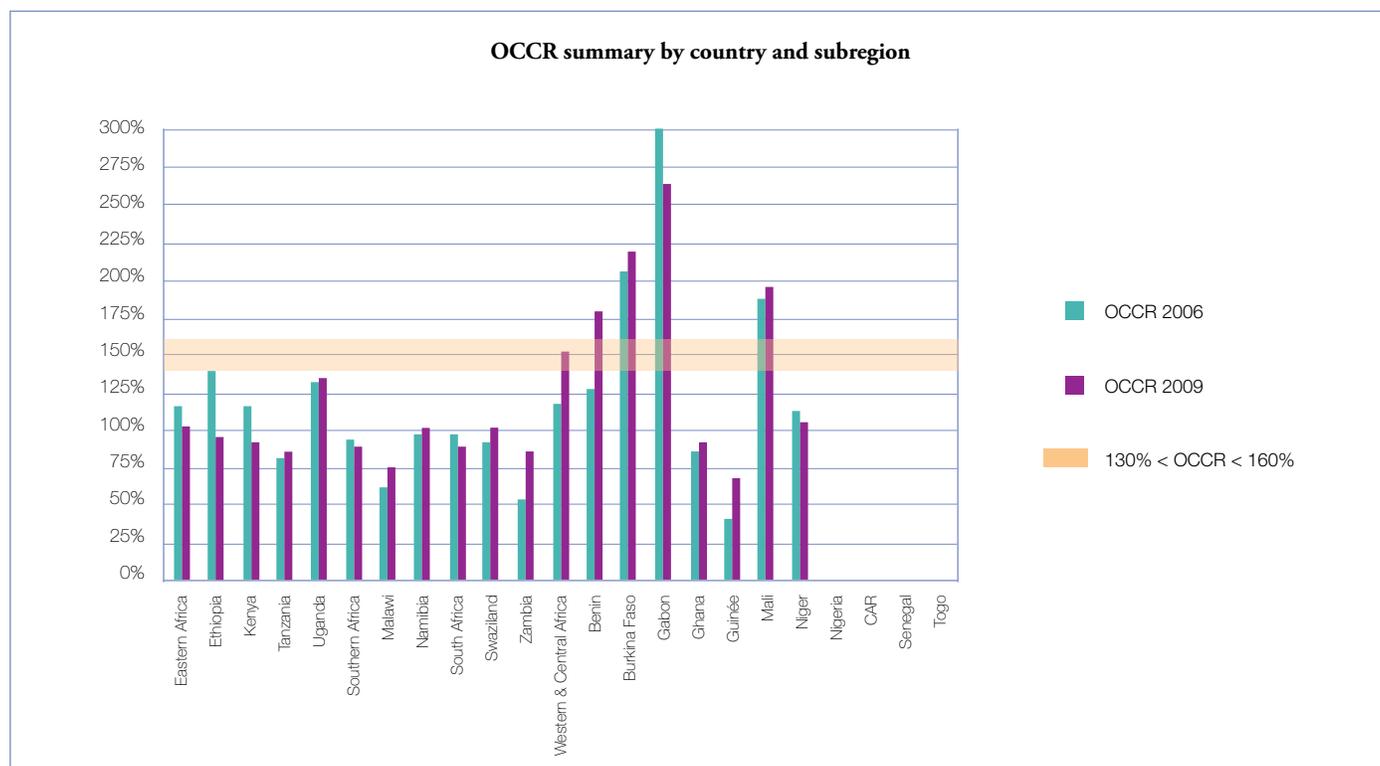


Figure 38 shows a box plot summary of OCCR in the Sub-Saharan Africa region.

3.4.2.1 OCCRs for Eastern African Utilities

OCCRs in the Eastern African region (where data are available) generally hover around the 100 percent mark, meaning that utilities are barely able to recover O&M costs from tariffs. In 2009 only Jimma Town, Kericho, Nyeri, and National Water of Uganda recovered between 130 percent and 160 percent of operating costs. In general, the Kenyan and Tanzanian urban water sectors recover less than 100 percent—with the Ethiopian

urban water sector just on 100 percent. This means that utilities are not replacing their assets in a timely manner and/or are neglecting maintenance. They are depleting the value of their assets and accumulating a backlog of maintenance and renewal expenditure.

Many utilities fall short of the shaded area, meaning that they are in theory dependent on government subsidies, but in reality they are ‘eating into’ their assets—whereas they could be raising enough revenue from their tariffs. **The lowest OCCRs are found in: Dar es Salaam, Harar, Nairobi, Musoma, and Singida; as well as KIWASCO, Kikuyu, Meru, Songea, and Sumbawanga.**

Figure 38: Box plot summary of OCCR in the Sub-Saharan Africa region (2009)

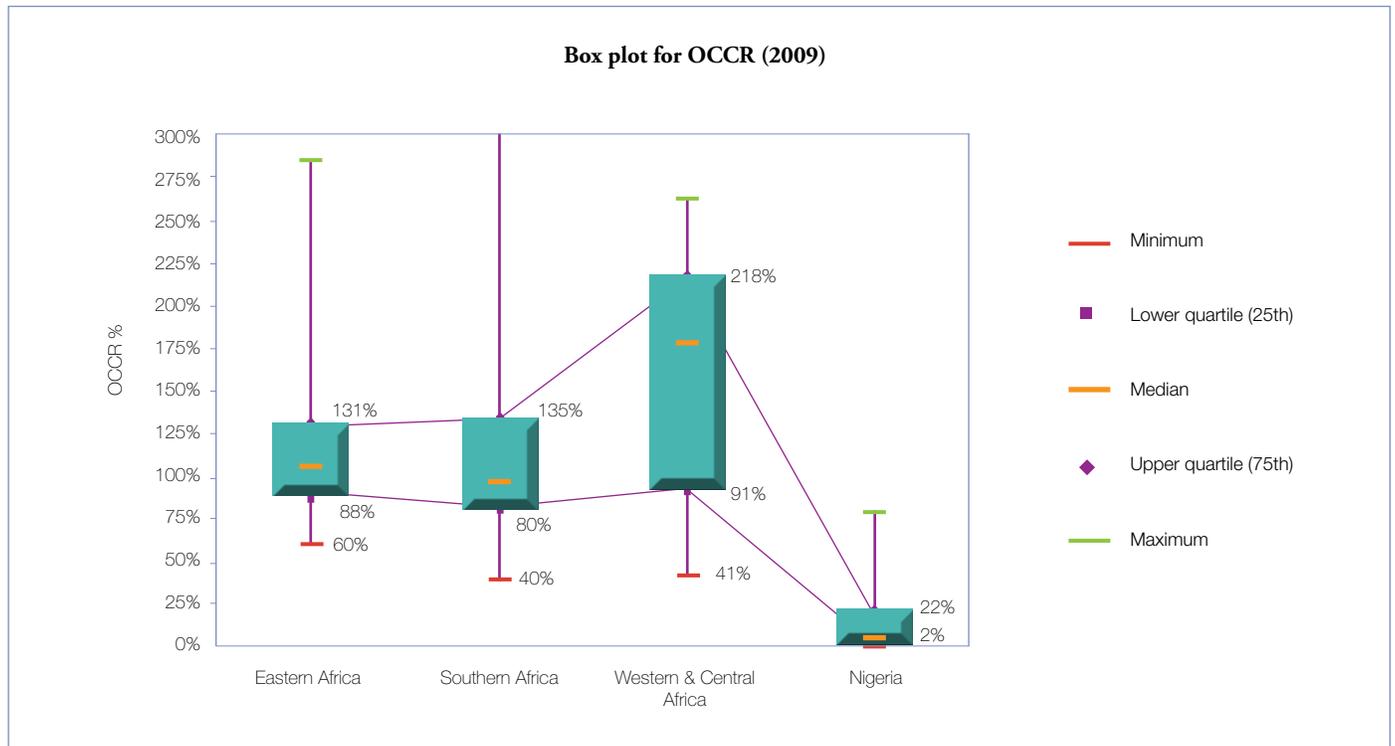
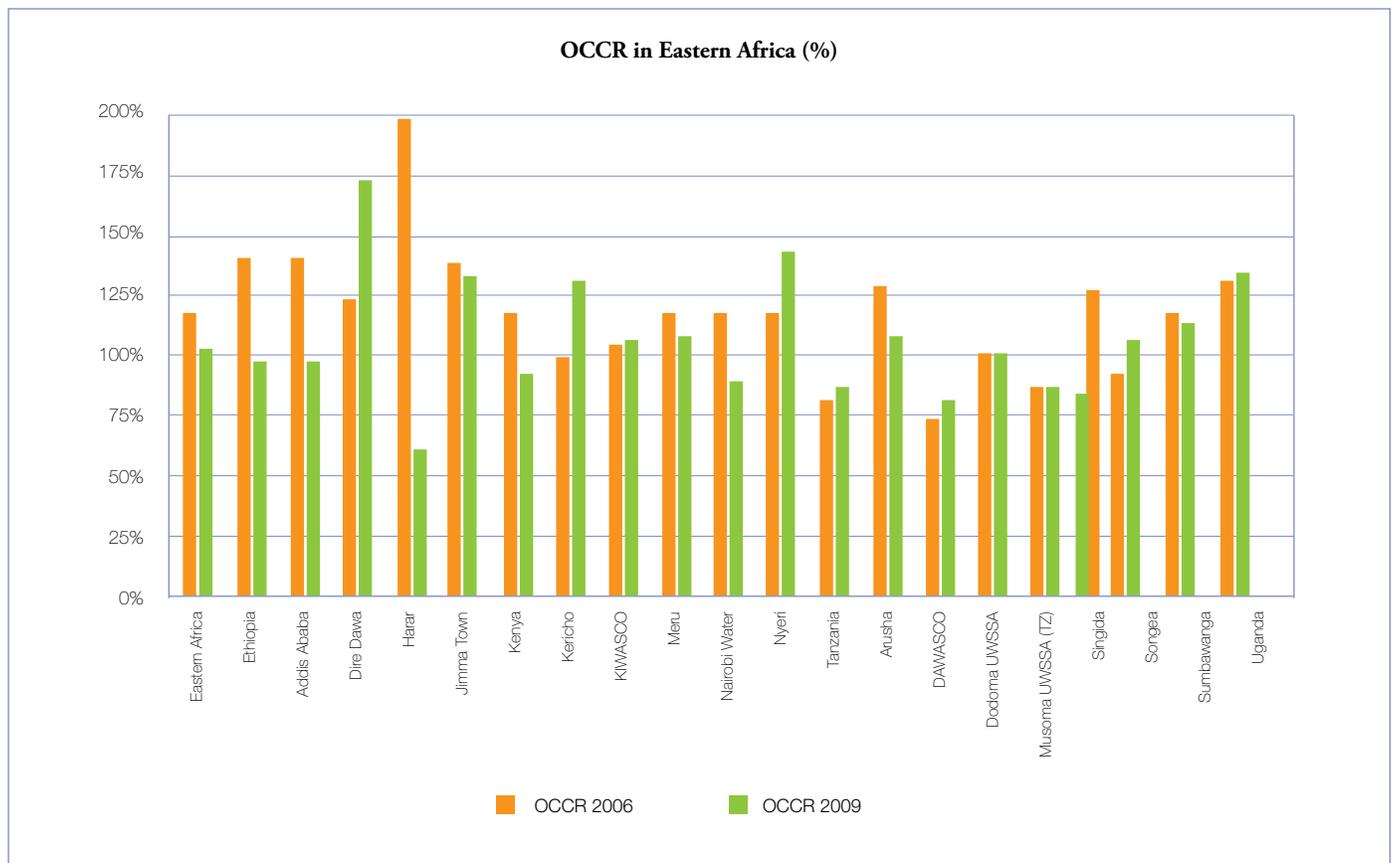


Figure 39: OCCRs for Eastern African utilities



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3.4.2.2 OCCRs for Southern African Utilities

The OCCRs calculated for Southern African utilities (when sufficient data were available) show that there has been only a marginal decrease in these ratios, although Mbombela (South Africa), Lukanga Water and Sewerage Company, and Southern Water Service Board in Zambia are in the high 200 percent (despite the small reduction for SWSB).

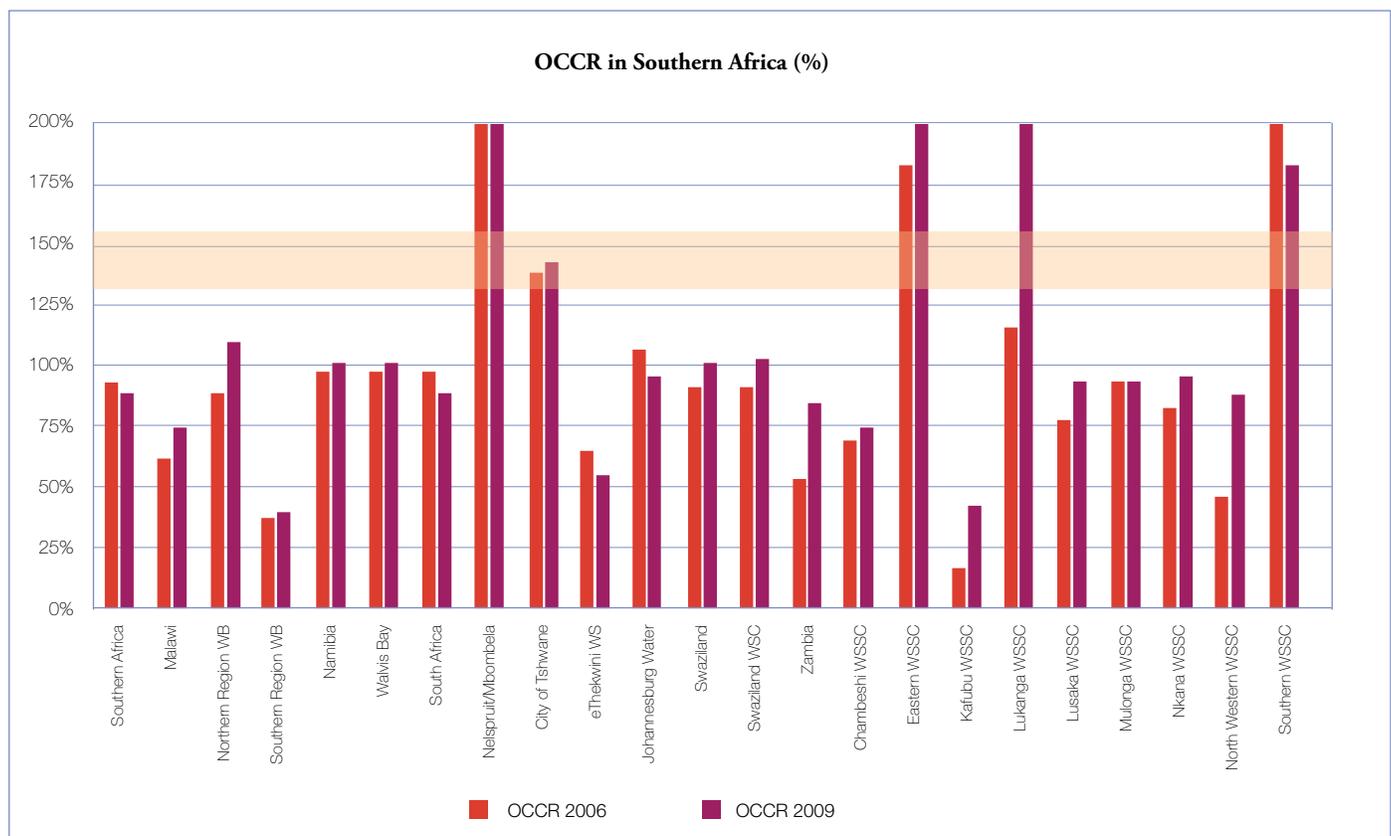
Only the City of Tshwane has an OCCR which falls within the good practice range of 130–160 percent. All the others are either significantly above or below.

All the others, including Johannesburg, eThekweni, and Lusaka and Lilongwe fall short of the 130 percent

limit, suggesting that these utilities continue to rely on government/municipal subsidies, at least for asset rehabilitation, replacement, and debt payments.

None of the Zambian utilities fall within the 130 percent–160 percent range. In fact, they are either less than 100 percent altogether or significantly higher than 160 percent (for example, Chambeshi WSSC at less than 75, Kafubu WSSC at less than 50 percent and Eastern, Southern and Lukanga WSSC at more than 180 percent). The overall performance in Zambia is still poor at approximately 80 percent average. This highlights poor quality data, significant disparities in revenue collection discipline and/or poor control of utility performance by the regulator.

Figure 40: OCCRs for Southern African utilities



The utilities that seem to be performing poorly (that is, OCCRs significantly less than 100 percent) include:

- Southern Region Water Board with less than 50 percent.
- Chambeshi Water and Sewerage Company Zambia with 75 percent.
- Kafubu Water and Sewerage Company Zambia with less than 5 percent.
- Luapula Water and Sewerage Company Zambia with 75 percent.
- Western Water and Sewerage Company Zambia also with less than 75 percent.

3.4.2.3 OCCRs for Western and Central African Utilities

The highest OCCRs are found in Western and Central Africa where there has been an increase to greater than 200 percent in the period for ONEA (Burkina Faso), SDE (Senegal), and SEEG (Gabon). This is due to the following reasons:

- Governments (and the utility) in these countries have created first time connection and/or CAPEX expansion funds which are funded (in full or in part) by customers' bills (hence increasing revenue collected and therefore OCCR).
- The utility has made (or is making) significant infrastructure investments that are being funded through customers' revenues (in full or in part) and therefore are being amortized quickly (thus increasing revenue collected and therefore OCCR).
- In addition some of the utilities, including in Gabon and Mali, are providing water supply and electricity

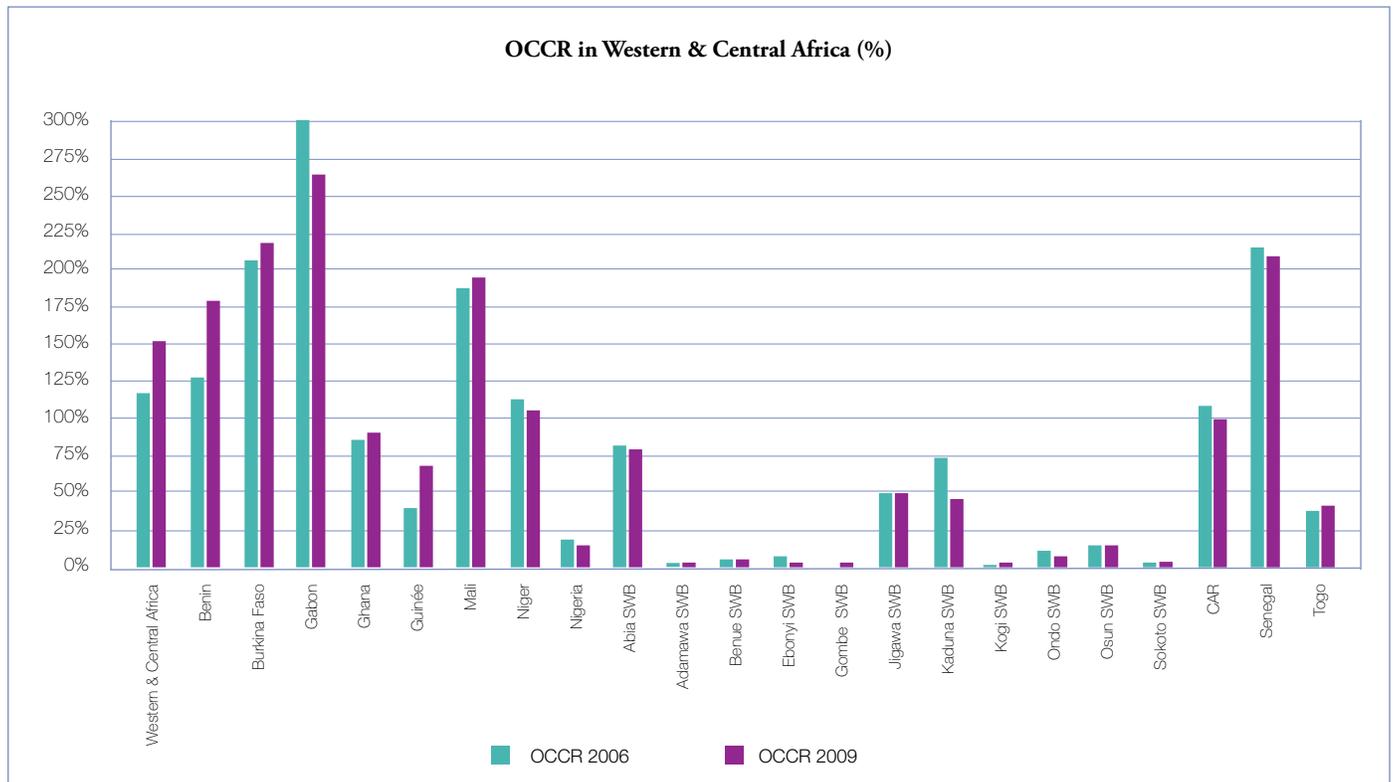
services. In that case the split of revenues collected and operational costs between water supply and electricity businesses may be unclear—this will mean that the overall level of OCCR for water supply in these utilities may be artificially high. Every effort has been made to obtain utility performance data on water supply services only.

