Smart Water Systems Final Report

Appendices

- Lusaka Workshop materials
- Nairobi Workshop materials
- London Workshop materials

Smart Water Systems

Tuesday 7th December 2010

Lusaka, Zambia

ZamDEx

Challenges and prospects of water management in Zambia

ZNBC.co.zm
Zambia National Broadcasting Corporation

700 boreholes sunk

Government has this year sunk over seven hundred bore holes countrywide.

Local Government and Housing Minister, BRIAN CHITUWO says in the 2010 national budget, government had budgeted for the sinking of one thousand boreholes countrywide.

Dr. CHITUWO said in a ministerial statement to parliament friday that more boreholes are currently being sunk in Zambezi, Chavuma, Mpongwe, Masaiti and Lufwanyama districts.

He said other boreholes are being sunk in Kafue, Namwala, Chongwe, Kalomo and Itezhi tezhi districts.

Dr. CHITUWO also said next year, government targets to sink a minimum of two thousand boreholes.
Ends
14:51 Hrs sat 06/11/2010

Call for action over private wells in Africa

Send to a frien

Tuesday, 16 November 2010 07:45

1. Women fetch water from a borehole.

By David Fox

Digg

London. Academics may call it "self-supply of ground water"; those who benefit from it are more likely to refer to "having their own well". Either way, it is a crucial part of the water supply to cities in the developing world, and one which is almost entirely absent from official statistics.

Now a new study from the International Institute for Environment and Development (IIED) urges that much more attention should be paid to these wells, on which, it estimates, something like a third of all urban dwellers in Africa, and South and Southeast Asia depend for their water.

"The policy trend is to promote the use of piped water, but as our research shows, large proportions of urban populations are not served and must supply themselves with groundwater from wells," says the report's co-author Jenny Grönwall.

SOUTHERN AFRICA

Shortages a Boon to Lusaka

Africa Energy Intelligence has learned that a delegation from Agence Francaise de Developpement will be in Zambia next month to examine the idea of AFD taking part in funding the 120 MW Itezhi-Tezhi dam on the Kafue river. (...) [230 words] [4]

President Banda Pledges More Investment for Zambia's Farmers

Like it

LUSAKA, Zambia, November 24, 2010 /PRNewswire/ – His Excellency, Mr. Rupiah Banda, President of the Republic of Zambia, yesterday launched the 2010/2011 agricultural planting season- promising to make more funds available to help Zambia's farmers.

At the official opening ceremony at Mweetwa Farm in Mumbwa District, President Banda reflected on this year's biggest ever harvest, which saw 2.78 million tonnes of maize produced - a surplus of more than 1 million tones.

In recognition of the huge efforts by Zambia's farmers to make this agricultural season the most successful in Zambia's history, President Banda pledged an increased budgetary allocation in the agriculture sector and the provision of K37 billion to build dams for irrigation and water supply to livestock.

To reap the maximum benefit of this commitment the President emphasised the importance of exploring and investing in agricultural technologies which will not only improve productivity but also help preserve the country's fragile environment.

Challenges and prospects of water management in Zambia

Kafue Flats a model wetland

Stakeholders unite to keep fragile area 'green'

Nov 21, 2010 12:00 AM | By LEWIS MWANANGOMBE

Dams, sugar cane plantations and rapidly growing population threatened the health of the Kafue Flats, a richly diverse wetlands in southern Zambia. But growing recognition of more sustainable use of its water and fertile soil are securing the health of the ecosystem.

Zambia KCM Says Pollution In Kafue River Contained

DOW JONES NEWSWIRES

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Zambia's largest copper miner by output, Konkola Copper Mines, announced Tuesday that an investigating team had found all the analyses on water quality in the polluted Kafue River had returned to normal, paving way for the resumption of normal water supply to thousands of households on the Copperbelt province.

Chingola Taps Still Dry

The Times of Zambia (Ndola)
November 2, 2010

Chingola is still without water following the pollution of Kafue River by mining effluent which prompted the water utility firm to shut down its water plant.

And Government has asked Konkola Copper Mines (KCM) to assist Mulonga Water and Sewerage Company (MWSC) to put in measures to ensure supply of clean water to the district while the pollution problem is being sorted out.

Meanwhile, KCM has confirmed that there was a leak in one of its old-age preg tanks at the tailings leach plant (TLP) at Nchanga, into the Kafue River but that immediate steps were taken to correct the situation by taking the suspect leach solution ts Save image as... lise the acid and spillage.

MWSC managing director Manuel Mutale said the water in-take and treatment plant was still shut due to high conductivity levels in the raw water.

He said with mineral particles in water, treating of water was extremely expensive thereby creating difficult for the water utility firm to meet the NWASCO water quality standard.

Africa Needs Innovative Sources Funding for Water and Sanitation, Says AfDB

MONDAY, 22 NOVEMBER 2010 06:48 NEWBUSINESSETHIOPIA.COM

BY NEW BUSINESS ETHIOPIA REPORTER

Africa needs to introduce innovative sources of funding to meet its water infrastructure needs, which range from 45 - 60 billion US dollars per annum, the African Development Bank (AfDB) says.

An estimated 45 - 60 billion US dollars is required annually to meet Africa's water infrastructure requirements, of which drinking water supply and sanitation represents some 11 billion US dollars, the bank noted in a press statement newbusinessethiopia.com received.

Africa leads the way in the mobile money revolution

Forbes

PERSONAL FINANCE

Names You Need To Know in 2011: Mobile Money

Mobile Money. Mobile Commerce. It's so new it's too early to say what name will ultimately stick, but over the next year we're going to be hearing a lot more about our ability to zap funds between one-another without the shackles of coins, paper bills, plastic cards or checks.

Image via CrunchBase

Mobile banking revolution gathers pace, opens new frontier for profits

Money transfer. Mobile cash transfers now stand at an average $10 billion a day. File

Kenya has been the birthplace of a banking revolution: with 65 per cent of mobile phone users now interested in adopting mobile banking services over traditional banking, according to a global survey last month by Netherlands technology firm Fundtech and research firm Aite

Africa now has 506 million mobile subscribers

10.11.2010

Categories: Mobile, Communications, Mobility, Wireless Communications

Tags: Mobile Phones, Mobile Broadband, Africa

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Africa is shaping up to be the next hotbed of mobile innovation after it emerged the number of active mobile subscribers on the continent has crossed the half a billion mark.

At the end of September, Africa reached 506 million mobile subscribers, according to Informa Telecoms & Media.

At the end of the third quarter, Africa accounted for 10pc of the world's mobile subscriptions and was one of the world's fastest-growing regions – with the subscription numbers increasing 18pc over the year to September – as a result of the still low mobile penetration rate on the continent, as well as demand for new services, such as mobile internet access, that increase the need for telecoms connectivity.

Mobile's next frontier - Africa has breached the half a billion mobile subscriber mark, don't be surprised to see some of the next major innovations in wireless to emerge from this region

Africa leads the way in the mobile money revolution

Orange expects rapid growth from mobile money in Africa

Published: Wednesday 10 November 2010
Region: Middle East & Africa
Tags: Orange France Telecom

Orange announced the expansion into Kenya of its mobile money service which the operator says is on target to reach 1 million customers across Africa by the end of November. The France Telecom-owned operator aims to have 2 million African customers of Orange Money by next summer, according to Marc Rennard, the operator's executive director for Africa, Middle East and Asia Pacific, notes *Dow Jones Newswires*. The service is now available in six countries, following its debut in the Ivory Coast in December 2008. The Kenyan launch is in partnership with the Equity Bank Group, and the two partners are considering launching the service together in other East African countries. Mobile money services enable customers to carry out simple banking transactions via their mobile phones.

M-Pesa boosts war against poverty

SHARE BOOKMARK PRINT EMAIL RATING

File | NATION The World Bank has praised M-Pesa saying it is an ideal story of why it pays to invest in the poor. The service provides a low-cost money transfer and savings service.

IN SUMMARY
- 'Africa has a culture of saving but people often do not have the mechanisms to save'

The M-Pesa network is a model for taking banking services to the grassroots, the World Bank has said.

The managing director, Ms Ngozi Okonjo-Iweala, said M-Pesa is the ideal story of why it pays to invest in the poor.

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22 November 2010 Last updated at 08:55

M-Pesa: Kenya's mobile wallet revolution

By Fiona Graham
Technology of business reporter, BBC News

Why has the developed world been so slow to adopt the mobile wallet?

Think of the developing world, and the first thing that springs to

Zambia Stanchart roll-out mobile payment system

Share Published on November 30, 2010 by admin View Comments

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By NKOLE CHITALA

STANDARD Chartered Bank (Stanchart) Zambia has started rolling out utility payment bills on its mobile banking system with Nkana Water and Sewerage Company and Lusaka Water and Sewerage Company.