There is a significant lack of data and consistently low OCCRs in Nigeria. Some of this is due to the poor quality of data reported, but in some cases it is due to the fact that most Nigerian utilities in this assessment (Bauchi, Bayelsa, Benue, Ebonyi, Katsina, Kogi, Nasarawa, Niger, Ondo, Osun, Plateau, Rivers, Yobe) do not recover any revenue from customer tariffs, meaning that OCCRs are equal to zero, water is free to households (or payments are not collected), and all the State Water Supply Boards' costs are directly paid through government subsidies. As pointed out earlier in this Section, it is unlikely that government subsidies are adequate for full operational cost recovery and, as such, utilities are likely to be underspending on asset maintenance and thus eating into their assets. See Figure 41.

3.4.3 Unit Costs of Production, Average Tariff, and Net Operating Surplus

Understanding, managing, reducing, and reporting O&M costs (that is, costs of production and distribution) is the first key step in improving utility efficiency as it forms the basis for analyzing expenditure and income requirements. Keeping unit costs down is the best way for utilities to sustain themselves financially. Some ways of reducing the unit cost of production and increasing average tariffs are shown in Box 7.

Figure 41: OCCRs for Western and Central African utilities



Box 7: Ways of reducing unit costs of production and increasing average tariffs

Reducing the unit costs of production can be achieved by:

- Reducing operational expenditure: using cheaper raw water sources, reducing pumping and treatment costs (for example, increasing storage rather than direct pumping), energy costs, staff costs) at source.
- Increasing the volume of water produced (that is, using higher volumes of water).

Increasing average tariffs can be achieved by:

- Increasing the volume of water sold: increasing the number of metered connections and reducing losses (technical and commercial).
- Increasing tariffs or readjusting tariff bands to fit consumption patterns and categories (domestic, commercial, institutions, and so on). However, this is often outside of the control of the utilities (regulation, and so on).

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This Section assesses the following indicators:

- The unit cost of production (in $\$/m^3$), which depends on the type of raw water source used and treatment processes required, data which were available in the self-assessment questionnaire. The volume produced is taken as the volume of water into supply, thus accounting for (a) actual volume of water produced, and (b) volume of water purchased in bulk. The cost of production is taken as the total operating costs for water supply only.
- The average tariff (expressed in $\$/m^3$ of water produced), which is dependent on the tariff level and structure, the level of NRW and the company's ability to first issue and then collect bills. The average tariff, which really represents the average price of water charged to consumers, is also referred to as average revenue in $\$/m^3$. To compare average tariff and unit cost of production, the average tariff (or average unit revenue) is expressed as $\$/m^3$ of water produced (not sold).
- Net operating surplus (expressed in $\$/m^3$), which is the arithmetic difference between average tariff and unit cost of production. The ratio of the same indicators (that is, average tariff or unit revenue divided by unit cost of production) is equal to the OCCR that was discussed earlier.

Key findings:

General findings

- There is a wide variation in the unit cost of production, the average tariffs, and the net operating surpluses across subregions and within countries. Individual figures are shown in the Appendixes. Figure 42 shows the average unit costs of production and average tariffs for 2006 and 2009, compared with the OCCRs for the same years.
- There is an equally large variation in the type of raw water source and treatment options used (Africawide), which significantly impacts the cost of production (although the USAQ did not collect any information on the volume of raw water by raw water source). This is shown in Figure 43. Utilities are found to have a large number of sources, including dams, rivers, lakes and boreholes; utilities are found to use different treatment systems (including chemical and biological); and some utilities, in particular, the South African utilities and the ones in Eastern Kenya, purchase water in bulk.

Unit cost of production ($\$/m^3$ of water produced)

- There is a large variation in the average unit costs of production (weighted by volume) across subregions and within countries. These are shown (across regions) in Figure 44.
- The higher unit costs in the Southern Africa region are driven by Johannesburg, eThekweni, Tshwane, Walvis Bay, and Swaziland—all of which purchase water in bulk (in some cases across international boundaries). However, overall the Southern African region recovers less revenue from bills than the unit cost of production. This highlights the presence of large scale government subsidies, in particular, in South Africa (except for the private company Silulumanzi in Mbombela/Nelspruit) but also in Zambia and Malawi.
- Eastern African utilities seem to have the lowest average unit cost of production (except for Kisumu which has one of the highest) but the lowest degree of diversification of water sources—but this is also combined to a lower continuity of supply than Western African utilities (excluding Nigerian utilities), which may explain the lower unit costs but the higher degree of vulnerability.

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Figure 42: Unit costs of production, average tariffs, and OCCRs in 2006 and 2009

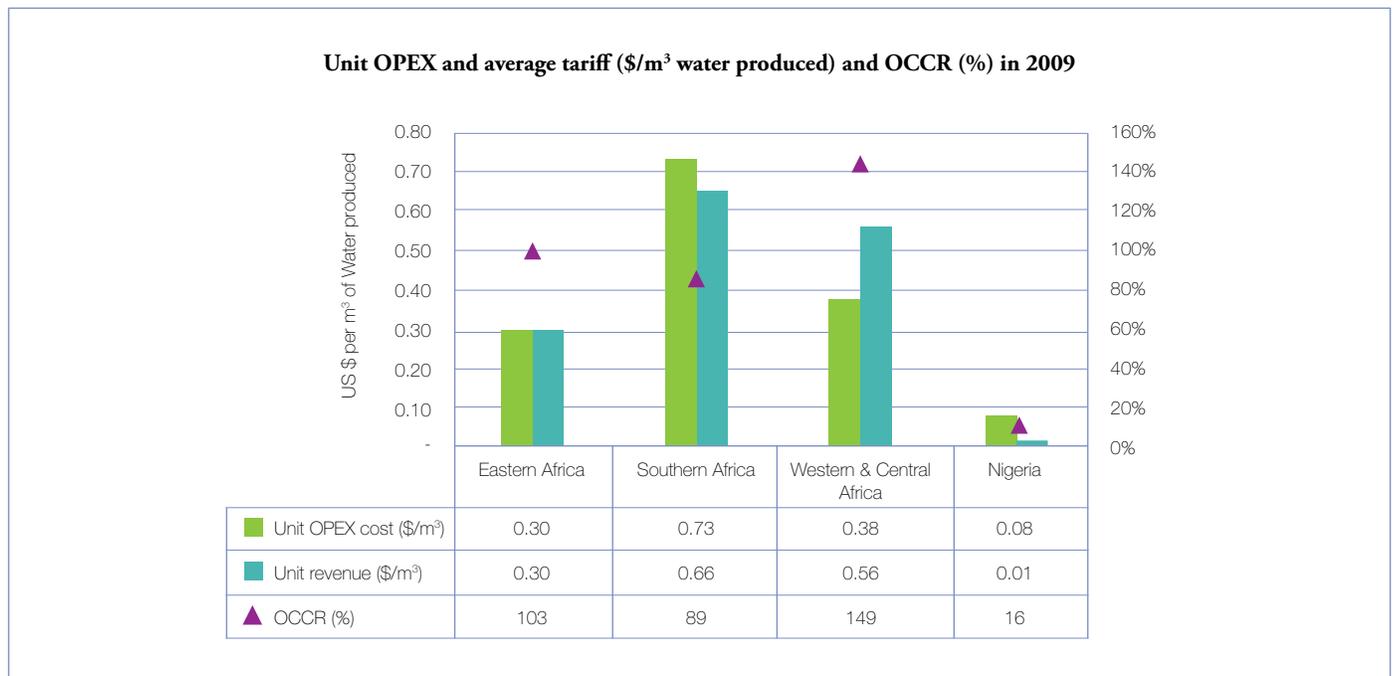
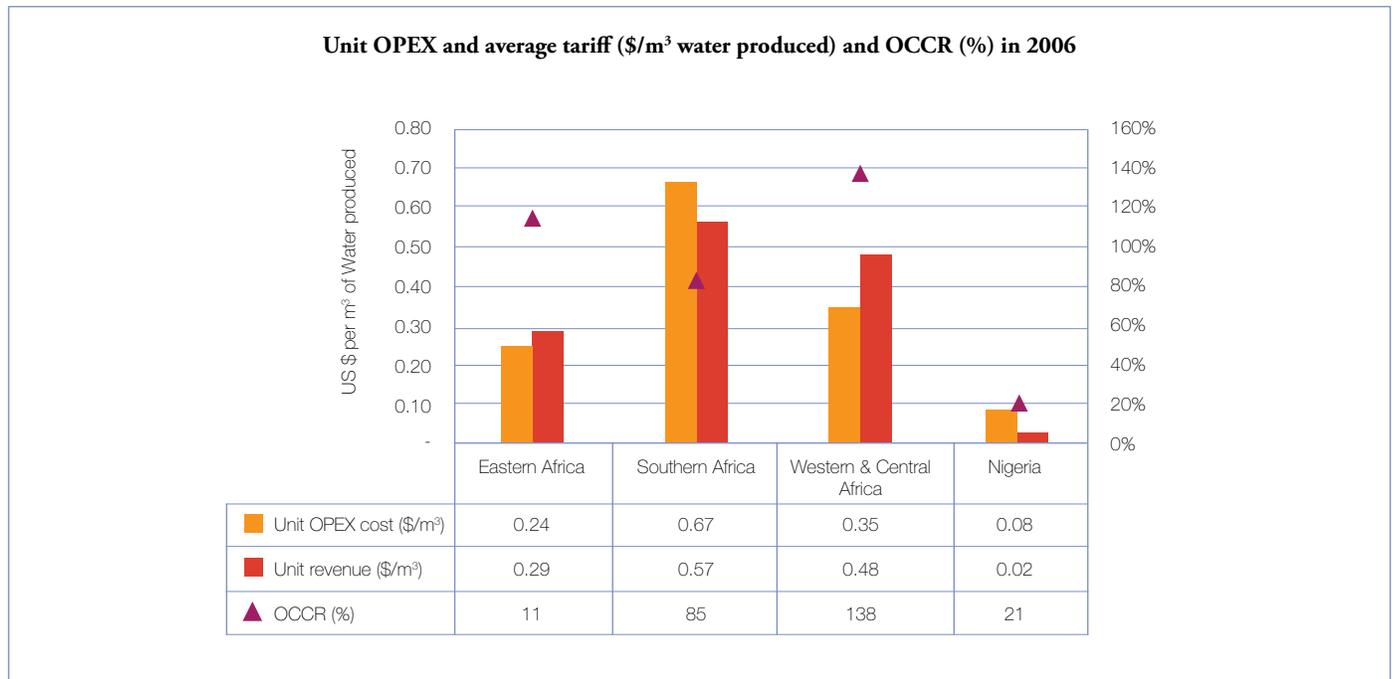
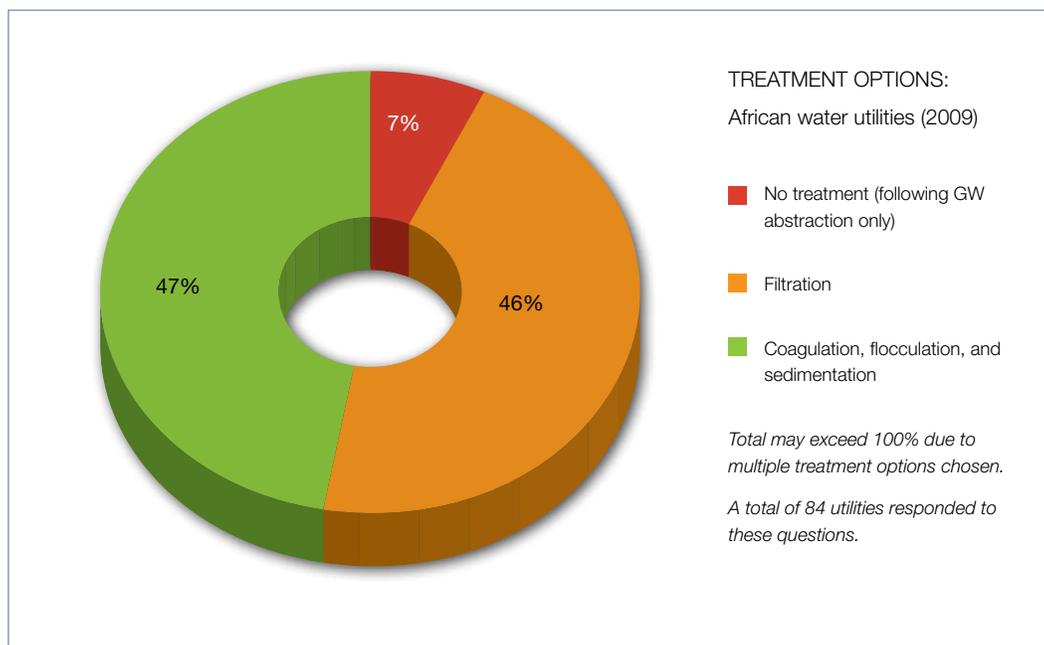
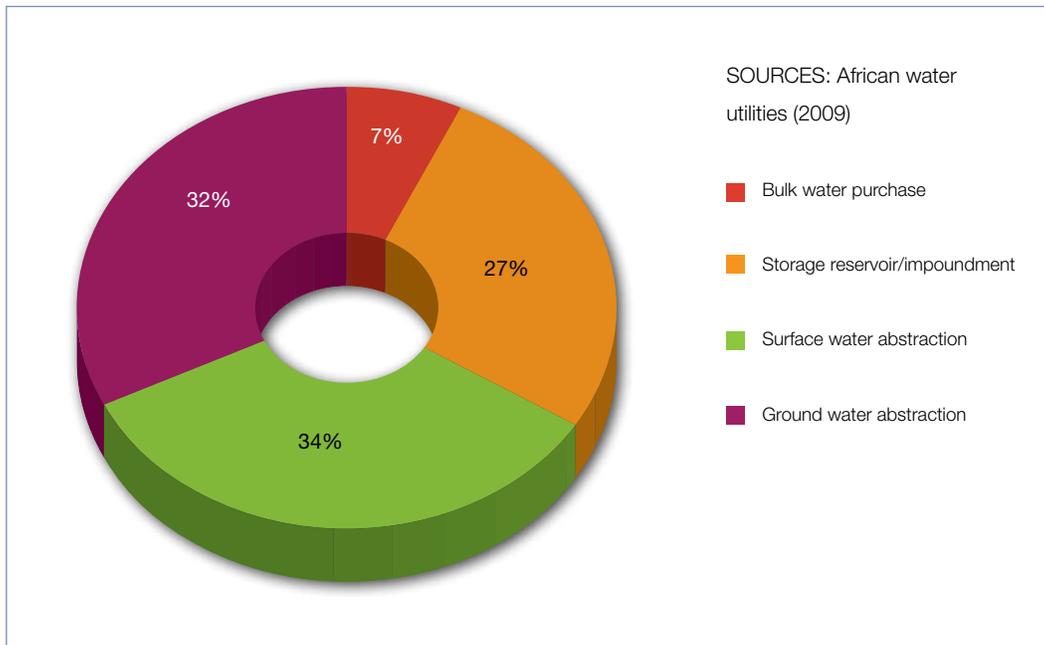


Figure 43: Summary of water sources and treatment options used (Africawide)

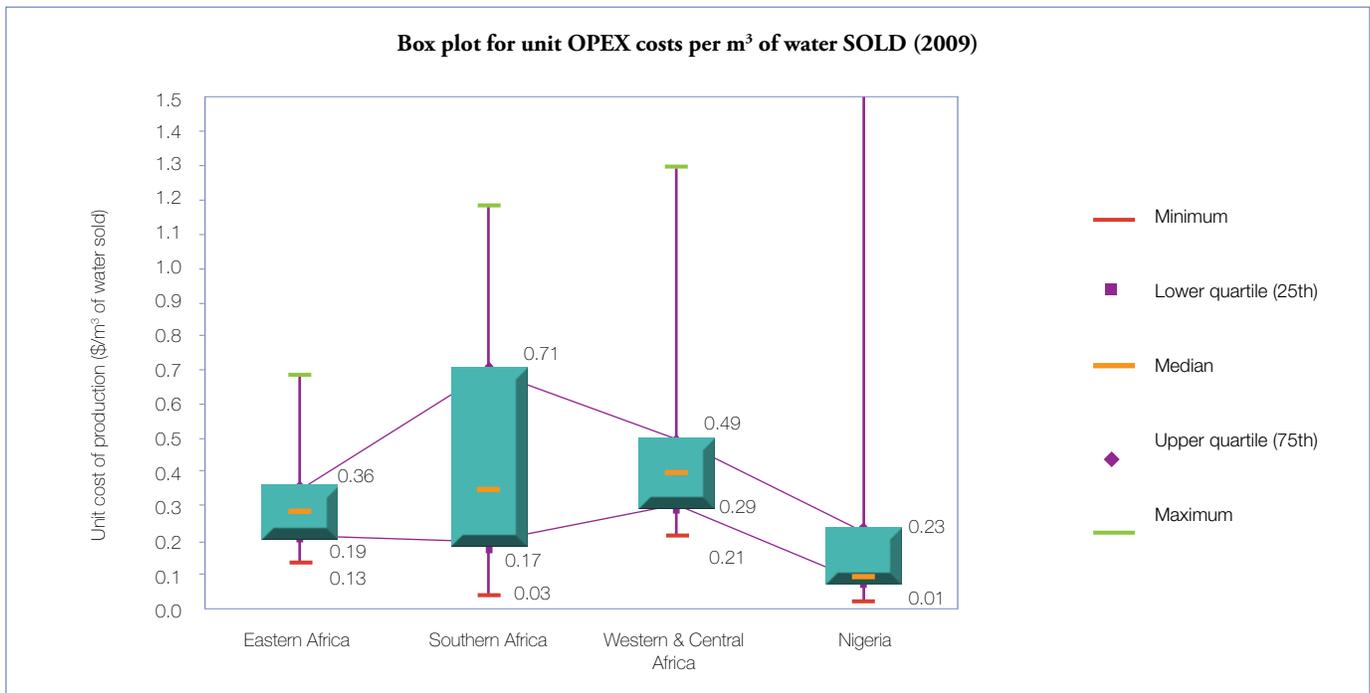
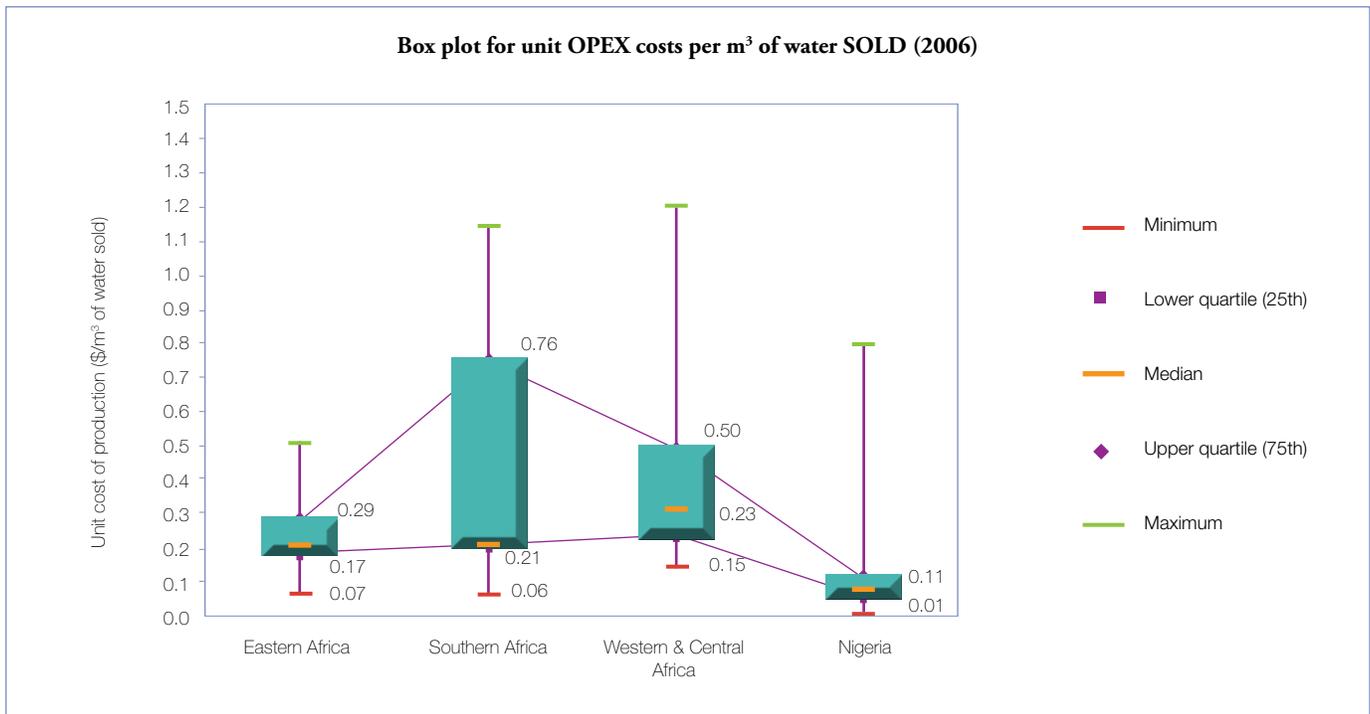


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Figure 44: Box plot of unit costs of production per subregion (2006 and 2009)



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Average tariff (\$/m³ of water produced)

- The highest average tariffs in the Eastern African region are achieved by KIWASCO (with more than \$1.4/m³ of water sold, \$0.53/m³ of water produced) and National Water (\$1.1/m³), both of which exhibit relatively high (and therefore inefficient) levels of leakage (NRW). Kisumu in addition has high costs of production from using surface water abstraction (and treatment) as a single source of water.
- Utilities in Southern Africa with the highest unit costs of production also have the highest unit revenues (that is, tariff is set high to allow the utilities to remain financial sustainable).
- Finally utilities in Western and Central Africa which have to finance large capital programs (including large scale connection funds) have the highest unit revenues (average tariffs): ONEA, SEEG, SPEN, EdM, with the exception of Abia State Water Board in Nigeria.

Net operating surplus

- Given the relative low OCCRs it is not surprising to find that the majority of utilities in Eastern Africa are only just breaking even, suggesting that tariffs are too low or that significant efficiencies can yet be achieved (or both). All utilities, except for Eldoret, Harrar, Musoma, Singida and Nairobi, generate some income (from water sales).
- Some utilities appear to be faring well (that is, generating significant income compared to

operational or production expenditure) from water sales: Iringa, National Water and Nyeri, all generate a net operating surplus of more than \$0.2/m³.

- In the Southern African region, eThekweni is making a loss per m³ of water sold—but this is covered by the yearly municipal budget. The situation is not as clear with NW Water and Sewerage Company in Zambia. Cascal, City of Tshwane and Eastern Water and Sewerage Company are making net profit of more than \$0.3/m³. Walvis Bay, which had the highest unit cost of production AND a high unit revenue per m³/produced, is only just about breaking even.
- Most of the Nigerian utilities are not generating any income (from bills) from the sale of water—or only just breaking even. Gombe and Zamfara State Water Boards provide water for free—and thus are showing a significant loss/m³ sold.
- ONEA in Burkina Faso generates the highest income per m³ of water sold. This is followed by SONEB (Benin), SDE (Senegal), and SEEG (Gabon), all of which have performance contracts with government/public institutions and large scale capital investment (expansion) programs. These investments are financed by the utilities, and thus need to be reflected by capital cost recovering tariffs combined to efficient unit costs of production.

The regional summaries presented for the three indicators are discussed in more detail in the following Sections. Detailed breakdowns of unit costs of production and average tariffs (both expressed as \$/m³ of water produced) are included in the Appendixes.

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Figure 45: Box plot of average tariffs per subregion (2006 and 2009)

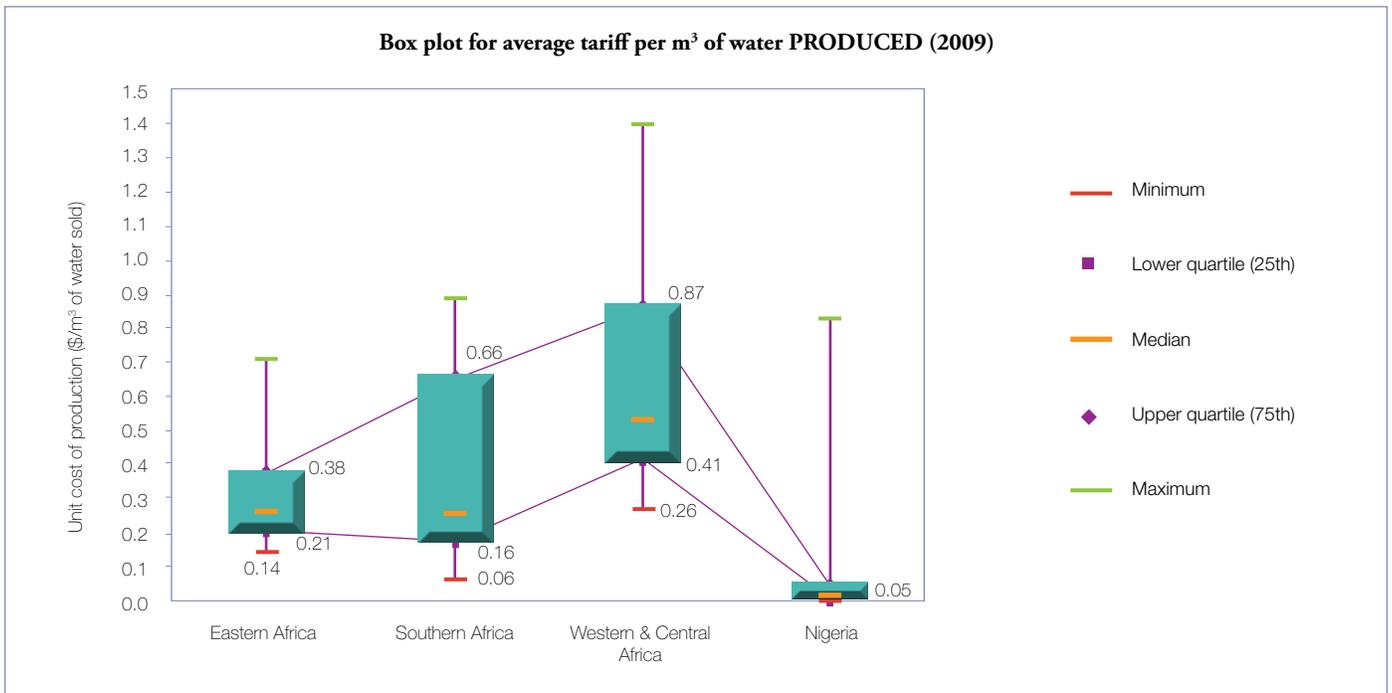
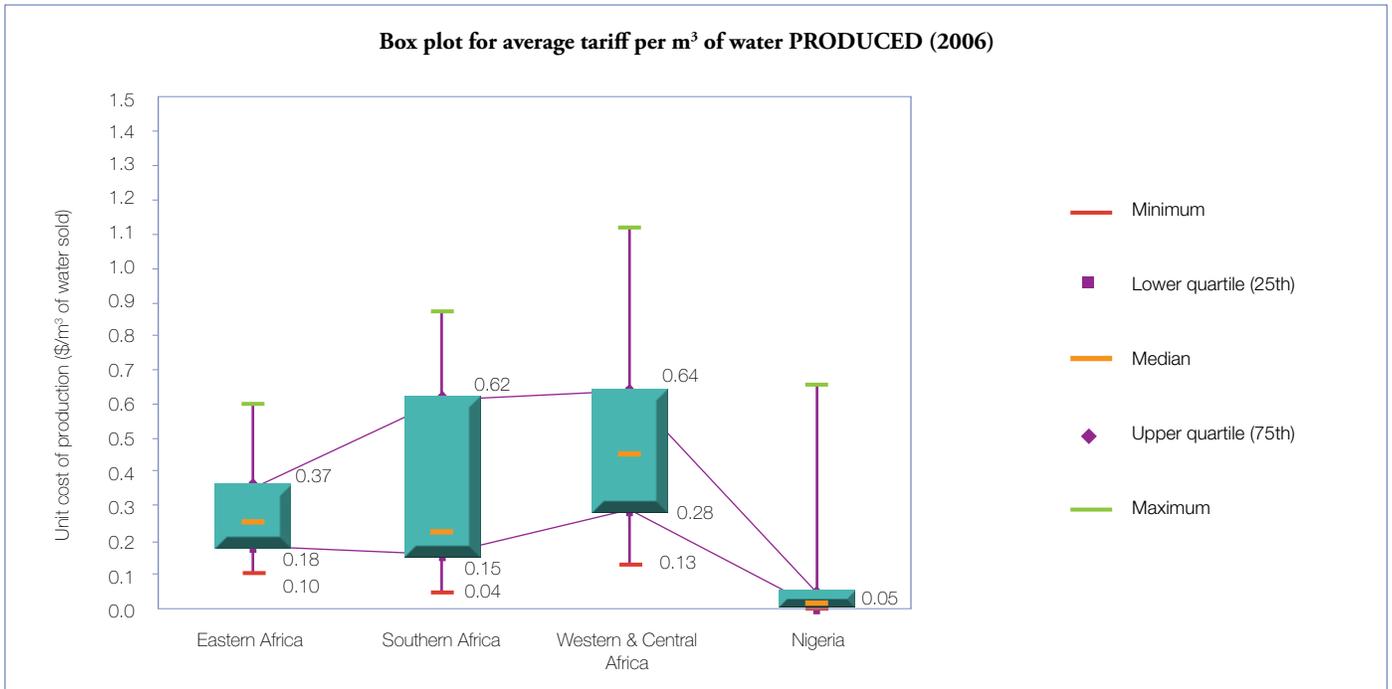
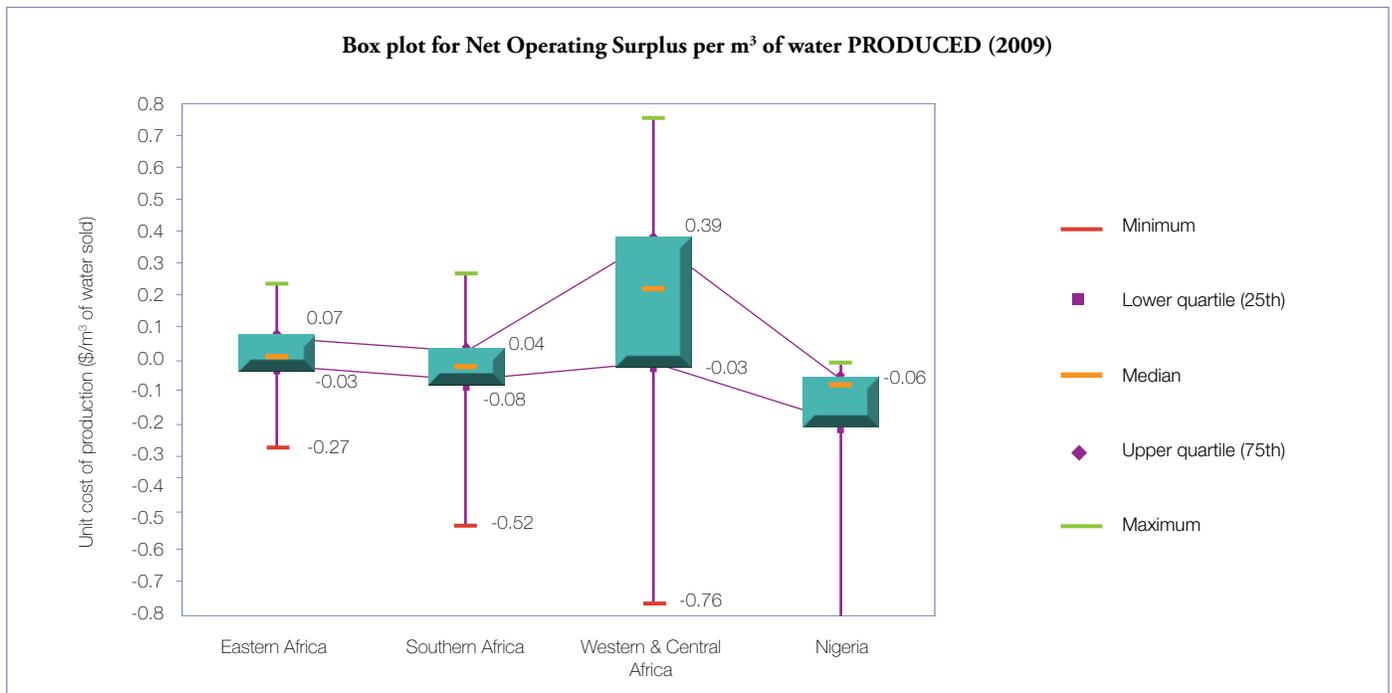
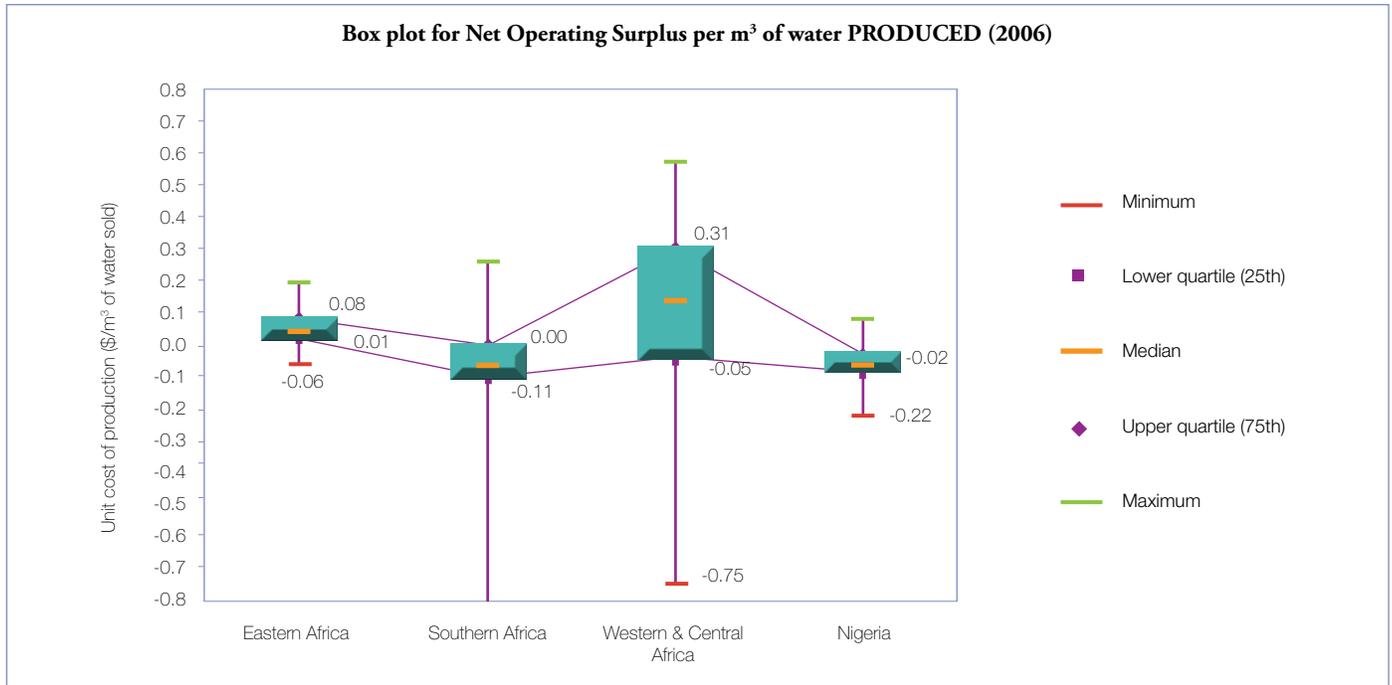


Figure 46: Box plot of Net Operating Surplus per subregion (2006 and 2009)



3.4.3.1 Summary of Findings for Eastern African Utilities

Most of the utilities in the region (38 percent) report using surface water as a raw water source. This is followed by 31 percent reporting using groundwater and 21 percent impounded water. However, the degree to which utilities have diversified their source of raw water, as a means of reducing costs and/or guaranteeing (or increasing the availability of), is low: 14 percent of utilities have three or more types of sources in 2009.

In general, unit costs of production have increased by 21 percent (whereas average tariff has only increased by 6 percent over the same period): from 0.24/m³ to \$0.3/m³ from 2006 to 2009. This is due to (a) inflation and the increase in power costs; and (b) increased production capacity. However, Addis Ababa, Dire Dawa, Jimma Town, Nyeri, and Welkite have seen a reduction in unit production costs, principally because of an increase in the volume of water produced.

Four utilities stand out in the subregion as having very high unit costs of production in 2009: National Water (Uganda), Kisumu, Eldoret, Meru (Kenya), and Harar (Ethiopia)—with \$0.45 to 0.65/m³ of water produced. This means that these utilities either have to increase tariffs (which may reduce consumption by households) or face the risk of not recovering 100 percent of OPEX costs (which means they will have to rely on government subsidies for O&M).

Of these utilities, only National Water in Uganda has a **well diversified raw water source** (impoundment; surface water and groundwater)—although Eldoret has both impounded and surface water sources. Kisumu and Meru stand out as having one of the highest cost of production (greater than \$0.5/m³) as well as a high reliance on surface water, which means higher pumping

and chemical/biological treatment, in addition to disinfection. See Figure 47.

Utilities whose unit cost of production increases need to charge higher tariffs to their customers in order to stay financially sustainable. The highest average tariffs are achieved by KIWASCO (with more than \$1.4/m³ of water sold, or \$0.53/m³ of water produced) and National Water (\$1.1/m³ of water sold or \$0.71/m³ of water produced), both of which exhibit relatively high (and therefore likely to be inefficient) levels of leakage (NRW).

Kigoma, Malindi, and Nanyuki did not submit data on production volumes, production costs, AND revenue collected—thus no profit (loss) per m³ is shown for them. All the other utilities, except for Eldoret, Dar es Salaam, Harrar, Musoma, Singida, and Nairobi, generate a net operating surplus from water sales.

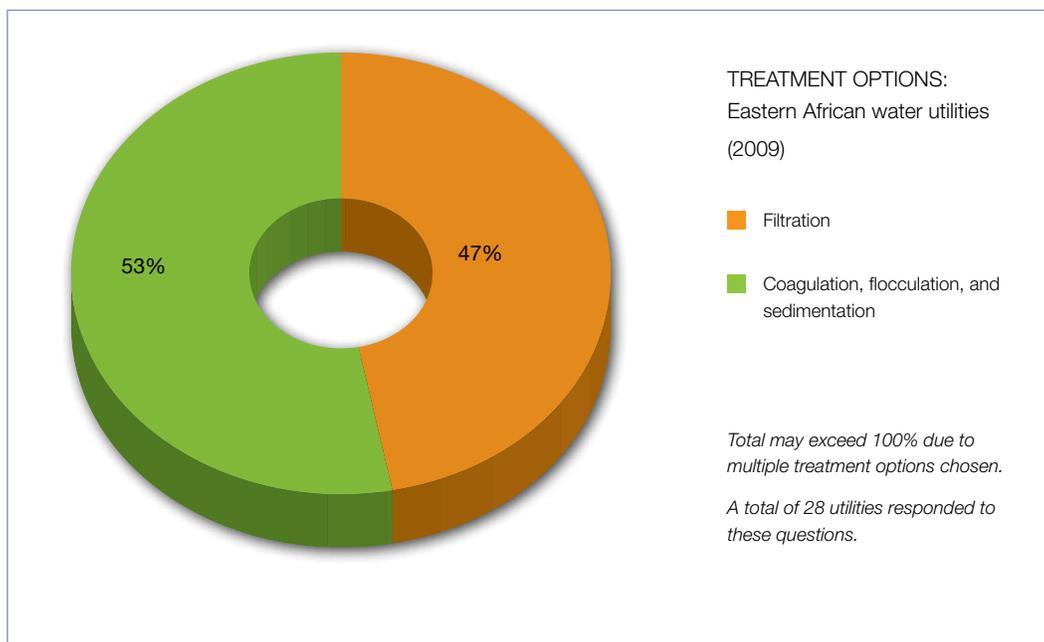
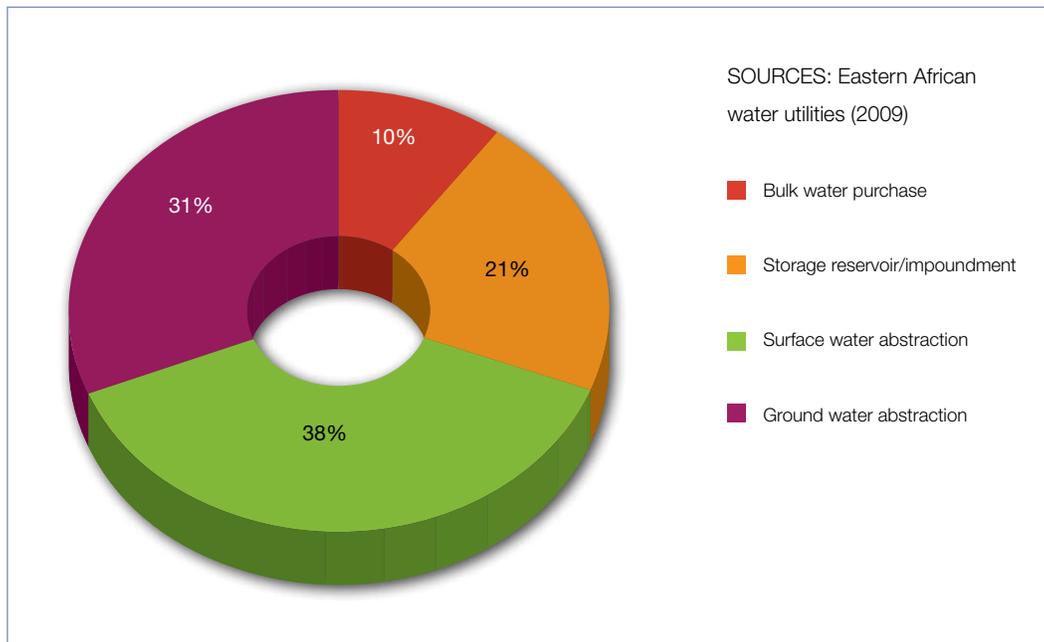
Utilities that appear to be faring well (that is, generating significant income compared to operational or production expenditure) from water sales are: National Water and Nyeri, which generate more than \$0.2/m³ net.