Stanchart distribution general manager Sonny Zulu said the roll-out will enable the bank's customers to settle their utility bills with the two utility firms through their mobile phones. Mr Zulu said in a statement in Lusaka on November 29 that the service will be available 24 hours a day and throughout the week.

Global growth of smart water metering technology

In future, water also must be smart

Published Friday, 12th November 2010

For now, the focus in smart metering is mostly on electricity, though dual electric-gas smart meters have already made their way into some households across Europe and the US. Smart metering, though, will eventually train the spotlight on consumption habits for yet another precious resource: water.

EE Times Home > News and Analysis

News & Analysis

Smart grid for water turns tap on innovation

Rick Merritt

11/10/2010 5:38 PM EST

Like the electric grid, many of today's water utilities are still using 19th century technologies. That's attracting a rising number of entrepreneurs to what is one of clean tech's newest and perhaps most critical sectors.

Some observers see a looming crisis as consumption of the planet's limited fresh-water resources continues to rise. Sensor networks and other electronics could be leveraged to rebuild an aging and inefficient infrastructure while accelerating the move to seawater and waste water reclamation, they say.

The Economist

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A special report on smart systems

Making every drop count

Utilities are getting wise to smart meters and grids

Nov 4th 2010

LONDON'S streets can be a bit of a maze, but below ground things are even more complex. Water pipes crisscross the city in all directions. Some areas used to have competing water companies, each of which built its own system. Not even Thames Water, the utility that operates the British capital's water-supply network today, knows exactly where all the pipes run.

Moreover, the network is ageing. Only a few years ago more than half of the 10,000 miles (16,000km) of water pipes below the streets of London were over a hundred years old and often burst. It did not help that over many years Thames Water, which was privatised in 1989, failed to invest enough. By the mid-2000s London had one of the leakiest water-supply systems in the rich world. Every day nearly 900m litres of treated water were lost and 240 leaks had to be fixed.

Global growth of smart water metering technology

THE MALTA INDEPENDENT | The Malta Business Weekly | THE MALTA INDEPENDENT ON SUNDAY | Just clic

22 November 2010 http://www.in

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Smart meter roll-out picking up momentum

by Francesca Vella

The smart meter roll-out, which began with a pilot deployment in May last year, is gathering steam, and about 4,500 meters are now being installed every month, according to Enemalta Corporation.

City-wide meter replacement project nears completion

Thursday, November 18, 2010 7:55 PM

(Source: The Garden City Telegram)By Shajia Ahmad, The Garden City Telegram, Kan.

Nov. 18--An ongoing city-wide project to replace electric and water meters for digital versions should be fully completed by mid-December, city officials said.

The $3.4 million bond-funded project approved by city commissioners in May allows for more accurate meter reads and likely will pay for itself over the next decade in savings, city officials have said.

THE TIMES OF INDIA | Hyderabad

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You are here: Home » City » Hyderabad

TNN(oc-meter.tim)cleared Hi-tech water meters in buildings soon

TNN, Dec 2, 2010, 01.23am IST

Disruptive technologies and developmental impacts

*"*Mobile telephony… can contribute meaningfully to every single MDG. The gains are breathtaking in promoting livelihoods, improved health, better schools, and other areas."

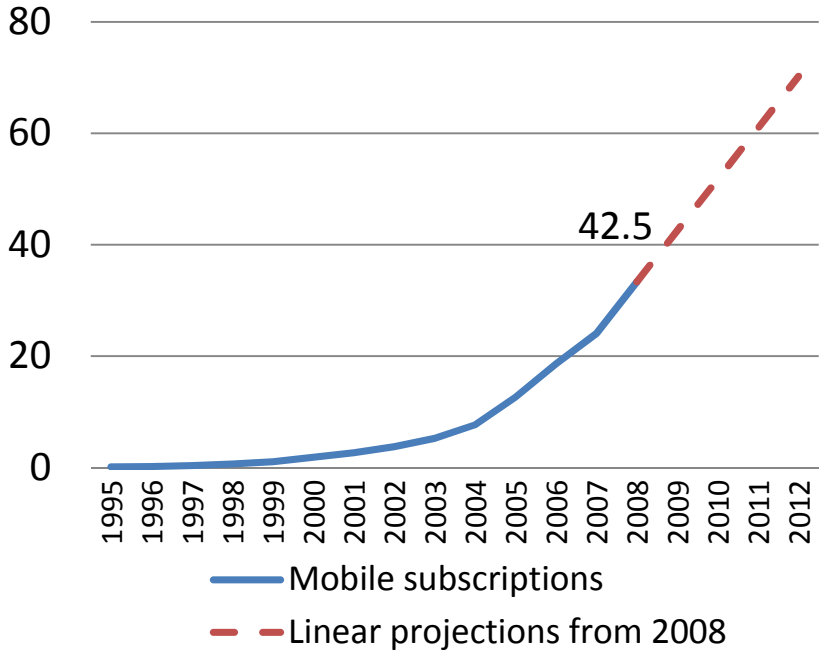
- *Prof Jeffrey Sachs, special adviser to the UN Secretary General on the MDGs*