However, the majority of utilities are only just breaking even, suggesting that tariffs are too low or that significant efficiencies can yet be achieved (or both).

3.4.3.2 Summary of Findings for Southern African Utilities

The proportion of water sources is similar to the Eastern African region, with the exception of bulk water purchases (which is now 11 percent). The number of utilities in the region which have a diversified raw water source is highest, with next to 60 percent of utilities using three or more sources of raw water.

Figure 47: Sources and treatment options used in the Eastern African region



The proportion of treatment processes used is also similar to the Eastern African region, with the exception that chemical treatment process (coagulation, flocculation, and sedimentation) are used by 45 percent of utilities, with 48 percent of utilities using filtration processes. See Figure 48.

The region has the highest average (weighted) unit cost of production at \$0.68/m³ in 2009. The expensive unit costs of production come from utilities which purchase water in bulk—South Africa, Swaziland, and Namibia, implying that bulk water purchasing may not be as cost effective as own treatment.

Nelspruit/Mbombela has a low cost of production and has diversified its raw water sources—meaning it is reducing its bulk water purchases. Utilities with the lowest unit costs of production seem to be those which have successfully diversified their raw water sources.

The average revenue per m³ of water sold takes into account NRW losses and unit costs of production. The same utilities that had high unit costs of production are also achieving the highest revenue per m³ of water sold: eThekweni, Johannesburg, Walvis Bay, and Swaziland.

However, other utilities are also faring well: Nelspruit/Mbombela; Blantyre and Lilongwe Water Boards, and the Zambian water boards. These may, therefore, be providing better value-for-money per m³ of water sold.

eThekweni appears to be making a loss per m³ of water sold—but this is covered by the yearly municipal budget. The situation is not as clear with NW Water and Sewerage Company in Zambia. Nelspruit/Mbombela, City of Tshwane, and Eastern Water and Sewerage Company are making net gain of more than \$0.3/m³.

Walvis Bay, which had the highest unit cost of production AND a high unit revenue per m³/produced, is only just about breaking even.

3.4.3.3 Summary of Findings for Western and Central African Utilities

Only two utilities in the region purchase (part of their) water in bulk: SPEN in Niger and Gombe State Water Board in Nigeria. The individual split of raw water sources and treatment processes is more evenly distributed than in the other two regions. However, this translates into 46 percent of utilities using three or more different raw water sources.

The split of utilities using chemical (coagulation, flocculation, and sedimentation) and biological (filtration) is similar to the other regions, but 10 percent of utilities report using no treatment (other than disinfection). See Figure 49.

Data from most utilities in Nigeria need to be checked as the variance in average unit costs of production is significant. For instance, Gombe State Water Board reports average unit costs greater than \$5/m³ produced—but has no metering so is potentially underreporting volumes produced (and thus artificially increasing the unit cost of production). SEEG in Gabon has one of the lowest unit costs of production at \$0.15/m³.

One of the highest average revenue is that charged by ONEA in Burkina Faso. This is probably linked to the fact that the utility has set up a comprehensive and large scale new connection policy and fund, with which it has significantly increased coverage. This is funded directly by the high average revenue.

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Figure 48: Sources and treatment options used in the Southern African region

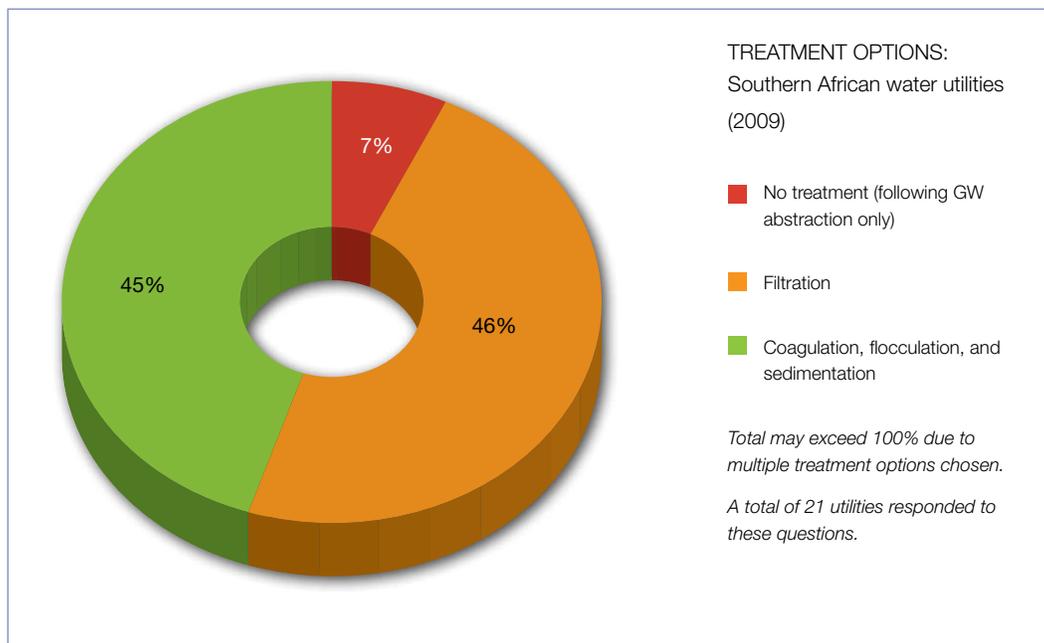
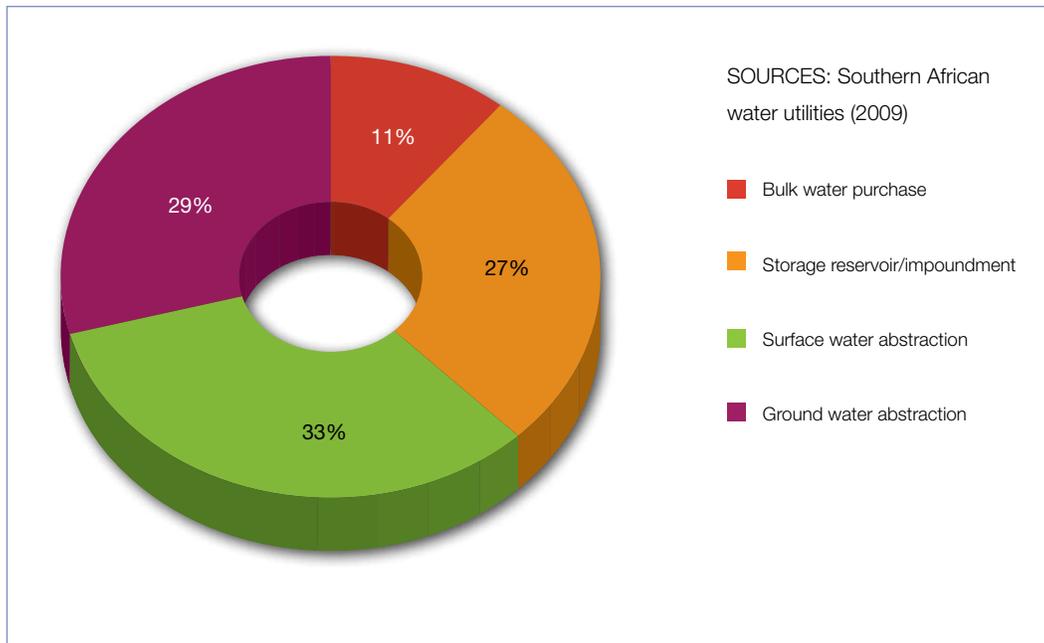
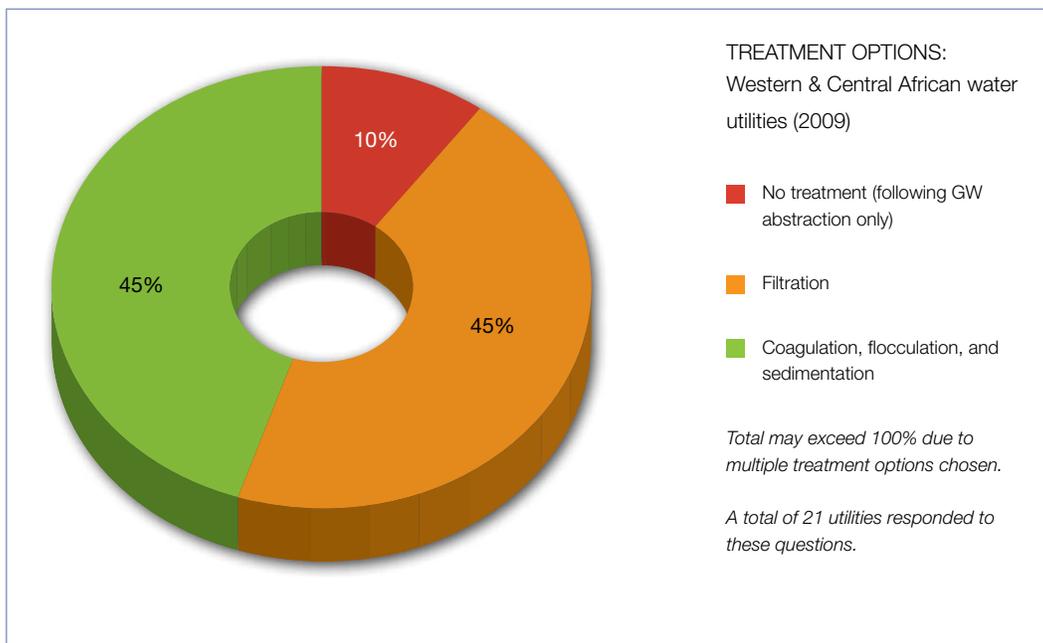
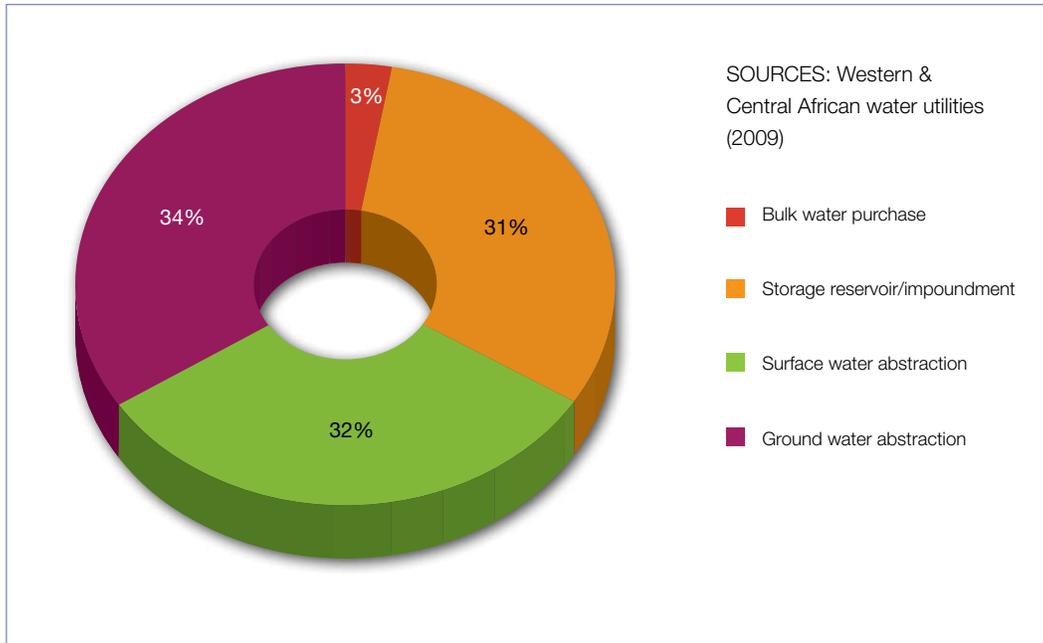


Figure 49: Sources and treatment options used in the Western and Central African region



Other utilities with high average unit revenues are SPEN, SEEG, SONEB, and SDE—all of which have invested heavily in the water sector and are trying to recover at least some part of CAPEX through customers' bills.

Most of the Nigerian utilities are not generating any income (from bills) from the sale of water—or only just breaking even. Gombe and Zamfara State Water Boards provide water for free—and thus are showing a significant loss/m³ sold.

ONEA in Burkina Faso generates the highest income per m³ of water sold. This is followed by SONEB (Benin), SDE (Senegal), and SEEG (Gabon), all of which have performance contracts with government/public institutions and large scale capital investment (expansion) programs. In fact, ONEA showed one of the highest increases in coverage over the period. These investments are financed by the utilities (for example, SEEG invested \$1 billion over 10 years), and thus need to be reflected by capital cost recovering tariffs combined to efficient unit costs of production.

3.4.4 Tariff Structures, Unit Domestic Consumption, and Adequacy of Subsidized Volumes

The previous Sections have considered costs of production and unit revenues generated from the sale of water. Some utilities (see previous graphs) appeared to generate particularly high revenues per m³ (net income greater than \$1/m³) sold. However, the analysis of average unit revenue/m³ water sold is not sufficient to draw an opinion of financial performance when utilities have adopted IBTs since revenues are collected over the

customer base, and implicit or explicit cross-subsidies are achieved between high and low volume consumers, and between rich and poor—and these need to be taken into account.

Key aspects to consider when designing and implementing IBTs for domestic customers include:¹⁷

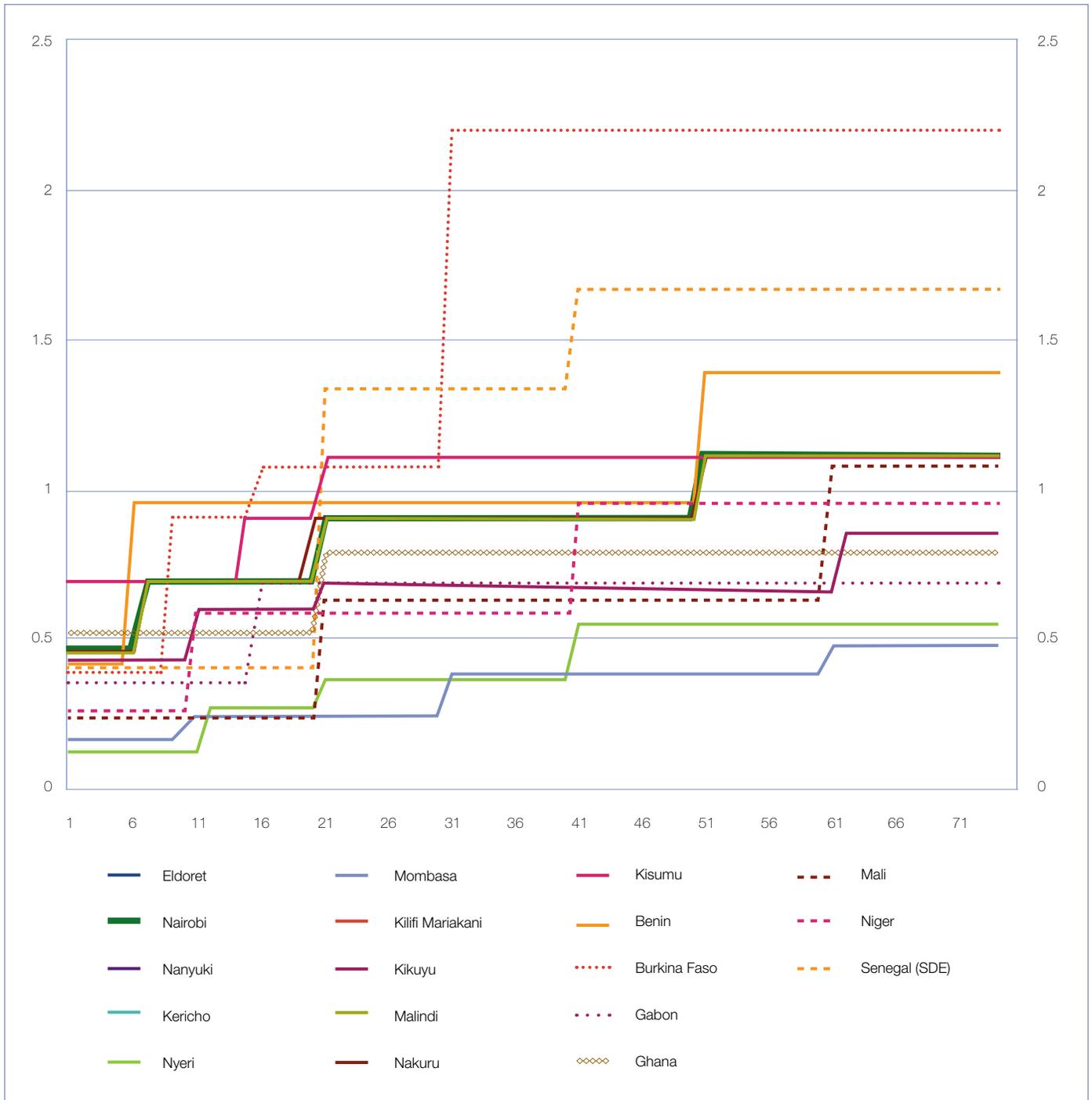
- **The basic (minimum acceptable) amount of water delivered per capita:** Some standards state 20 loses per capita per day, others 50 loses per capita per day.
- **The practicality and cost of service provision versus the availability of resources:** Is there enough water to deliver this basic amount of water? If not, how much would new sources cost?
- **The profile of domestic customers:** Do 100 percent of households have individual connections? Do 50 percent have connections and the rest get water from neighbors (that is, sharing connections)? Do only 10 percent have connections and 90 percent buy water from kiosks? Are all connections metered? Are certain customer categories (or types of connections) expected to grow more than others?
- **The opportunities for cross-subsidies:** Is there evidence (metered) that a large number of rich customers, with high ability to pay (ATP) and willingness to pay (WTP), could pay more for water? Are there other customer categories, for example, industry, institutions? Is there a system (for example, national cash hand-outs) which could help reduce customers' bills?

¹⁷ More information is included in: Komives, Kristin, Vivien Foster, Jonathan Halpern, and Quentin Wodon. 2005. *Water, Electricity and the Poor: Who benefits from utility subsidies?* World Bank.

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Figure 50: Domestic water tariff structures (2009) for a selection of African water utilities (\$/m³)



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- The message that the utility wants to send to high consumers (relating to wastage, using drinking water to irrigate land, and so on).

In this Section the following are considered:

- **Water tariffs**, including structure (flat rate; increasing block tariff; and so on) and levels (volumetric tranches and price/m³).
- **The level of subsidized daily consumption** (that is, the daily volume of water which falls within the first tranche of the tariff structure) versus the **average unit consumption per capita per day**. This assesses how well the first tranche has been set, depending on the average size of the household and the international benchmark of 50 lpcd.

There are many different tariff structures and levels across the utilities that participated in this assessment. Some tariff structures are applied to municipalities (and are thus somewhat reflective of the local context), whilst others are national (and seek to provide similar levels of services, at least in terms of cost, to all customers). A selection of these are shown in Figure 50, based on information collected via the USAQs.

Most, if not all, the utilities that participated in this assessment have IBT structures; some of the utilities in Nigeria charge a flat rate or provide water for free. IBTs are therefore a major aspect of subsidies for serving domestic households (including the poor) in Africa's urban areas.

This Section attempts to make an initial assessment of the degree to which these tariff structures are pro-poor, by exploring the impact of these structures and levels on the unit volume of water that is subsidized (that is, the first tranche). It thus assesses how effective the targeting of each of these subsidies really is.

The graphs on the following pages compare the **average unit consumption** (expressed in liters per capita per day) and the **volumetric size of the subsidized tariff** (first step), that is, the daily equivalent per capita, in liters per capita per day. These are shown on the left hand axis.

This comparison is useful in helping utilities, regulators, and policy makers in determining whether the level of subsidy (for each utility) is large enough or not. Each of the graphs also shows the internationally accepted benchmark of 50 liters per capita per day (for individual house connections)—which is widely accepted as the minimum volume per capita per day required for drinking, cooking, and washing needs. This is shown as a green dashed line and gives a visual evidence of the variance across the region and across each of the subregions.

Methodology:

An estimate of coverage needs to take into account (a) the number of individual house connections and the average household size; (b) the number of people using each of the kiosks and the number of kiosks; and (c) the number of households that are using their neighbors' connections. However, the latter is seldom considered.

A reverse calculation of average household size, based on the total population served by house connections, divided by the total number of domestic connections, gives the implied household size. This is shown as the red line (and red triangles) on the following graphs.

If the implied household size is significantly greater than the actual household size (which is usually measured following a house to house survey or census), then this suggests that a large number of customers obtain water from their neighbors' taps (that is, the individual house connections are actually shared connections).

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In addition, if this fact has not been taken into account when designing or sizing the first tariff tranche (in terms of volume and price), then a large number of poor households (which use their neighbors' taps) are, in fact, not benefiting from the subsidized tariff, and are actually subsidizing consumption from non-poor households within the first tariff band. (See explanations in Box 4 at the start of Section 2.2).

Utilities in whose areas poor households are likely to be excluded from the first tariff tranche (the subsidized tariff) are shown with a black circle.

Key findings:

The assessment of unit consumption (liters per capita per day), volume of subsidized consumption (losses per capita per day) and implied household size (compared to actual), has highlighted a number of important lessons:

- **A large number of utilities are failing to deliver adequate volumes of water to their customers:** Of those that reported, 50 percent in East Africa and 54 percent in Western and Central Africa (5 percent in Southern Africa) supplied less than 50 liters per capita per day.
- **An even higher proportion of utilities are unable to deliver a sufficient volume of basic water for drinking, cooking and washing,** as they are failing to take into account the implied household size (equal to population served divided by the number of individual house connections) when designing their first tariff step (when IBTs do exist). This means that poor households in these services areas (municipal and national) are not connected but are subsidizing

the consumption of non-poor households that are themselves likely to be connected (and which use more than 50 liters per capita per day and are likely to be selling water to the poor):

- o 71 percent of utilities in East Africa have a subsidized water volume which is significantly lower than 50 liters per capita per day;
 - o 47 percent in Southern Africa (and even in South Africa where only Johannesburg delivers 50 liters per capita per day); and
 - o 31 percent in Western and Central Africa (with ONEA delivering barely 40 liters per capita per day of which 25 is subsidized).
- This means that IBT steps are too large and provide the wrong incentives to non-poor households. This is a major shortcoming which is typical of IBT structures¹⁸ and remains to be rectified.
 - The implied average household size is significantly greater than the actual household size—meaning that utilities are not aware that a large number of their customers (who are likely to be the poorest) actually use their neighbors' individual house connections and are therefore also likely to attract higher tariffs, defying the very purpose of the IBT. Implied household size varies from five (actual) to 25 in Eastern and Southern Africa; and from five to greater than 400 (in some Nigerian utilities).
 - Not only does this suggest that poor households are still not being served adequately and equitably, but also that coverage estimates reported by utilities are, therefore, likely to be based on very uncertain assumptions.

¹⁸ World Bank. 2005. *op. cit.*

3.4.4.1 Summary of Findings for Eastern African Utilities

There is significant variation, even at country level, in both the unit consumption per capita per day AND the unit volume of subsidized water across the region.

Unit consumption:

- **Highest** in Arusha, Eldoret, Nairobi and Nanyuki—all with more than 80 liters per capita per day (liters per capita per day).
- **Lowest** in Kisumu, Malindi, Mombasa, Musoma, National Water, Singida, and Welkite with less than 40 liters per capita per day. Absolute lowest is Nakuru < 5 liters per capita per day and Welkite < 10 liters per capita per day). These figures either denote an exaggerated figure for population served or a significant lack of adequate water resources, or both.

Level of subsidy (volume of subsidized water, losses per capita per day):

- **Highest** in Kigoma (78 losses per capita per day), Eldoret (60 losses per capita per day), Kericho, and Nairobi (both 48 losses per capita per day).
- **Lowest** (less than 20 liters per day) in Arusha, Dar es Salaam, Jimma Town, Malindi, Mekelle, and Nakuru.

Utilities that seem to provide enough water and enough subsidized water are shown with a star. There are only three—Eldoret, Nairobi City and Nanyuki. See Figure 51.

3.4.4.2 Summary of Findings for Southern African Utilities

There is a large variance but also large amount of missing data due to the inability of some utilities to report both

on coverage (population served) AND volumes of water sold to domestic customers.

Unit consumption:

- **Highest** in Johannesburg with 650 liters per capita per day in 2009, City of Tshwane, Luapula, Nkana, and Western Water and Sewerage with greater than 150 liters per capita per day.
- **Lowest** in Chambeshi and Lusaka Water—with about 50 liters per capita per day.

Level of subsidy:

- **Highest** in Walvis Bay with 90 liters per capita per day (against unit consumption of 85 liters per capita per day).
- **Lowest:** all the other utilities have levels of subsidy less than 50 lcpd (see green line in Figure 52).

Utilities that seem to provide enough water and enough subsidized water are shown with a star. There are only two—Johannesburg Water and Southern Water and Sewerage Co. See Figure 52.

3.4.4.3 Summary of Findings for Western and Central African Utilities

Data from most of the Nigerian utilities were not complete so these are not shown on the graph. There is much less variance in the unit consumptions AND level of subsidy in Western and Central Africa.

Unit consumption:

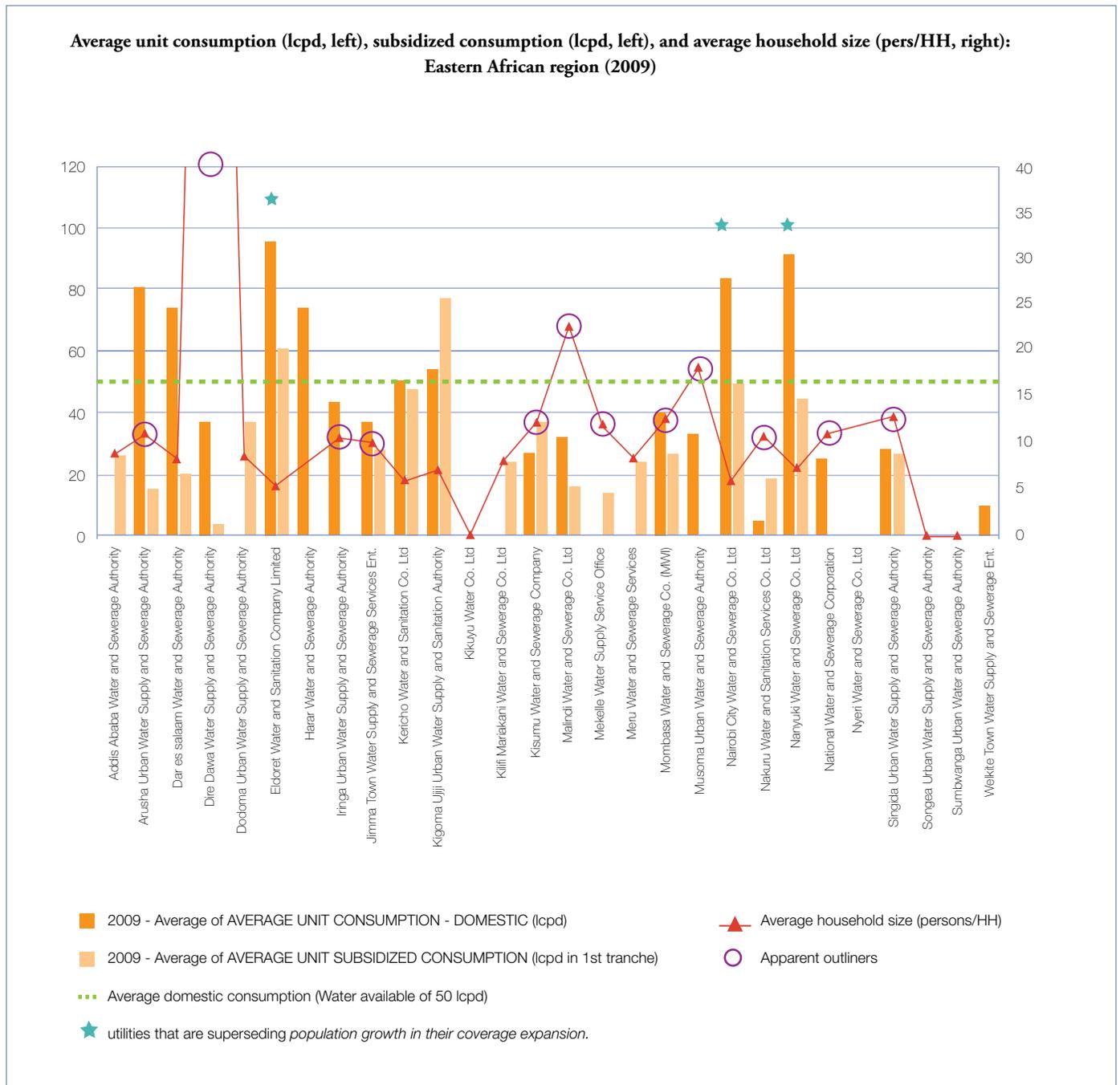
- **Highest** in Energie du Mali and Ondo State Water Corporation, both with more than 80 liters per capita per day, followed by Adamawa, Imo State and SPEN with about 60 liters per capita per day.

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Figure 51: Average unit consumption, subsidized consumption, and average household size in the Eastern African region

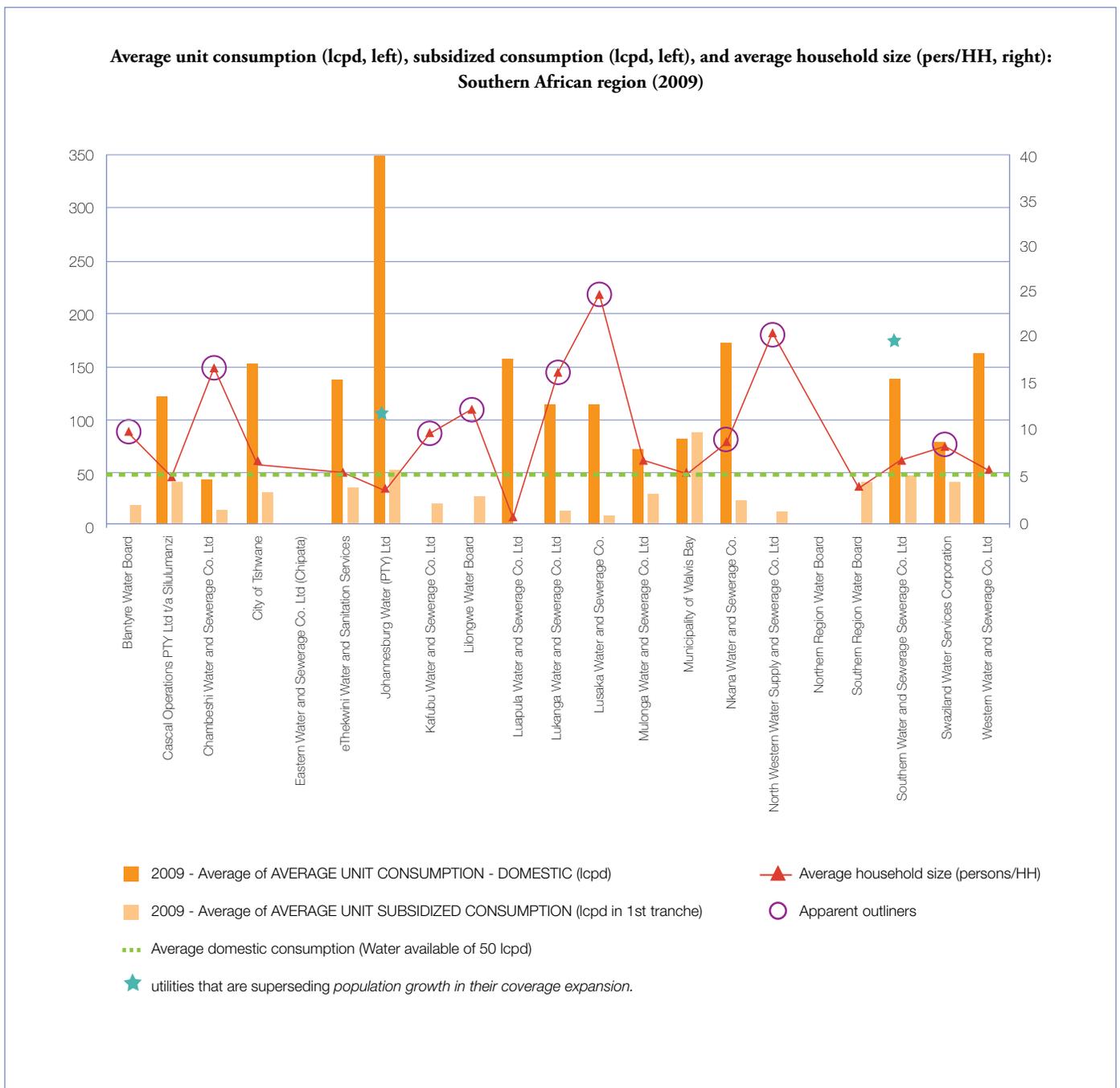


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Figure 52: Average unit consumption, subsidized consumption, and average household size in the Southern African region

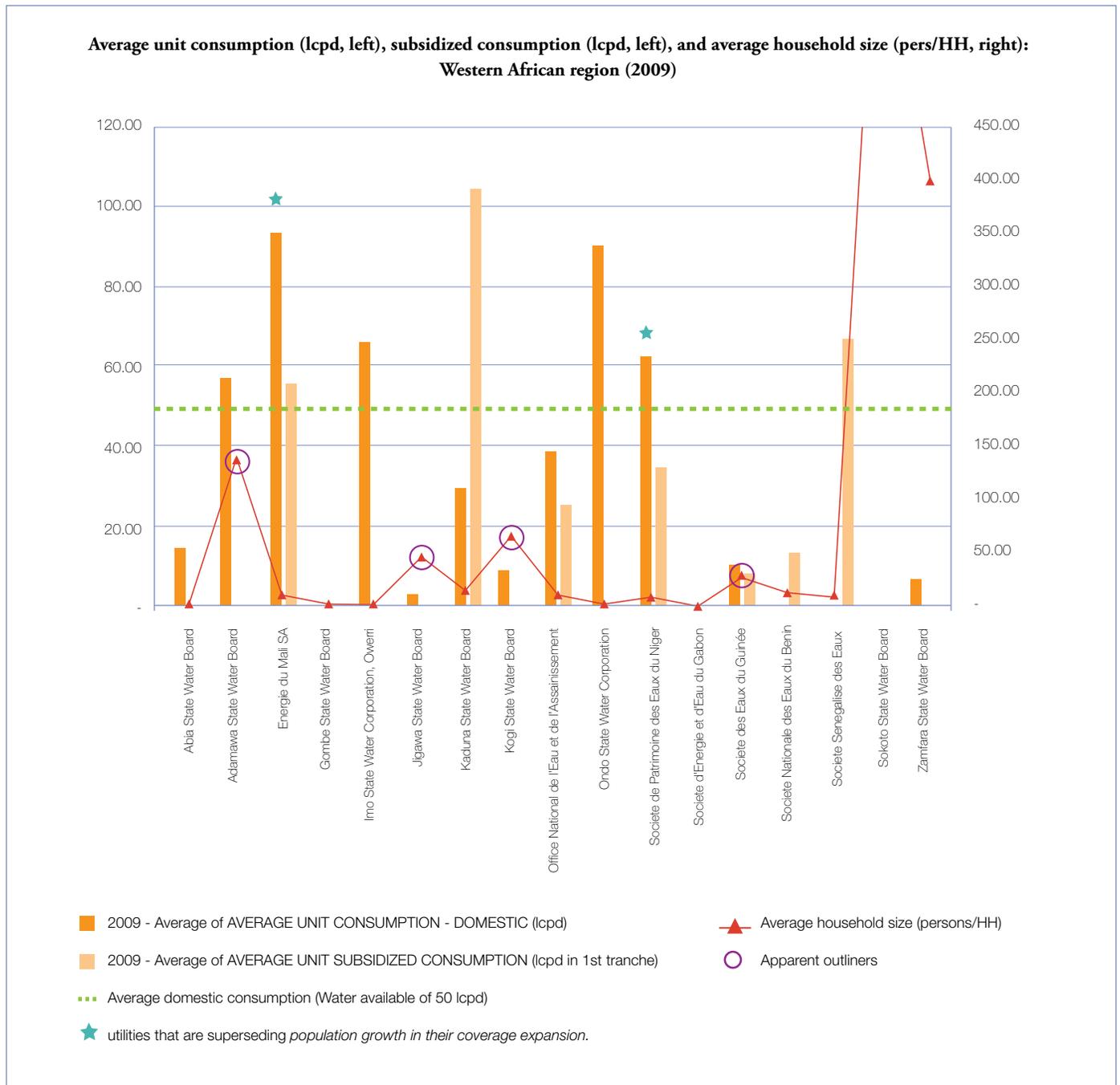


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Figure 53: Average unit consumption, subsidized consumption, and average household size in the Western and Central African region



- **Lowest** in Abia, Gombe, Jigawa, SEG, and Zamfara with less than 20 liters per capita per day. No data from SEEG in Gabon.

Level of subsidy:

- **Highest** in Kaduna State with more than 100 liters per capita per day (much greater than supply), followed by SDE (68 liters) and Energie du Mali (55 losses per capita per day).
- **Lowest:** all the others have levels of subsidy less than 50 losses per capita per day, with SEG and SONEB less than 20 losses per capita per day—and a lot of data missing for Nigeria, SEEG.

Kaduna State Water Board appears to be distributing about 30 liters per capita per day but subsidizing more than 100 liters per capita per day.

Utilities that seem to provide enough water and enough subsidized water are shown with a star. These are only Energie du Mali and SPEN in Niger (although SPEN is providing less than 40 liters per capita per day of water subsidized).

All three graphs (Figures 51, 52, and 53) show a significant variance in the implied average HH size, both across the whole region and across countries.

3.4.4.4 Implications of Implied Versus Actual Household Size in Each Region

The term “implied household size” is defined as the total population served by individual household connections divided by the average household size (which is obtained from the relevant national statistics departments). This provides useful information on the degree to which house connections are shared between many households,

and thus a different perspective on coverage figures provided by sector stakeholders.

Whilst actual average household size in the Eastern and Southern African regions is between five and seven, it is between nine and 12 in the Western and Central African region. However, the variance of implied household size in each of the regions is much larger: up to 22 in Eastern Africa, 25 in Southern Africa, and greater than 150 in the Western and Central African region.

Because of this variance, it is considered that a large number of utilities are distributing water through shared connections (and are reporting unusually high coverage rates), and are NOT reflecting this fact in their tariff structure: this is demonstrated by the low per capita volume of subsidized water (significantly less than 50 liters per capita per day).

The red circles over utilities whose poor households are likely to be excluded from the subsidized tariff show a strong correlation with a low average volume of subsidized consumption: the higher the average (implied) household size the lower the actual subsidized volume available to each member of the household, and the higher the likelihood that the consumption from these households will attract a higher tariff band, thus defying the purpose of the subsidized tariff.

Framework for assessment of performance in this category (traffic lights)

Where adequate data were reported, the assessment is based on a combination of:

- i. Volume of water available to households (on a per capita basis).
- ii. Volume subsidized (also on a per capita basis).
- iii. Implied (versus actual) average household size.

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The traffic lights are explained in Table 30. Results by utility and subregion are presented in Tables 31, 32, and 33.

Table 30: Color code significance for analysis of consumption subsidy efficiency

Traffic lights	Volume of water available (lcpd)	Volume of water subsidized (lcpd)	Implied (vs. actual) average HH size (number)	Consumption subsidy efficiency
Best performers	No upper limit.	Within +/- 10% of 50 lcpd.	Within the range of actual average HH size (per region).	Excellent: utility likely to have up-to-date data on customers.
Borderline	Less than 80 lcpd but greater than 50 lcpd.	Between 30 and 45 lcpd.	50% higher than the actual average HH size (per region).	Acceptable but should be improved. Utility to collect up-to-date customer data.
Poor performance	Volume of water is less than that which is subsidized (resource problem).	Less than 30 lcpd or significantly higher—showing a lack of targeting of subsidy.	More than double the actual HH size (per region).	Unacceptable: update of customer data urgently required.

Lcpd: Liters per capita per day.