"New technology-based solutions that did not exists when the [Millennium Development] goals were endorsed can and should be leveraged to allow for rapid scaling up. The most important of these technologies involve use of mobile telephones, broadband internet and other information and communication technologies"

- *UN Secretary General Ban Ki Moon*

Mobile money is leapfrogging traditional modes of banking in Sub-Saharan Africa

Mobile phone subscribers in SSA (per 100 people): 1995-2008



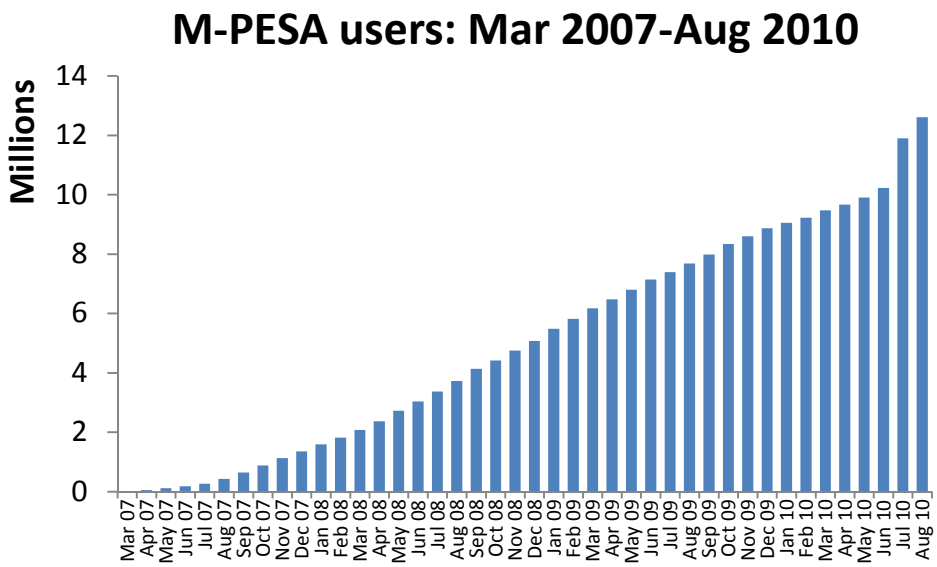
In comparison, there are only 16.3 bank accounts per 100 adults in Sub-Saharan Africa