Table 31: Consumption subsidy efficiency in the Eastern African region

Utility	Adequate volume of water available per capita	Adequate volume of subsidized consumption	Implied HH size (vs. average actual)	Consumption subsidy efficiency
Addis Ababa Water and Sewerage Authority	No data	Red	Orange	Red
Arusha Urban Water Supply and Sewerage Authority	Green	Red	Red	Red
Dar es Salaam Water and Sewerage Corporation	Green	Red	Orange	Red
Dire Dawa Water Supply & Sewerage Authority	Red	Red	Red	Red
Dodoma Urban Water Supply and Sewerage Authority	No data	Orange	Orange	Orange
Eldoret Water and Sanitation Co. Ltd.	Green	Green	Green	Green
Harar Water & Sewerage Authority	Orange	No data	No data	No data
Iringa Urban Water Supply and Sewerage Authority	Red	Red	Orange	Red
Jimma Town Water Supply and Sewerage Service Enterprise	Red	Red	Red	Red
Kericho Water and Sanitation Co. Ltd.	Orange	Green	Green	Orange
Kigoma Ujiji Urban Water Supply and Sanitation Authority	Red	Red	Green	Red
Kilifi Mariakani Water and Sewerage Co. Ltd.	No data	Red	Green	Red
Kisumu Water and Sewerage Company	Red	Red	Red	Red
Malindi Water and Sewerage Co. Ltd.	Red	Red	Red	Red
Mekelle Water Supply Service Office	No data	Red	Red	Red
Meru Water and Sewerage Services	No data	Red	Orange	Red
Mombasa Water and Sewerage Company (MWWI)	Red	Red	Red	Red
Musoma Urban Water and Sewerage Authority	Red	Red	No data	Red
Nairobi City Water and Sewerage Co. Ltd.	Green	Green	Green	Green
Nakuru Water & Sanitation Services Co. Ltd.	Red	Red	Red	Red
Nanyuki Water and Sewerage Co. Ltd.	Green	Green	Green	Green
National Water and Sewerage Corporation	Red	Red	No data	Red
Singida Urban Water Supply and Sewerage Authority	Red	Red	Red	Red
Welkite Town Water Supply and Sewerage Enterprise	Red	No data	No data	No data

Table 32: Consumption subsidy efficiency in the Southern African region

Utility	Adequate volume of water available per capita	Adequate volume of subsidized consumption	Implied HH size (vs. average actual)	Consumption subsidy efficiency
Blantyre Water Board	No data	No data	Red	Incomplete data
Cascal Operations Pty. Ltd. t/a Silulumanzi	Green	Green	Orange	Orange
Chambeshi Water and Sewerage Co. Ltd.	Red	Red	Red	Red
City of Tshwane	Green	Red	Orange	Red
eThekweni Water & Sanitation Services	Green	Orange	Green	Orange
Johannesburg Water (Pty.) Ltd.	Green	Green	Green	Green
Kafubu Water and Sewerage Co. Ltd.	No data	Red	Red	Incomplete data
Lilongwe Water Board	No data	Red	Red	Incomplete data
Luapula Water and Sewerage Co. Ltd.	Green	No data	Green	Incomplete data
Lukanga Water & Sewerage Co. Ltd.	Green	Red	Red	Red
Lusaka Water and Sewerage Company	Orange	Red	Orange	Red
Mulonga Water and Sewerage Co. Ltd.	Orange	Red	Orange	Red
Municipality of Walvis Bay	Red	Green	Green	Orange
Nkana Water and Sewerage Company	Green	Red	Orange	Red
North Western Water Supply & Sewerage Co. Ltd.	No data	Red	Red	Incomplete data
Southern Region Water Board	No data	Orange	Green	Incomplete data
Southern Water and Sewerage Co. Ltd.	Green	Green	Green	Green
Swaziland Water Services Corporation	Orange	Orange	Orange	Orange
Western Water and Sewerage Co. Ltd.	Green	No data	Green	Incomplete data

Table 33: Consumption subsidy efficiency in the Western and Central African region

Utility	Adequate volume of water available per capita	Adequate volume of subsidized consumption	Implied HH size (vs. average actual)	Consumption subsidy efficiency
Abia State Water Board	Red	No data	Green	Red
Adamawa State Water Board	Red		Red	Red
Energie du Mali SA	Green	Green	Green	Green
Imo State Water Corporation, Owerri	Orange	No data	Green	
Jigawa State Water Board	Red	No data	Red	Red
Kaduna State Water Board	Red		Red	Red
Kogi State Water Board	Red	No data	Red	Red
Office National de l'Eau et de l'Assainissement	Red		Green	Red
Ondo State Water Corporation	Green	No data	Green	
Societe de Patrimoine des Eaux du Niger	Green	Green	Green	Green
Société des Eaux de Guinée	Red	Red	Red	Red
Societe Nationale des Eaux du Benin	No data	Red	Green	Red
Societe Senegalaise des Eaux	No data	Green	Green	Red

Most of the information pertaining to Nigerian water utilities is missing and thus not shown above.

Other utilities have also not provided sufficient data, such as Ghana Water Company Limited and SEEG (Gabon).

It seems that ONEA in Burkina Faso, which had exhibited one of the best performances in previous Sections of this report, is providing very little water to its customers (on average less than 40 liters per capita per day of which 25 liters per capita per day is subsidized). This may be due to resource unavailability or simply a large number of households sharing connections, or both.

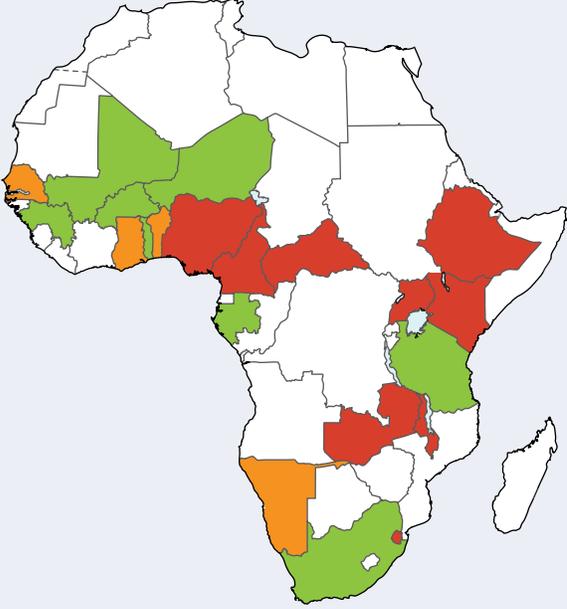
Some utilities are performing very well, with good performance in each of the categories above: EdM in Mali, SPEN in Niger, and SDE in Senegal (despite reporting incomplete data on volumes available in liters per capita per day).

3.5 Summary of Technical and Financial Performance

A summary of the technical and financial performance discussed in this report is presented in Table 34, by indicator.

Table 34: Summary of technical and financial performance

Indicator	Key findings and commentary on performance
<p>Coverage of water supply and sanitation services</p>	<ul style="list-style-type: none"> • Water supply coverage has remained stagnant at 59% overall as utilities/countries have not been able to exceed population growth. This means that the number of unserved households continues to increase. • Three groups appear: <ul style="list-style-type: none"> o Some countries (in green) have reached the water MDG (Ethiopia, Zambia, and Swaziland) but will need to continue their efforts beyond 2015 to prevent coverage from reducing. o Others (in amber) are within +/-5% or have seen a recent reduction (Tanzania, South Africa, Niger, Mali, Burkina Faso, Senegal, Gabon, and Guinea): these will need to increase their efforts to ensure that the rate of new connections exceeds population growth. o Some countries (in red) fall short of the MDG and are likely to fail achieving the target unless significant technical support and investments are provided (Kenya, CAR, Cameroun, Nigeria, Benin, Togo, and Ghana). <p><i>Urban water supply coverage (2009 estimate)</i></p>

Indicator	Key findings and commentary on performance
	<p data-bbox="509 222 1008 254"><i>Urban sanitation coverage (2009 estimate)</i></p>  <ul data-bbox="509 1014 1463 1541" style="list-style-type: none"> • Sanitation coverage has increased but remains low: 42% coverage in Eastern Africa and 53% in Southern Africa. No figures for Western and Central Africa are presented as sanitation service provision is the responsibility of local government (except in Senegal and Burkina Faso). • Efforts to achieve the MDG need to be increased in all countries (even those that appear to have already met the target) as it is likely that urban population growth will continue and will concentrate in the poor unserved areas, potentially leading to a net reduction in coverage. • The definition of coverage needs to be improved throughout the region and take into account the fact that a large number of households share connections or use water from communal taps and kiosks. This needs to feed into pro-poor targets that are developed from the bottom up at the utility level and gathered, monitored, and supported at the national level.
Nonrevenue water	<ul data-bbox="509 1583 1430 1829" style="list-style-type: none"> • NRW has remained stagnant at 32% overall in 2009. This means that a large proportion of additional volumes into supply (a 33% increase over the period) are lost, and that significant efforts, both in terms of technical assistance and funding, need to be spent to reduce losses. • The best performers are Western African utilities (25%); worst performers Eastern Africa (41%)—although only limited data were obtained from Nigeria.

Indicator	Key findings and commentary on performance
	<ul style="list-style-type: none"> • Efforts to manage and reduce NRW need to be increased. Significant investments are required in technical assistance and water mains rehabilitation.
Continuity of supply	<ul style="list-style-type: none"> • Continuity of supply has remained stagnant at less than 17 hours per day on average, with many utilities supplying water for less than 12 hours per day. None of the Eastern African capitals have 24-hour supply, whereas most Western ones do. • Poor continuity of supply needs to be analyzed in more detail through WOP as it impacts on all other KPIs (in particular, NRW and water quality). • It is considered that poor continuity of supply is a disincentive to serve the poor as utilities are incentivized to seek to maximize revenues by selling water to higher income consumers (domestic and industrial).
Metering	<ul style="list-style-type: none"> • Metering is still low with only 35% utilities reporting 100% metering; 31% (mostly in Nigeria) have zero metering. This means that utilities are less able to report accurate volumes produced and sold, which is likely to further impact NRW and demand management, as well as overall business planning.
Burst rates	<ul style="list-style-type: none"> • Burst rates have increased, suggesting that the performance of utilities is deteriorating, with extremely high burst rates (80% greater than one burst per km per annum), with worst performance in Eastern Africa (greater than five bursts per km per annum). There is a strong correlation between high burst rates and high NRW levels (expressed as % of water produced). • This highlights the extremely poor condition of watermains and/or the lack of knowledge on utility assets and means that significant investments are required.
Water quality	<ul style="list-style-type: none"> • Water quality has improved but only 72% of samples (by volume) pass the residual chlorine test. This is very poor performance and suggests that most utilities provide water that is unfit for human consumption. • Poor water quality highlights poor management and condition of the water supply network, and is likely to be exacerbated by low continuity of supply.
Collection efficiency and collection period	<ul style="list-style-type: none"> • There has been some improvement in collection efficiency and collection period in all regions: Eastern Africa from 78% to 83%, Southern Africa from 84% to 90%, and Western and Central Africa from 94% to close to 100% (although most Nigerian utilities have not been able to report). • Government and institutional customers are still not paying bills on time. This is causing poor performance in collection period and further eroding utility revenues in the region.

Indicator	Key findings and commentary on performance
Operating cost coverage ratio	<ul style="list-style-type: none"> • There has been some improvement but the ratio is still too low (101% to 106% on average). There is mixed performance in East Africa: Nairobi and Addis have deteriorated; Kericho and Nyeri have improved. Majority of other regions have improved—but Southern Africa regional average is still lower than 100%. • This shows that utilities are barely able to recover their operational costs from customers' bills—and thus are likely to require continued government subsidies to continue providing services. • Most utilities in francophone Western and Central Africa charge customers for full cost recovery tariffs, meaning that OCCRs are often in excess of 200%.
Unit consumption	<ul style="list-style-type: none"> • Overall unit consumption has reduced. A large number of utilities are failing to deliver the basic 50 liters per capita per day: 50% in East Africa, 54% in Western and Central Africa and only 5% in Southern Africa (even in South Africa). • This means that whilst utilities have tried to increase coverage, this has been at the expense of unit consumption—despite a significant increase in water produced AND lost.
Subsidy targeting	<ul style="list-style-type: none"> • A large number of utilities are failing to deliver adequate volumes of water to their customers (even equal to minimum accepted standard of 50 liters per capita per day): 50% in East Africa and 54% in Western and Central Africa (5% in Southern Africa). • An even higher proportion of utilities are unable to deliver a sufficient volume of basic water for drinking, cooking and washing, as they are failing to take into account the implied HH size (equal to population served divided by the number of individual house connections) when designing their first tariff step (when IBTs do exist). This means that poor households in these services areas (municipal and national), are not connected but are subsidizing the consumption of non-poor households that are themselves likely to be connected (and use more than 50 liters per capita per day). • 71% of utilities in East Africa have a subsidized water volume which is significantly lower than 50 liters per capita per day, 47% in Southern Africa (and even in South Africa where only Johannesburg delivers 50 lcpd actually for free); and 31% in Western and Central Africa (with ONEA delivering barely 40 liters per capita per day of which 25 is subsidized). • Increasing block tariffs are poorly sized (the steps are too large) and consumption subsidies are poorly targeted: this provides little incentives for utilities to serve the poor. This is a major shortcoming which is typical of IBT structures but, as of 2009, remains to be rectified.

Indicator	Key findings and commentary on performance
	<ul style="list-style-type: none"> <li data-bbox="511 260 1442 506">• The implied average HH size is significantly greater than the actual HH size—meaning that utilities are not aware that a large number of their customers (who are likely to be the poorest) actually use their neighbors’ individual house connections and are therefore also likely to attract higher tariffs, defying the very purpose of the IBT. Implied HH size varies from five (actual) to 25 in Eastern and Southern Africa; and from five to greater than 400 (in some Nigerian utilities). <li data-bbox="511 548 1446 646">• Not only does this suggest that poor households are still not being served adequately and equitably, but also that coverage estimates reported by utilities are, therefore, likely to be based on very uncertain assumptions.

3.6 Services to the Poor

Participating utilities in this second phase of performance assessment and benchmarking expressed the need to learn specific approaches that can be implemented in the Sub-Saharan Africa region to expand services to the poor, and to sustain these services. Thus the assessment of the degree to which utilities were serving the poor has been included in this phase of WOP.

The Section draws on the information collected from utilities via the USAQ and follows detailed discussions and presentations by utilities during each of the regional workshops in Naivasha, Kenya (for Eastern African utilities), Lusaka, Zambia (for Southern Africa utilities), and Dakar, Senegal (for Western and Central African utilities). The objective is to comment on what the key issues are with serving the poor, identify some of the approaches implemented by the utilities that responded to the USAQ, and then to link these with some of the overall performance data, in particular, coverage.

The provision of services to poor households continues to be a major challenge for all urban utilities in Africa. Population growth, which is a combination of internal growth and rural-urban migration, is highest in the informal settlements where men and women come in search for better livelihoods. Utilities are often faced with the difficult reality that services cannot be provided in unplanned or illegal settlements, such as floodplains,

steep slopes, pipeline reservations/way-leaves, and other public land with already identified uses.

In this context the residents in informal settlements have developed coping mechanisms to obtain water, whether it is safe to drink or not. Typically this involves obtaining water from illegal connections/yard taps (or any water that flows from the burst watermains), purchasing water from formal and informal street sellers and vendors (whether the water is safe to drink or not), even using shallow wells and streams or, in the best of cases, obtaining water from dedicated kiosks constructed and managed by the utility—on the outskirts of the settlement (where formal infrastructure can be provided). It is widely recognized that poor households in these circumstances pay anything from 10 to 50 times more for water than households that have a house connection.

The size of the informal sector market can sometimes be significant, as in the case of Ghana (Accra) where formal water tanker associations represent the informal services provided by a cohort of more than 300 tanker trucks and an equally large number of pushcart operators. It is not unreasonable to assume that there are considerable quality issues with the water being distributed and consumed through these means.

Initiatives that are geared to improving services to the poor tend to focus on providing access to water—house connections, yard taps or kiosks—when the

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informal nature of the settlements, and individual land tenure, is not an issue for infrastructure development. Once households are 'connected' (or once there is a sufficient number of available connections, whether individual, shared or kiosks) the priority is to ensure that the tariff structure is reflective of the total population and number of connections that are used (see the Section on the targeting of subsidies). Often tariff structures are poorly targeted and do not reflect the reality that poor households share connections or buy water from resellers. In such instances poor households actually pay much higher for water, and end up subsidizing non-poor households that are connected.

Utilities that are struggling to recover revenue from large customers, that cannot invest in infrastructure rehabilitation, and recruit and retain good staff, are caught between increasing losses (technical and financial) and dwindling revenues. These circumstances are reflective of the majority of utilities in Africa and provide disincentives for utilities to focus on serving the poor—although the demand from the poor areas (whether these are planned or not) can be significant. **The previous chapter concludes that utilities have weak incentives to serving poor households when their own performance is poor, and that significant additional efforts are required to improve efficiency and rehabilitate watermains prior to or in parallel with expansion.**

Given this context, policy makers and utilities need to address the very fact that utilities that are not providing services (increasing coverage) to unserved (poor) areas are facing the risk of becoming redundant—at least in these areas.¹⁹ **Addressing the needs of poor households with technically appropriate and demand**

responsive delivery mechanisms that include cost effective levels of service, easy-to-use and easy-to-pay-for water and sanitation services, and options for increasing access quickly (for example, amortization of connection costs) is paramount.

Some of the utilities that have participated in this assessment have already risen to the challenge, often with significant positive impacts on their financial sustainability. Their experiences are summarized below and are categorized into institutional, financial, technical, and socioeconomic approaches.

Principal findings:

- There are a significant number of pro-poor services that utilities in Africa currently provide. The main drivers that have a direct impact on the poor (in terms of coverage of water supply services) are as follows:
 - **Clear strategies and targets** to expand services into low-income settlements, supported by dedicated **pro-poor units** at utility level that improve the planning and management of service provision in poor areas, and which act as the focal point for all interactions between the utility and low income consumers.
 - **Multiple levels of services and modes of payment**, thus giving customers a real choice (in particular, paying in installments/amortized cost of connection). This can be found in Eastern and Southern Africa. In the Western and Central African region a number of utilities (and their government partners) have implemented social

¹⁹ Some utilities in East Africa are responsible for providing services to a significant proportion of poor households: in Kisumu, 50–60 percent; and Nairobi, 30–40 percent.

connection policies targeted to all domestic households—with excellent impact on overall water supply coverage.

- Once the two conditions above have been set, other important aspects of service expansion into unserved settlements include:
 - **Partnerships with community-based organizations** (CBOs) and the local private sector (principally for planning, design, and construction of service expansion) and for delivering results at scale.
 - **Consumption subsidies in the form of increasing block tariffs**, although these can only benefit poor households once they are connected to the network (more discussion on the targeting of subsidies is included in Section 3.4.4), either following a social connection program or amortized payment of the cost of connection.
- Only half of the utilities in this assessment have reported having strategies and targets for expansion of services into unplanned areas (most of them are in Western and Central Africa). This is a significant hindrance, in addition to population growth, to any public and private initiatives destined to increasing coverage.

3.6.1 Pro-Poor Services Currently Provided

The utility self-assessment questionnaire posed the following questions:

1. Does the utility have a mandate to serve the poor?

2. Has the utility developed a strategy to do so?
3. Does the utility have targets to increase coverage in unserved areas?
4. Does the utility propose a choice of water supply services to poor households?
5. Does the utility propose a choice of sanitation services to poor households?
6. Does the utility offer poor households the possibility to pay for connections in installments (that is, amortization connection period)?
7. What forms of subsidies are available to poor households?
8. Does the utility have a pro-poor unit?
9. Does the utility have a social connection program (for example, first time new domestic connection fund)?
10. Finally, has the utility entered into partnerships (formal and informal) with external specialists such as CBOs and the local private sector (even if informal)?

The responses to these questions are analyzed on a subregional basis and compared with subregional water supply coverage figures.

Water utilities that participated in the assessment have implemented the following actions to better serve the poor:

- ✓ Development of a pro-poor strategy and annual targets to serve the poor (although only 50 percent of utilities have reported doing so).
- ✓ Setting up of dedicated pro-poor units (for example, in Nairobi and Kampala).
- ✓ Multiple levels of service for water supply and sanitation (most utilities, but eThekweni Water Services in particular).

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- ✓ Amortized cost of connection.
- ✓ Social connection programs (in particular in Western and Central Africa) which benefit all customers, including the poor (although the actual degree of benefit to the poor is difficult to assess).
- ✓ Consumption subsidy (discounted or free basic water).
- ✓ Partnerships with CBOs and local private sector providers.

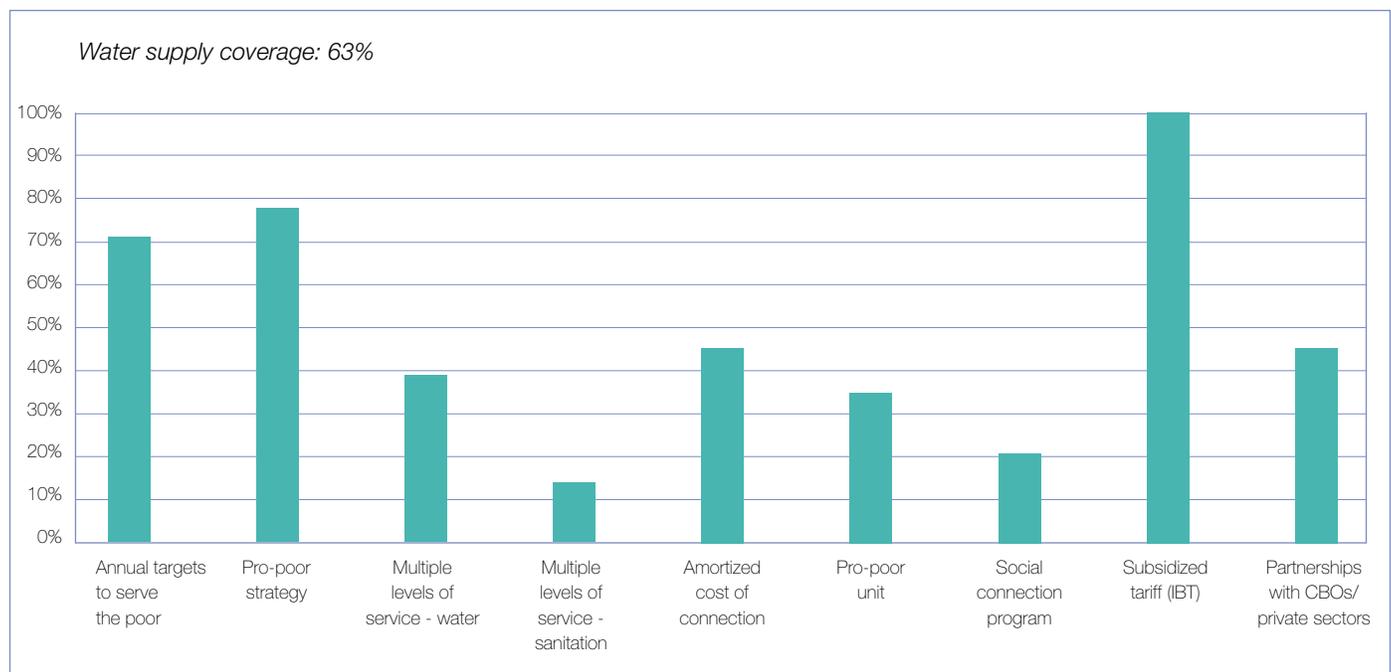
3.6.1.1 Pro-Poor Services Provided in the Eastern African Region

The type of pro-poor services provided by Eastern African utilities are summarized here.