Rapid expansion of mobile banking services in Sub-Saharan Africa: 2007-2011

Sources: World Bank Databank; World Bank and CGAP 2010

M-PESA in Kenya is the iconic success story

13 million users in just three and a half years



By 2009, ~40% of Kenyans used M-PESA compared to 19% who had bank accounts

M-PESA success inspired a range of other mobile banking products

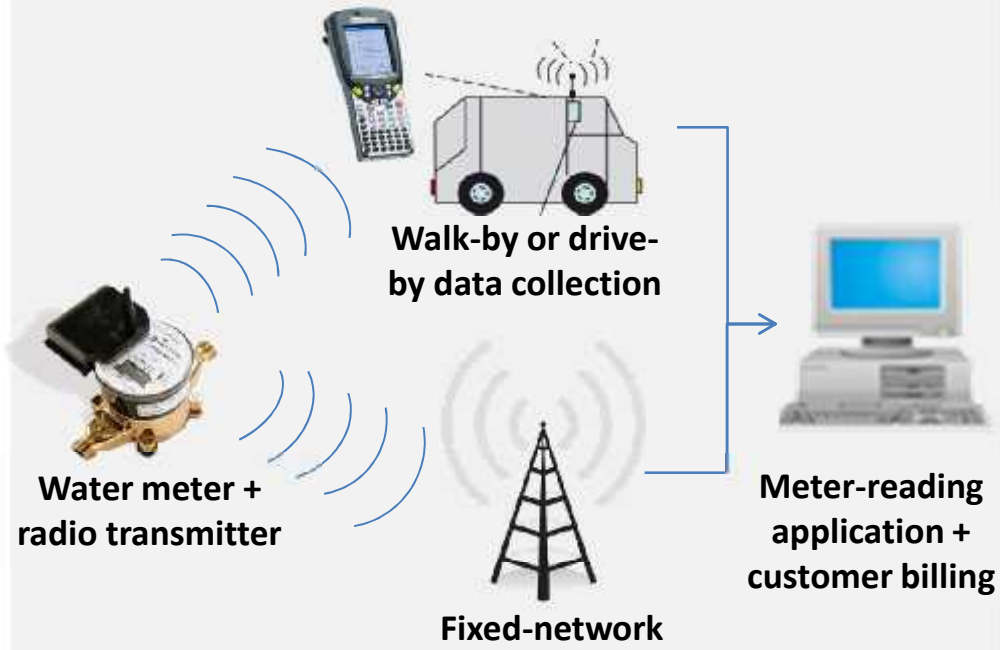
MPESA can now be used to pay water bills for metered customers in Eldoret, Kisumu, Nairobi and Nakuru

Now over 70% of households in Kenya and over 50% of the poor, unbanked and rural populations use M-PESA

Sources: Central Bank of Kenya 2010; CGAP 2010; FinAcess Kenya 2009

Potential benefits of smart water metering

Typical AMR/AMI configuration

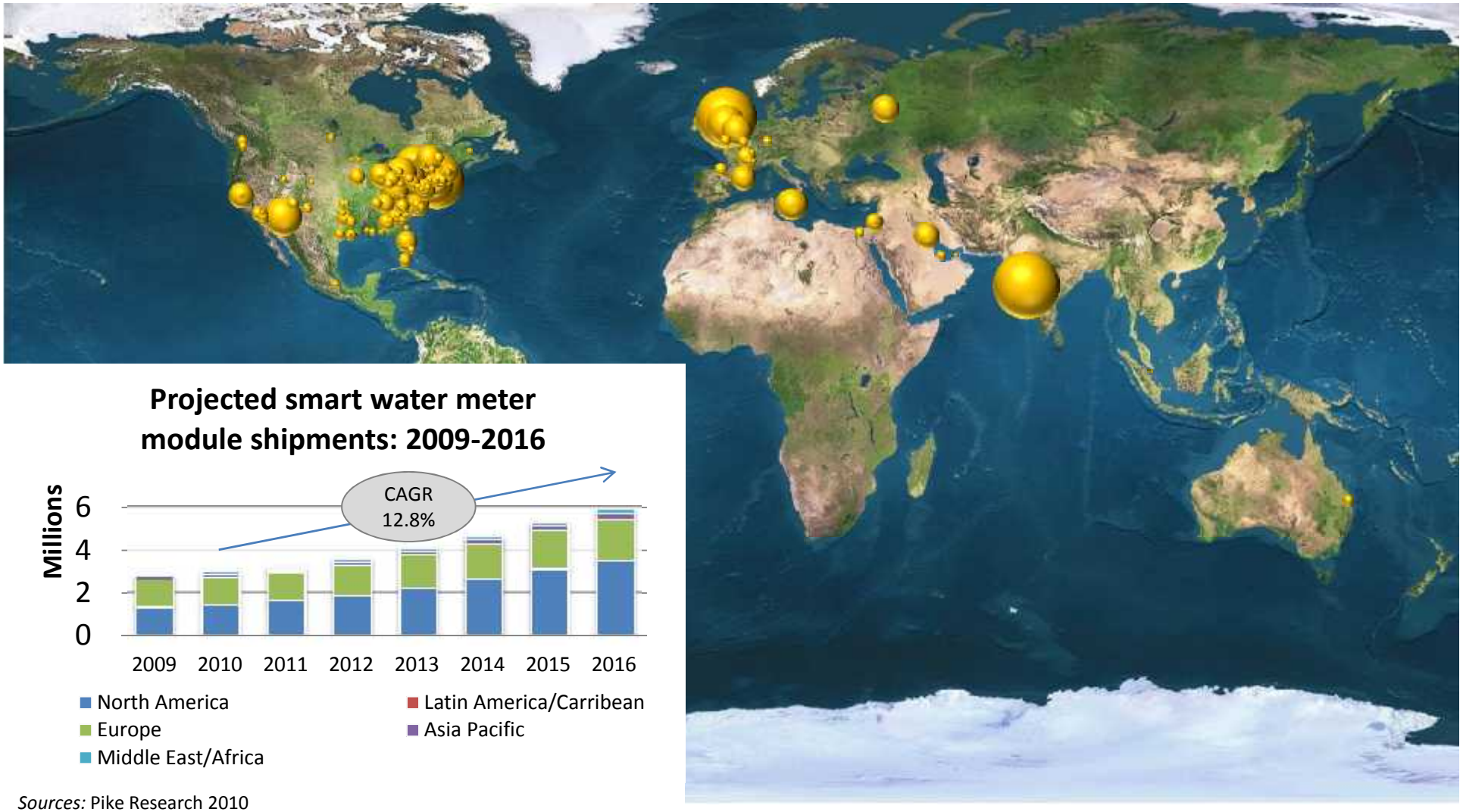


Potential benefits

- Faster/more efficient meter reading
- Theft and leak detection
- Accurate measurement of UfW
- Billing accuracy
- Enabling a flexible tariff structure
- Improved debt collection
- Monitoring resource use
- Scope to integrate with mobile banking

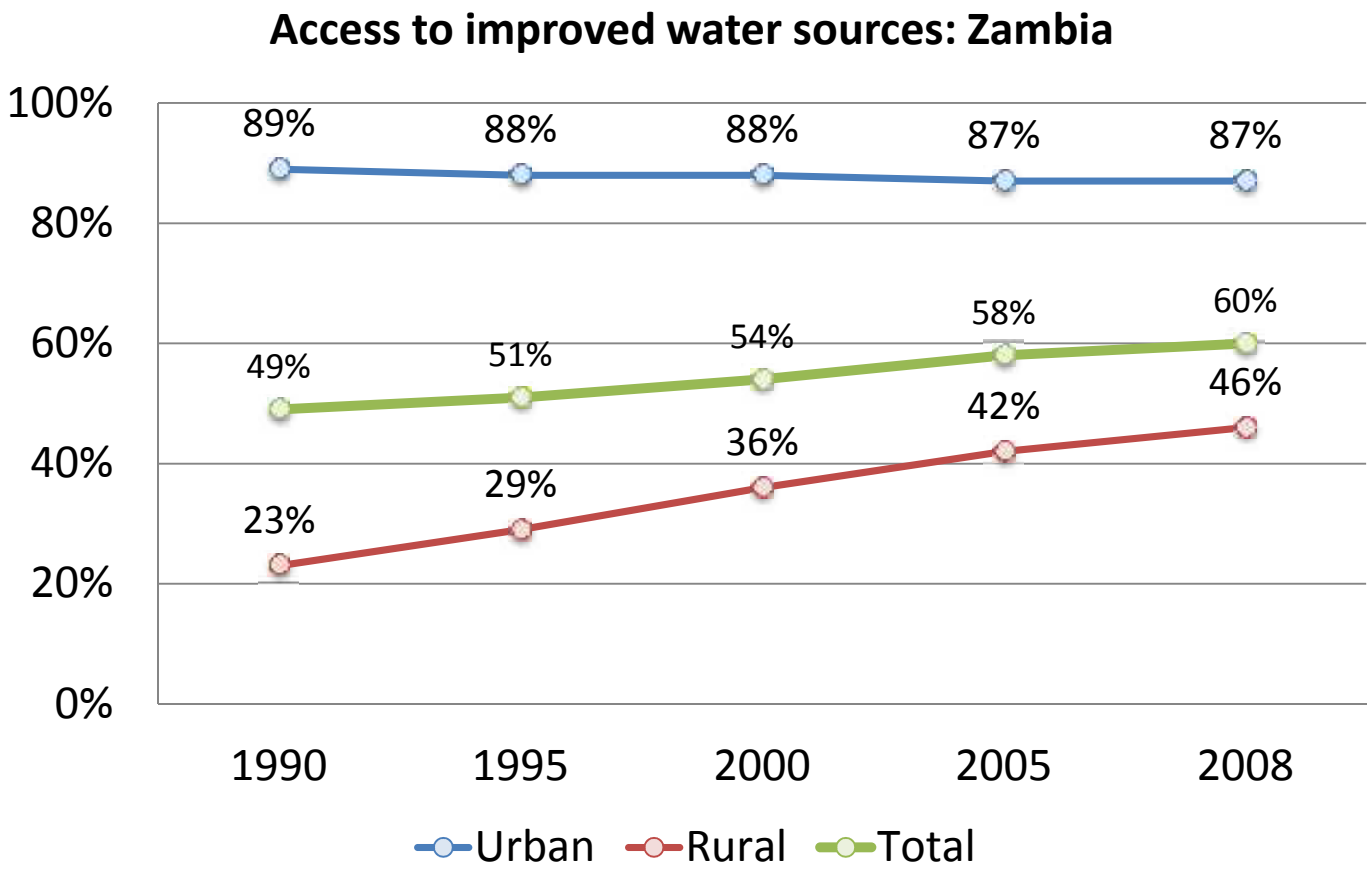
Smart water metering projects are expanding rapidly