Key observations:

- Coverage in the region is excellent except in Kenya. This brings the regional average down to only 63 percent (see Section 3.2.1 on coverage of water supply). A significant proportion of utilities report having pro-poor strategies (80 percent) and annual targets in place to serve the poor (70 percent). This is the highest in the region.
- Whilst 40 percent of utilities consider they are giving customers a choice of level of service, nearly 50 percent of utilities also help customers connect in the form of an amortized cost of connection. This is believed to be the single largest contributing factor to improving services in poor settlements.

Figure 54: Pro-poor services from Eastern African utilities



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- Only a few utilities in the region report having implemented a social connection program.
- All utilities in the region provide a consumption subsidy (to those who have access to house connections) in the form of increasing block tariffs, and close to 50 percent report working in partnership with community groups and local private sector entrepreneurs.

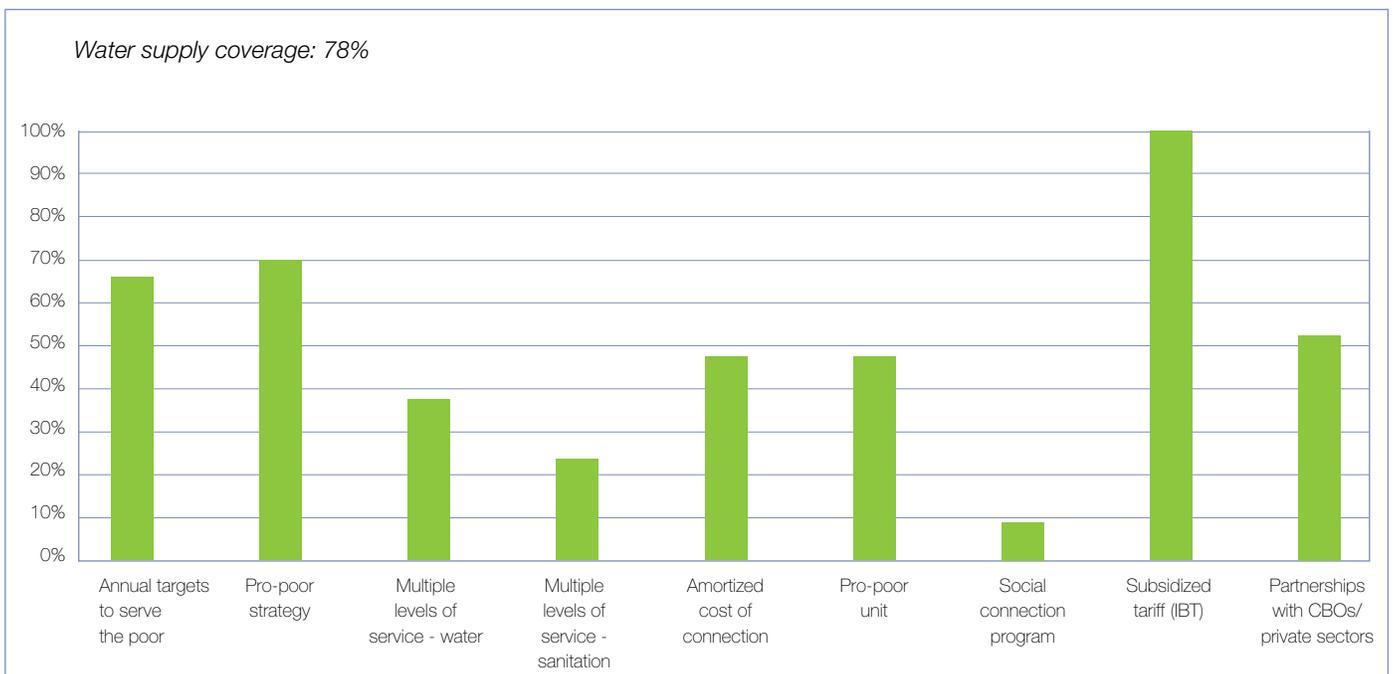
3.6.1.2 Pro-Poor Services Provided in the Southern African Region

The type of pro-poor services provided by Southern African utilities are summarized here.

Key observations:

- Coverage in the region is the highest in Africa at 78 percent. This is due to the fact that utilities have clear strategies (70 percent) and targets to serve poor households (65 percent), pro-poor units (50 percent) that guide the interventions in poor areas, multiple levels of service and modes of payments (50 percent) which poor households can choose from, as well as project delivery partnerships with CBOs and the local private sector (50 percent).
- The fact that only a few of the utilities have social connection programs does not seem to impact on the level of coverage achieved—rather, this is

Figure 55: Pro-poor services from Southern African utilities



affected by adequate planning for services and helping poor households pay for connections in installments (amortized cost of connections).

- All utilities provide a consumption subsidy in the form of increasing block tariffs, which is likely to benefit a large number of households that are connected (including the poor). The Free Basic Water Policy in South Africa is based entirely on IBTs and, in the case of Durban, on levels of service that help households manage their own consumption.
- High water supply coverage in the subregion is driven by the large utilities in South Africa (Durban, Pretoria, Johannesburg) and in the significant investments and innovative delivery mechanisms mobilized to expand services into poor areas, financially sustainable, and at scale.

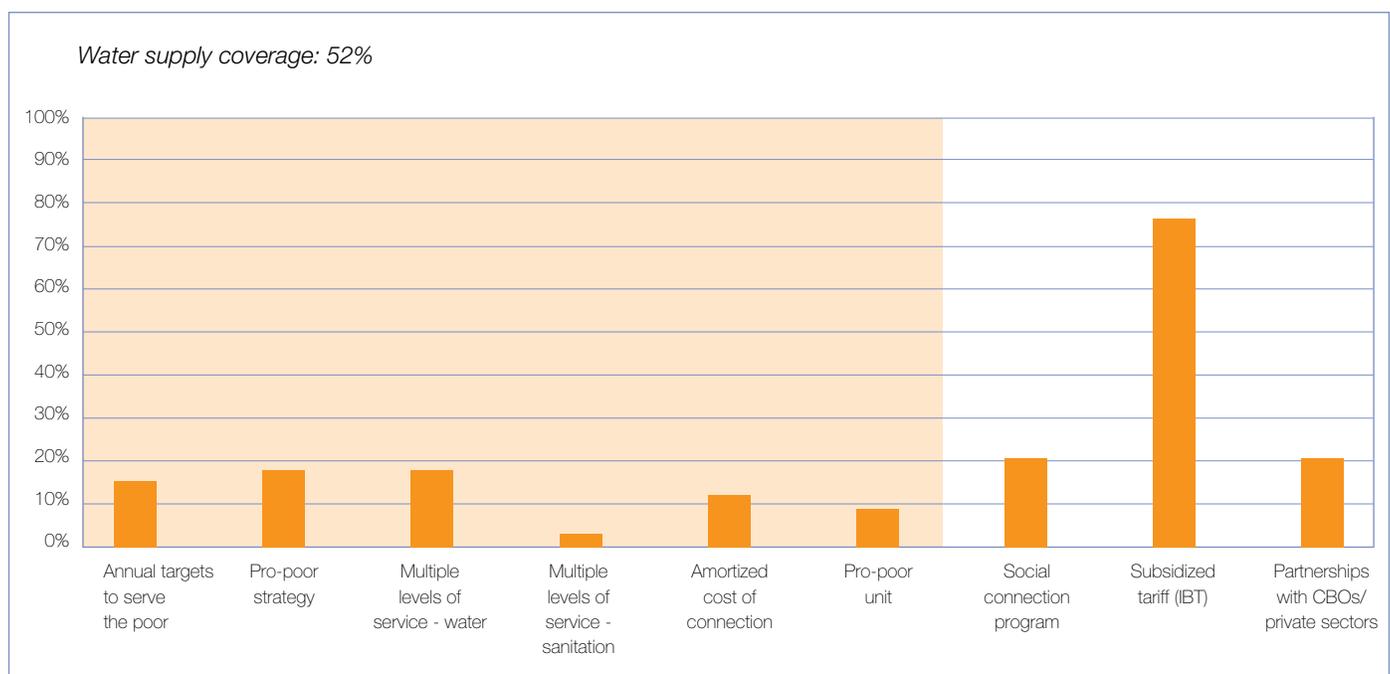
3.6.1.3 Pro-Poor Services Provided in the Western and Central African Region

The types of pro-poor services provided by Western and Central African utilities are summarized here.

Key observations:

- The number and type of pro-poor services developed by Western and Central African utilities is markedly different from the Eastern and Southern African regions. As a consequence, the overall level of coverage of water supply services in the region is much lower. However, poor coverage figures in Nigeria (45 percent), Cameroon (42 percent), Benin (57 percent), Ghana (55 percent), CAR, and Togo hide excellent results achieved in Burkina Faso, Gabon, Guinea, Mali, Niger, and Senegal.

Figure 56: Pro-poor services from Western and Central African utilities (2009)



- The combination of low numbers of utilities with strategies and targets to serve the poor (with low number of pro-poor unit) and the lack of choice of level of service and mode of payment to serve the poor has a significant impact on coverage: these are two main drivers of expansion of services into low-income settlements.
- Seventy-five percent of utilities provide a consumption subsidy in the form of IBT: this is the single largest pro-poor service provided in the region. However, this does not actually help poor households as these are not connected (and have to purchase water from vendors or share connections).
- Strategies and targets for expansion in unserved areas—to be developed at utility level and centralized, monitored, and funded at central government level. This can involve other stakeholders as well, such as local or international private operators (under a number of contractual frameworks), nongovernmental organizations (NGOs) and CBOs. The importance is for pro-poor service to become a clear target of the sector, and to align investments with targets. Performance based contracts (at utility or at individual staff level) are also useful in focusing priorities. Not to forget that the responsibility to invest in service expansion (whatever the choice of model considered) is the responsibility of government (delegating authorities in Western and Central Africa, water boards in Kenya, municipalities in Southern Africa, and so on).

3.6.2 Additional Pro-Poor Approaches

This Section describes in more detail the lessons learned from a number of utilities across the region. These lessons are categorized into institutional, financial, technical, and socioeconomic approaches.

3.6.2.1 Institutional Approaches

It is important for government, development partners, and utilities to consider at what level in the political decision-making process (and institutional framework) the needs of the poor (and strategies to address these needs) are included.

Key lessons:

- Overall definition of service areas: The responsibility for providing water supply and sanitation services needs to be clarified. If it is the responsibility of utilities then the service areas of the utilities need to include poor settlements (including the unplanned areas).
- Corporate objectives to increase coverage to all customers, in general, and to specifically targeted customers in particular.
- Pro-poor units to plan, design, and manage construction of water supply and sanitation services into unplanned/poor areas, but also to act as focal points with external stakeholders.
- Contractual incentives, including payments and penalties, bearing in mind the responsibilities (performance targets and levels of investment) of all parties to the contracts, in particular, the public sector. The best performers are those whose performance contracts enshrine financial sustainability (often referred to as the 'financial equilibrium' clause), and therefore tariff increases, timely payments by government/institutional customers, levels of investment required and outputs to deliver. Sustainable services to the poor are only realistic if utilities are already reasonably well performing and commercially managed.

Nairobi, Dar es Salaam, Kampala, and Lusaka's experience with setting up pro-poor units is summarized in Box 8.

Box 8: Experience with setting up pro-poor units in Nairobi, Dar es Salaam, Kampala, and Lusaka

Background

- In 2006, only 35% of urban residents in the Sub-Saharan Africa region had an individual house connection.
- The majority of new customers will be poor households living in inner city slums.
- Few utilities have the mandate, organizational structure, incentives, and skills to address the challenges of serving the poor.

Implementing a pro-poor strategy

- Utilities need to take a leading role in service all urban consumers and need to work with NGOs, CBOs, and the local private sector (instead of letting them implement their own piecemeal approaches).
- A pro-poor unit within the utility (that is familiar with the technical, commercial, financial, and socioeconomic challenges of service provision in poor settlements) can proactively lead efforts in: increasing access and coverage; increasing revenue; reducing water losses; and improving relations with poor consumers.
- The pro-poor unit can decide on its area of focus: Corporate planning? Capital works? O&M? Billing and revenue collection? Or a combination of the above?

Purpose in different utilities

- Nairobi (at operator level): to coordinate donor and partner activities; implement capital works programs (in coordination with the asset holder);

and provide guidance and support to branch offices for O&M and social issues. Manager reports to the technical director.

- Dar es Salaam (at asset holder level): to implement and supervise the community-managed water and sanitation schemes; also responsible for DAWASA public relations and implementing the resettlement action plan. Manager reports to the CEO.
- Kampala (at operator level): to execute NWSC's mandate to help meet the MDGs by providing support to NWSC branches in Kampala; and to work with HQ and donors to implement capital works programs targeting the urban poor. Manager reports to GM of Kampala and project manager of Urban Poor at HQ.
- Lusaka (at operator level): coordination, implementation, and operation of services in peri-urban and informal settlements. Manager reports to commercial director. (*Note: Lusaka Water's pro-poor unit is also helped by the Devolution Trust Fund which is housed within the regulator's office.*)

Staff skills required

- Participatory assessments.
- Participatory planning and design.
- Identification and mobilization of key stakeholders (internal and external to the utility, including development partners).
- Liaising with small scale providers.
- Using appropriate technologies.

See: WSP. 2009. Setting up pro-poor units to improve service delivery: Lessons from water utilities in Kenya, Tanzania, Uganda and Zambia. WSP Field Note.

3.6.2.2 Financial Approaches

Financial approaches for improving services in poor areas include:

- Approaches designed to increase coverage/access, such as connection subsidies, social connection programs, and options available to households to pay the cost of connection in installments (amortization).
- Approaches designed to increase consumption (or subsidize basic consumption), such as IBTs.

This additional money available to utilities for providing services to the poor can be raised in a variety of ways:

- Through government taxes or vouchers (for example, the vouchers provided by the government for water

supply connections to the poorest households in Tabora, Tanzania).

- Through tariffs and cross subsidies (for example, Senegal and Uganda for the social connection program, and most other countries for consumption subsidies via IBTs).
- Through local private sector (for example, in Kenya with K-Rep bank, a commercial bank specializing in microfinance lending) or donors (for example, GPOBA projects in Cameroon, Kenya, and Uganda).

The workings of the social connection programs in Uganda and Senegal are summarized in Boxes 9 and 10, respectively. Kenya's experience with K-Rep Bank is summarized in Box 11; the principles of output-based aid subsidies used in Kenya, Cameroon, and Uganda are summarized in Box 12.

Box 9: The social connection program in Uganda

Background

- National Water and Sewerage Corporation is the national water service provider in urban areas and small towns.
- Driving forces for the social connection policy: stagnation in growth of customer base; need to provide for the less privileged; high NRW associated with leakage due to poor service pipes installed by customers; and low capacity utilization/need to increase capacity utilization.
- Legal and strategic basis: Corporate Plan 2003–2006; performance contract with government 2003–2006; PRSC: World Bank support US\$150 million.
- Rationale: inability of many consumers, especially the poor, to afford the one-time upfront connection charges; need to increase access, encourage yard taps as opposed to standpipes and thereby reduce real prices of water to urban poor; connection subsidies have proven more effective than consumption subsidies.
- Need to standardize materials for connection: need to adequately maintain service pipes up to meter to reduce water losses; need to increase NWSC revenue by raising demand (that is, number of subscribers); need to reduce water losses.

Implementation strategy

- Customers pay reduced connection fee, \$35, for domestic (the cost of meter).
- The NWSC pays for materials (DN15, PN10), including supply and installation of service pipes, fittings, trenching, and road reinstatement costs (total cost of connection is approx \$150 assuming 50 m pipe length; so a total cost of about \$1.7 m for 12,000 domestic connections per year).

- The NWSC pays for maintenance of all lines (all lines became the property of the Corporation by law).
- Customers within a distance of 50 meters from the NWSC service pipe to be included (excess to be met by customer).
- Policy financed through a surcharge on the tariff (10% surcharge only) which is collected in a dedicated social connection fund.

Impact of policy

- Increased demand for new connections and improved service coverage; the rate of new connections has doubled from 10 to 20,000 per year; payment of water bills is prompt; many of the new customers were poorer customers who used less than 10 m³/month.
- Policy has led to formulation of the sewerage connection policy in 2006–2007.
- Improved leakage control resulting from standardized materials and improved workmanship.

Challenges

- Demand may overwhelm ability to implement new connections.
- Need to ensure effective network expansion.
- Need to streamline and fast track procurement of materials to avoid lags.
- Land ownership issues may slow down or hinder the smooth implementation of the policy.
- Increasing input costs may strain the cash flow for the policy.
- Challenge of accurately measuring the beneficiaries of the policy, especially the poor.

Box 10: The social connection program in Senegal

Background

- The urban water sector in Senegal is managed under a lease (affermage) type contract—with SONES as the asset owner (mainly responsible for investments) and SDE as the operator (mainly responsible for service provision). The SDE's performance is regulated through the PSP contract with SONES.
- Senegal opted early on for individual house connections (including standpipes) as the principal delivery mechanism and put in place a social connection policy in the 1970s.
- This has significantly boosted coverage in the urban areas to 98% in 2010, of which 10% is coverage of kiosks and communal water points (the rest being individual house connections). In 1996 coverage was 80%, with 22% from kiosks and communal water points.

Social connection program

- Eligibility criteria: geographic (targeted areas of Dakar, the outskirts and interior towns); individual connections are for domestic use (households); all houses connected are within 20 m of the distribution main and the connection is 15 mm diameter. Social connections are mostly standpipes.
- Documents required: certified photocopy of ID documents and certificate of land/plot ownership (or authorization from the landlord).
- Costs: beneficiaries pay an advance on consumption only (equivalent to \$27), and no connection cost (total subsidy includes \$200 for the connection and \$12 for the survey/design). All new connections under the social connection program are identified and pay by the asset owner, SONES.
- Progress: 154,000 new connections were made between 1996 and 2009 (thus an additional 1.5 million population served) focusing on the poor

(which is 71% of the connections made in that period). The total number of connections has more than doubled since 1996. Going forward, an additional 51,000 new connections are planned.

Social tariffs

- IBT and cross subsidies between different customer categories; social tariff for domestic consumption of less than 10 m³ per month (that is, 35 liters per capita per day). Social tariff at \$0.38 per m³ (whereas kiosk tariff is \$0.64 per m³).
- Social tariff does not attract VAT and has not increased since 2003.
- Billing is done every other month for small diameter connections (for example, domestic connections) but monthly for large consumers. Households can also opt to pay their bills in staged payments if these are high.
- To prevent overcharging of households that share connections, the SDE has installed meters at the subdivision level (that is, within compounds and between families).

Factors of success

- Clear allocation of roles and responsibilities (and compliance with these roles) as stipulated in the performance based lease (affermage) contract.
- Management focused on customer satisfaction and environmental protection.
- Constant attention to customers' needs, with Freephone number and dedicated cockpit for maintenance of the network, two annual meetings with customer representatives, frequent customer satisfaction surveys.
- Tariffs that balance sector needs with customers' ATP.
- Permanent dialogue and climate of trust with all stakeholders.

Box 11: Financing small piped water systems in rural and peri-urban Kenya

Background

- Community run small-scale systems play a critical role in supplying consumers in the peri-urban and rural areas of Kenya. Such providers, however, experience problems that hinder their ability to provide reliable services and expand coverage, including: limited management capacity; low operating revenues, and lack of access to finance.
- Alternative financing mechanisms, therefore, have a crucial role to play in supplementing sector budgets in those areas. However, at the same time, domestic banks do not typically finance investments in water infrastructure because of the long term nature of such assets, and the perceived lack of creditworthiness of small-scale water providers.