Global shipments of smart water meter modules predicted to double by 2016



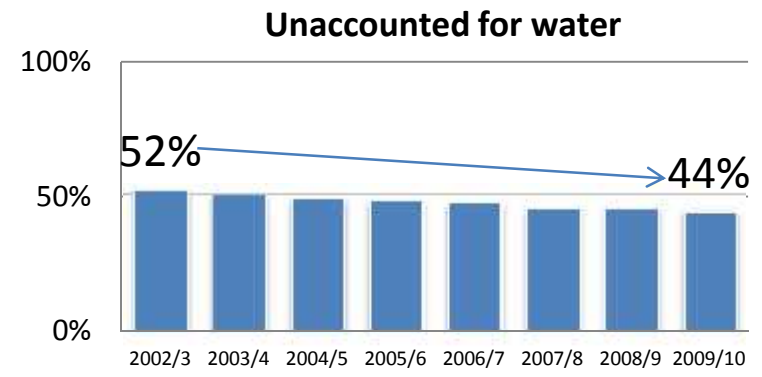
Sources: Pike Research 2010

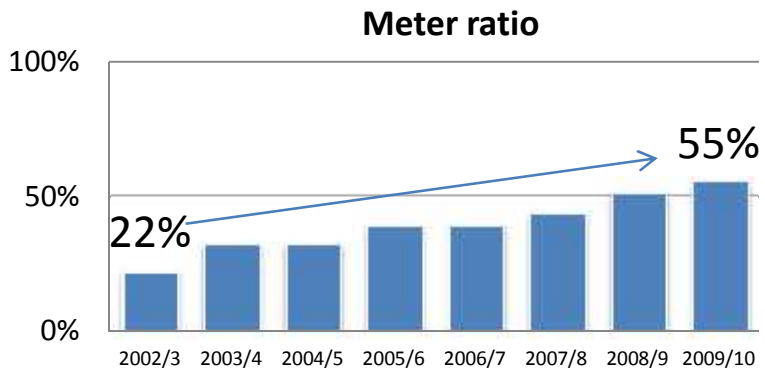
In Zambia, more people have access to improved water services than ever before...