Approach

- To address this, a program to finance such investments was initiated in Kenya in 2006, with investments of up to \$160,000 (per scheme) prefinanced with 20% equity as community contribution, and 80% debt from K-Rep Bank, a local commercial bank specializing in microfinance lending.
- Loans have a grace period of one year (mostly during construction), followed by a five-year loan repayment period (on the basis that loans are not

backed by significant asset bases). Loans are priced at market interest rates (16–18%).

- At the pilot stage, a GPOBA subsidy of 40% of total project costs was paid to eligible communities upon satisfactory delivery of service delivery and revenue collection efficiency outputs (subsidy goes towards reducing the principal loan amount).

Results

- In the pilot phase, \$1 million was lent to 10 community projects; total subsidies of \$450,000 over the period.
- All projects were successful and successfully moved into the loan repayment phase; 36,000 house connections were made.
- Revenue collection tripled from \$17,000 to \$50,000 per month.
- Projects have been able to meet debt service costs from water sales alone.

Going forward

- The project is being scaled up with additional subsidy of \$2.2 million from the EU's Water Facility.
- K-Rep Bank has committed to a revolving credit facility of \$3.2 million to financing investment in water projects countrywide.

See: WSP. 2011. Sustainable Services through Domestic Private Sector Participation: Financing Small Piped Water Systems in Rural and Peri-Urban Kenya. WSP Working Paper.

Box 12: Output-based connection subsidies in Cameroon, Kenya, and Uganda

Background

- The GPOBA is a partnership of donors and international organizations working together to support output-based aid (OBA) approaches. The GPOBA's mandate is to fund, design, demonstrate, and document OBA approaches to improve delivery of basic infrastructure and social services to the poor in developing countries.
- The goal is to mainstream OBA approaches with development partners, including developing country governments, international financial institutions, bilateral donors, and private foundations. Mainstreaming is defined as OBA being used on a regular basis in project design.

Workings of OBA projects

- OBA is an innovative approach to increasing access to basic services—such as infrastructure, healthcare, and education—for the poor in developing countries. OBA is used in cases where poor people are being excluded from basic services because they cannot afford to pay the full cost of user fees such as connection fees.

- OBA is also known as 'performance-based aid' or 'results-based financing' (in the health sector). It is part of a broader donor effort to ensure that aid is well spent and that the benefits specifically go to the poor.
- An output-based subsidy ex-post is paid to a service provider upon achievement of clear predetermined outputs (in the case of water supply: a connection to a poor household that wants one). The principal aspects of OBA projects are: expressed demand for improved services (through detailed ATP and WTP surveys); specific targeting of poor households; subsidy cost efficiency (which can be achieved through tendering of the private sector); financial sustainability of service provision (that is, adequate O&M and tariffs); potential for replication to other parts of the service area/country/region; and innovative service provision.
- Services have to be provided to poor households (that is, prefinanced) before the service provider can become eligible for subsidies upon satisfactory delivery of predetermined outputs (these are assessed independently by a third party usually appointed by the GPOBA).

COUNTRY/ project	Output and number of outputs	Total number of beneficiaries	Funding sources	Total GPOBA subsidy (\$)	Subsidy efficiency (\$ per capita)	% complete
CAMEROON: Water Supply Affermage Contract	Water connections: new; \$260.	40,000 (240,000 beneficiaries).	Private prefinancing.	5,250,000	22	7%
KENYA: Microfinance for Community-Managed Water Projects	Water connections: Greenfield with CAPEX (\$1,140) and rehab (\$125)	25,000 connections (150,000 beneficiaries).	Government prefinancing.	2,930,000	20	30%
UGANDA: Water Connections for the Poor in Kampala	Water connections: yard taps (\$173), public water points (\$384), and prepared public water points (\$1,325).	20,000 (410,000 beneficiaries).	Government prefinancing.	2,257,100	6	16%

3.6.2.3 Technical Approaches

Utilities have developed context-specific technical solutions to connect as many households as possible to sustainable water supply services. Some have relied on a combination of individual house connections, standpipes, and kiosks. Others however, as is the case with Durban Metro Water Services, have developed a large array of water supply and sanitation services, each priced and charged differently. These are summarized here.

For water supply these include:

- Three levels of service for water supply that take into account the available network pressure, which is itself regulated to correspond with the communities' ability to pay for water. In the case of Durban (eThekweni Water Services) this has led to the development of:
 - o Full pressure individual house connections, typical of individual house connections elsewhere (but in this case a number of diameters are proposed).
 - o Semi-pressure house connections, where network pressure, and thus flow, is restricted by flow limiting devices which help households regulate their monthly consumption. Semi-pressure house connections are usually associated with roof tanks—which help increase pressure (and thus flow) at the tap. Both full and semi-pressure systems can co-exist in the same neighborhoods.

- o Low pressure connections which limit consumption to 200 liters per day. Drinking water is provided to individual ground tanks and yard taps, either automatically through a trickling ball valve and stopcock mechanism, or manually to a group of ground tanks from a larger diameter valve. Ground tanks are developed in formal areas that are very poor (including informal areas that have recently been formalized).

- Ablution blocks, which combine water supply and sanitation services, and are separate for men and women. These blocks are installed free of charge in all informal settlements. The utility is exploring ways to incorporate solar powered lighting inside each of the blocks. Sometimes these abluion blocks are built in shipping containers (typically one pair of such abluion blocks for 55 families) and close to water and sanitation connections (usually the lowest point).

For sanitation these include:

- Normal pour flush toilets connected to the sewerage network (or to community-based wastewater treatment plants).
- Individual and community latrines—often as urine diversion toilet systems installed within abluion blocks or latrines as a means of reusing urine (which is rich in phosphate) for irrigation (dried feces is also reused but to a lesser extent).

Figure 57: Some examples of levels of service in Durban (eThekweni Water Services)



Low pressure (ground tank) yard tap connection.



Semi-pressure connection (with header/roof tank).



Low pressure (ground tank) with yard tap and associated drainage channel (soak away).



Urine separation toilet (the bucket contains ashes to pour into the toilet/pit).



Installation of two ablution blocks (within shipping containers)

Note: All pictures are courtesy of eThekweni Water Services (Frank Stevens).

3.6.2.4 Socioeconomic Approaches to Involve the Poor

Socioeconomic approaches are considered to include approaches designed to improve the relationship between the utility and its customers and the quality of service provided by the utility. They, therefore, involve the complete cycle of service provision—from planning to designing, construction, operating, maintaining, and sustaining service provision.

At the centre of the approach is the fact that the utility is looking for a financially sustainable mechanism for delivering water supply and sanitation services to customers, and thus to improve and sustain its relationship with customers.

Utilities would typically undertake a combination of studies to assess customer ability and willingness to pay for services (given the existing means used to obtain water). This knowledge will help the utility and community representatives to determine what technical options are available to households, how much this would cost the utility to provide, and how much the utility needs to recover (from bills, taxes or municipal subsidies) to provide that service within an agreed

framework of standards, performance targets, and customer expectations.

A number of approaches have been implemented by the utilities that participated in this assessment. This includes:

- Working in partnership with CBOs, the local private sector, and local leaders to develop a service delegation arrangement from the utility to specifically appointed 'master operators' responsible for service provision (including operation, maintenance, billing, and revenue collection).
- Working with community representatives, and different representatives of men and women in particular, to develop technical and payment options for improving water and sanitation services.
- Working with community representatives of community liaison and customer education activities.

A case study of a delegated management model developed and in use in Kisumu, Kenya, is summarized in Box 13.

Box 13: Delegated management model in Kisumu, Kenya

Background

- Total population of Kisumu is about 520,000 (it is the third-largest city in Kenya), with 60% of customers living in informal settlements.
- 80% of NRW is lost in informal settlements due to leaks and illegal connections. Residents in the informal settlements were paying more than 10 times the average tariff for water at a house connection. This contributed to significant customer dissatisfaction which led to vandalism, further affecting NRW. High incidence of water-related diseases due to poor water quality arising from leaks.
- Given the situation it became apparent that a new approach had to be developed to tackle the problem. Following extensive consultation with the communities, representatives, politicians, and NGOs, the concept of a delegated management model (DMM) was developed

Description

- Extended water supply lines into the informal settlement, where the utility is a bulk service provider designated as 'master operators', each responsible for a metered distribution line.
- Each line has flow meter chambers from which customers connect (domestic customers, kiosks, and so on). The KIWASCO thus enters into a bulk supply agreement with the master operators.
- Contracting of master operators: initial selection/screening by community followed by a detailed assessment (by KIWASCO) of the candidates. Each master operator must be a registered group or individual; must come from the community; have expertise and basic level of education; groups must have an organizational structure already in place; experience in the water sector (for example, plumbing), and have a source of finance (bank account, and so on).
- Prior to signing the performance based contracts,

each master operator was trained on: budgeting and record keeping; management; customer care; billing; revenue collection; line maintenance; and quality surveillance.

Results

- A total of 781 connections have been achieved (50% are individual connections and 50% kiosks). Each kiosk serves approximately 50 households. Some customers have retained their individual connections with the KIWASCO. NRW in the pilot project areas has reduced to less than 7%.
- Reduction of staff-customer interface, thus reduced opportunity for corruption.
- Reduced O&M costs for KIWASCO and timely billing and revenue collection (revenue collection has increased by a factor of 13 times in five years).

Lessons learned

- Technical and managerial competence of master operators are key to successful and sustainable operations of the DMM (and service provision to customers).
- Community participation and support is central to the ownership of DMM. Community mobilization in implementation offers an opportunity to marry technical solutions with social concerns.
- Pilot projects require strong communication programs during implementation and post-implementation: messages need to be clear to galvanize the people and address emerging concerns.
- Handholding and back stopping by the service provider is essential at early stages of operations.
- Contract should aim to equitably distribute and allocate risks between parties (in particular, technical and commercial losses).
- Need to provide financial incentives for well performing master operators to spur growth/extensions.

See: WSP. 2009. *Serving the Urban Poor: Improving Water Utility Services through Delegated Management*. WSP Field Note.

Chapter 4. Conclusions and Recommendations

Conclusions

1. Technical performance has remained stagnant over the period: utilities have not managed to increase coverage to exceed population growth; nonrevenue water levels have not been reduced, thus implying that a large proportion of the significant investments in additional water supplies (32 percent increase overall) have gone to waste. This means that the number of poor unserved households is continuing to increase, and that a large number of utilities are likely to miss the MDG targets for water supply and sanitation.
2. High population growth is not the only reason why many utilities are likely to miss the MDGs. Fifty percent of utilities (mostly in Western and Central Africa but also in the other regions) do not have strategies and targets to expand services to poor areas. If utilities continue to turn a blind eye on these increasing unserved populations, they run the risk of becoming redundant in their own service areas as they compete against other, informal and unregulated, service providers.
3. Utilities lack the management systems to adequately monitor and evaluate their own performance, and therefore plan any meaningful rehabilitation works (in particular water mains). This inadequate management of assets contributes to further deterioration, leakage, poor continuity of supply, poor water quality, and so on. Governments and development partners need to help utilities rehabilitate their assets and install modern asset management planning systems prior to or in parallel with infrastructure expansion. It is considered that a significant amount (in volumes and percent) of the water that is lost through leaks can, in fact, be used to increase coverage.
4. Financial performance has somewhat improved, although utilities are only recovering their operational costs and government and institutional customers are still not paying their bills on time. This is further eroding utility revenues and is preventing utilities from improving service efficiency, and is providing a disincentive to serve the poor as the utilities are forced to concentrate on providing water to customers who use more and pay more. Poor technical and financial performance, therefore, exacerbates the lack of services to poor settlements.
5. National, regional, and international utility performance assessment and benchmarking needs to be improved. This starts at the utility level with improved information management systems, but also at national level with improving the planning, monitoring, and evaluation of sector progress against the MDGs.
6. Utilities, governments, and development partners need to work together to help utilities develop concrete and realistic action plans for improving services to the poor: these need to be based on clear strategies and targets, and complemented with adequate and committed financing. The report illustrates a number of technical, financial, institutional, and socioeconomic options that are available for utilities to serve the poor. Utility action plans for serving the poor need to be based on a combination of these.

7. The definition and measurement of water supply and sanitation coverage estimates is currently very poor, in particular when utilities serve a large number of customers through kiosks, shared connections as well as individual house connections. This means that estimates of capital works and investments required to achieve the MDGs are likely to be significantly underestimated (as these are only developed at national level and not at utility).
8. Most, if not all, utilities have IBT structures that are poorly targeted: utilities are not aware that a large proportion of their customers share connections and therefore end up paying a lot more for their water. Utilities first need to increase coverage and then develop tariff structures (consumption subsidies) that are appropriate for their customer base.
3. Utilities in the Western and Central African region (in particular, in Senegal and Burkina Faso) fare much better than the rest because they are run on a commercial basis and have clear roles and responsibilities, performance targets, and payment mechanisms. These are included in a negotiated long-term performance contract (lease type). Similar aspects of these contracts, in particular the role of government (asset owner), can be adopted by all utilities in Africa.
4. Although the performance of Western and Central African utilities has been notably better than the rest it seems that service expansion has led to a reduction in per capita water consumption: whilst significant expansion has taken place (with the use of, for example, social connection programs) it seems that average unit consumption per capita has reduced from just less than 50 liters per capita per day to as low as 15–25 liters per capita per day, suggesting that additional investments in water supply capacity are required..
5. African water utilities are significantly affected by the number of poor households living in their service area—for example, 50–60 percent and 30–40 percent of the customer base in Kisumu and Nairobi, respectively. Utilities that are unwilling or unable to provide sustainable water supply and sanitation services in these poor, often unplanned, settlements, are at risk of becoming redundant (at least in these areas) and losing a significant portion of their potential revenues. Some utilities have developed specific strategies to improve services to unplanned/poor settlements, and these need to be shared across the continent.

Recommendations

1. Utility performance needs to be assessed and benchmarked at the national and regional levels by an independent body—for example, African Water Association, a network of national regulators, and so on. Existing utility performance benchmarking systems need to be improved, data submitted by utilities independently reviewed, challenged and audited, prior to use and publication. Institutional frameworks need to incentivize utilities (for example, bonus and penalties) to report correct and timely information which can be used for overall sector planning and monitoring.
2. Existing international utility performance benchmarking systems can be used, such as IBNET (International Benchmarking Network for Water and Sanitation Utilities, www.ib-net.org), which could also initially be based on a set of simplified KPIs.

Appendixes

The appendixes contain:

- A. The Utility Self-Assessment Questionnaire:
 - a. Paper version.
 - b. Electronic version.
- B. Definition of technical and financial KPIs used.
- C. Utility performance assessment database (electronic version) with summaries for each of the indicators considered in the assessment.



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Appendix A: Utility Self-Assessment Questionnaire (USAQ)

Appendix B: Definition of KPIs Used

Technical KPIs

KPI	Unit	Definition	Reason for selection
Water supply coverage	%	Calculated as the population served (which is the sum of the population served by each level of service: connections, kiosks, communal water points, and so on) divided by the total population living in the service area.	Key overall performance indicator that can be benchmarked against urban water MDG targets. Is used in planning for infrastructure expansion. <i>In this assessment:</i> attention to be given to how service providers estimate the number of people who use (and/or share) water supply connections and communal water points/kiosks.
Sanitation coverage	%	Calculated as the population served (which is the sum of the population served by each level of service: sewerage connections, latrines, septic tanks, and so on) divided by the total population living in the service area.	Key overall performance indicator that can be benchmarked against the urban sanitation MDG targets. Is used in planning for infrastructure expansion. <i>In this assessment:</i> attention to be given to how service providers estimate the number of people who use (and/or share) sewerage connections and on-site sanitation systems.
Nonrevenue water (NRW)	Various, see text	Calculated as the difference between water supplied and water sold; therefore, the volume of water which is lost. Can be calculated and expressed in three different ways: <ul style="list-style-type: none"> • The standard approach is to express NRW as a % of water into supply; • NRW expressed as liters per capita (or connection) per day; and • NRW expressed as volume lost per day by length of mains (m³/km/day), which is the IWA's Infrastructure Leakage Index (ILI). 	Key overall performance indicator that can be benchmarked against utilities' own targets. However, splitting NRW into technical and commercial losses will require more data. <i>In this assessment:</i> NRW indicators to be used will be NRW expressed as (a) overall % of water into supply (the standard way); (b) water losses per km of mains per day (m ³ /km/day); and (c) water losses per capita per day (to benchmark utilities that have large numbers of customers using shared water points).

KPI	Unit	Definition	Reason for selection
Continuity of supply	Hours per day	Average number of hours per day during which customers can access water supply services. This indicator is provided directly by the utilities (and is therefore not calculated separately in this performance assessment). Is usually associated with the number of households/customers who get intermittent supply.	A key indicator of the quality of service provided to customers, which is closely linked to other performance indicators: nonrevenue water; bursts and leaks; water quality; costs of production; unit consumption; customer satisfaction; and WTP for tariff increases.
Unit volume of water produced	Liters per capita per day	Total volume of water into supply (including volume produced and purchased from a bulk supplier) per person served per day. Calculated as the total volume into supply (per day) divided by the number of population served (including population that has access to connections and public water points).	Useful to understand if the utility is able to serve more households without having to resort to producing more water (or investing in water production and transmission infrastructure).
Unit consumption (unit volume of water sold)	Liters per capita per day	Total volume water sold to customers (by customer type) per person per day. Calculated as the total volume of water sold (per day) divided by the number of population served (by customer type—to separate unit consumption at an individual house connection from that consumed at public water points).	Useful to assess whether individuals are getting enough water per day. Also useful in benchmarking any efficiency improvement.
Metering level	%	The percentage of connections with flow meters. Number and % of connections that are metered (called meter penetration rate) and utility's statement on number and proportion of operational meters. However, this is only relevant if utilities are able to report on (a) total number of meters by customer type, AND (b) the condition of these meters.	Useful indicator that correlates well with the utilities' ability to control flows, customer billing and payment collection, and thus financial equilibrium.

KPI	Unit	Definition	Reason for selection
Bursts and leaks per km of water main	Number/km/annum	Total number of reported bursts/leaks per km of water main per annum. This indicator is useful in assessing the condition of water mains — although the overall average (not by type of material used for the pipe) provides only an indication of the condition of water mains.	Useful to assess the overall condition of watermains.
Water quality and water quality monitoring frequency	% and number of tests/m ³ water produced	Two indicators used: <ul style="list-style-type: none"> • Proportion (%) of water quality tests that pass the (utility) residual chlorine test; and • Number of tests undertaken per m³ of water produced. 	Useful to assess the operational practices of the utility and provide commentary on general water quality.
Staff productivity	Number of staff per '000 connections (or capita)	An indicator of the efficiency of a utility with staff productivity index expressed as total number of staff per 1,000 connections.	Useful as a general assessment of labor efficiency. <i>In this assessment:</i> staff productivity will be measured in number of staff per 5,000 population served, to prevent distortions for utilities which distribute a large proportion of water through kiosks, and not connections.

Financial KPIs

KPI	Unit	Definition	Reason for selection
Collection ratio	%	The ratio of cash income (actual revenue) to total billed revenue, expressed as a percentage. Can be greater than 100% if the utility is recovering arrears.	Standard KPI which can be assessed by customer category to determine the collection ratio by customer type (and thus highlight if revenue collection is particularly difficult for a given customer category—for example, government institutions).

KPI	Unit	Definition	Reason for selection
Collection period	Days	Estimates the average time it takes for the utility to collect bills from customers. Calculated by dividing year-end accounts receivable by annual revenues, multiplied by 365 (days). If accounts receivable is 10% of billings then the collection period equals 36.5 days.	Standard KPI which can also be assessed by customer category (if there is sufficient breakdown of year-end accounts receivable). Can be used as a proxy for customer satisfaction or affordability.
Operating cost coverage ratio (OCCR)	%	A ratio that measures the utility's ability to cover its operating costs through revenues from bills, without reliance on external subsidies. OCCRs less than 100% denote a utility that cannot recover sufficient revenue from customers to cover O&M costs, and thus highlights that the utility is relying on external subsidies (which might not be sustainable). Accepted practice is for OCCR to be between 130% and 160% of O&M costs.	Standard KPI.
Overall efficiency indicator	%	A ratio that considers the % water which the utility can use for billing and the collection ratio, calculated as $[1 - \text{NRW}] * (\text{collection ratio})$.	Simple and intuitive KPI developed at WOP1 stage.
Average operation and maintenance cost	\$/m ³ produced	The ratio of a utility's total annual O&M expenses and total annual volumes produced.	Standard KPI – which is often compared with the unit revenue.
Average tariff (collected)	\$/m ³ sold	The ratio of total water revenue collected divided by the total volume of water sold. Also called unit revenue.	Standard KPI – which is compared to the average O&M cost as well as the average tariff (water into supply).
Profit (loss) per m ³ water	\$/m ³	Comparison between average operating cost and average revenue, both expressed either by volume produced or volume sold.	This gives an indication of the level of losses which the utility makes, in \$/m ³ .



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Appendix C: Utility Performance Assessment and Benchmarking Database

This is available in electronic format only. Please see the accompanying CD.

Design and layout by: Catherine Njeri