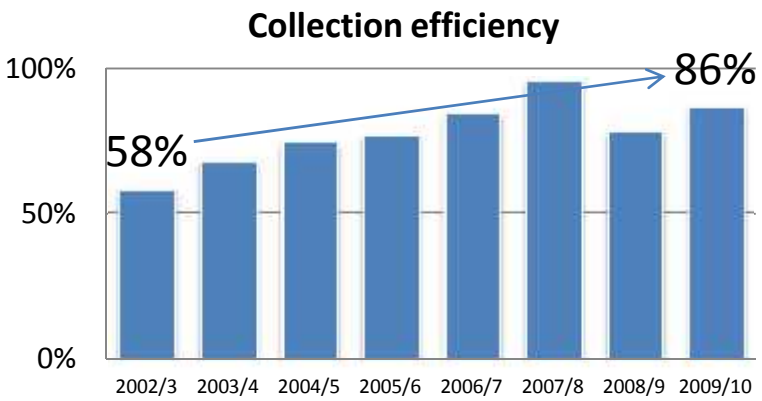


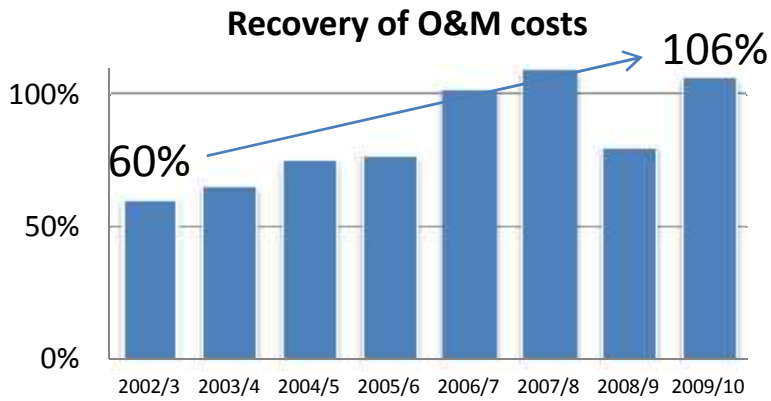
Sources: WHO/UNICEF Joint Monitoring Programme

... and a decade of water sector reforms are beginning to yield dividends in urban areas



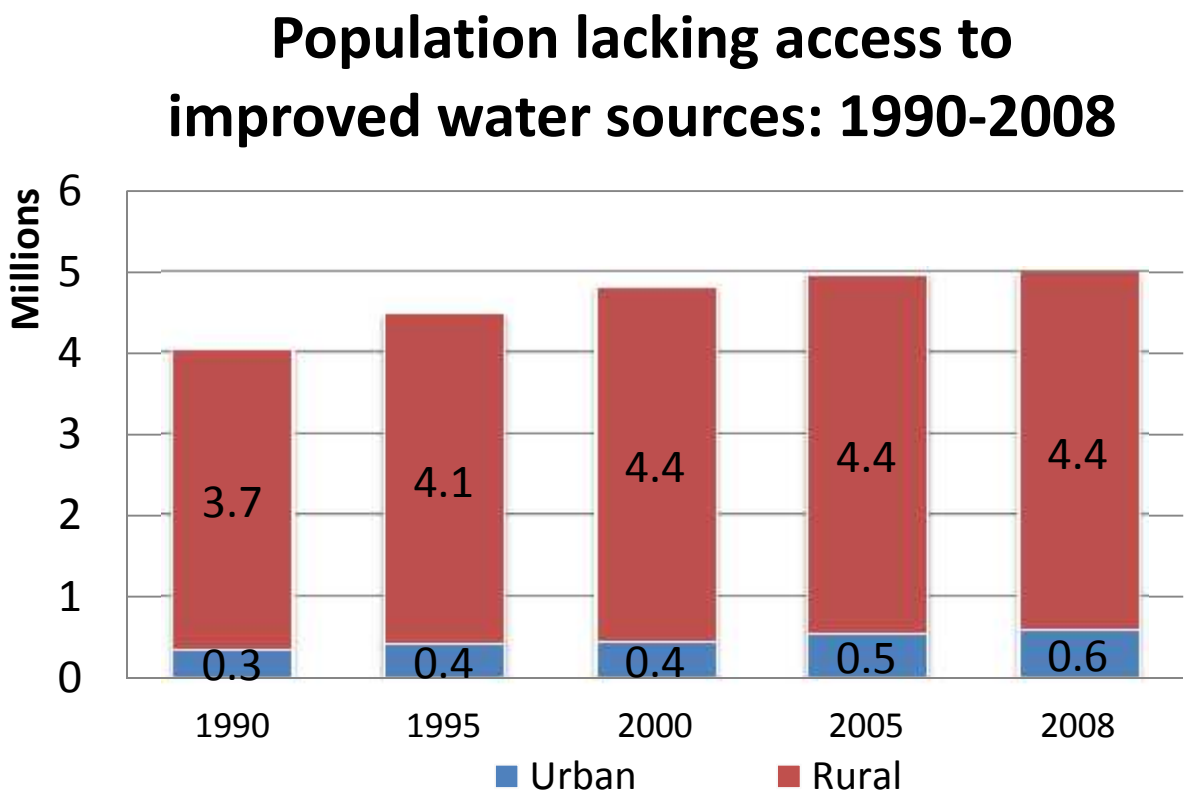






Sources: NWASCO sector reports 2002/3 to 2009/10

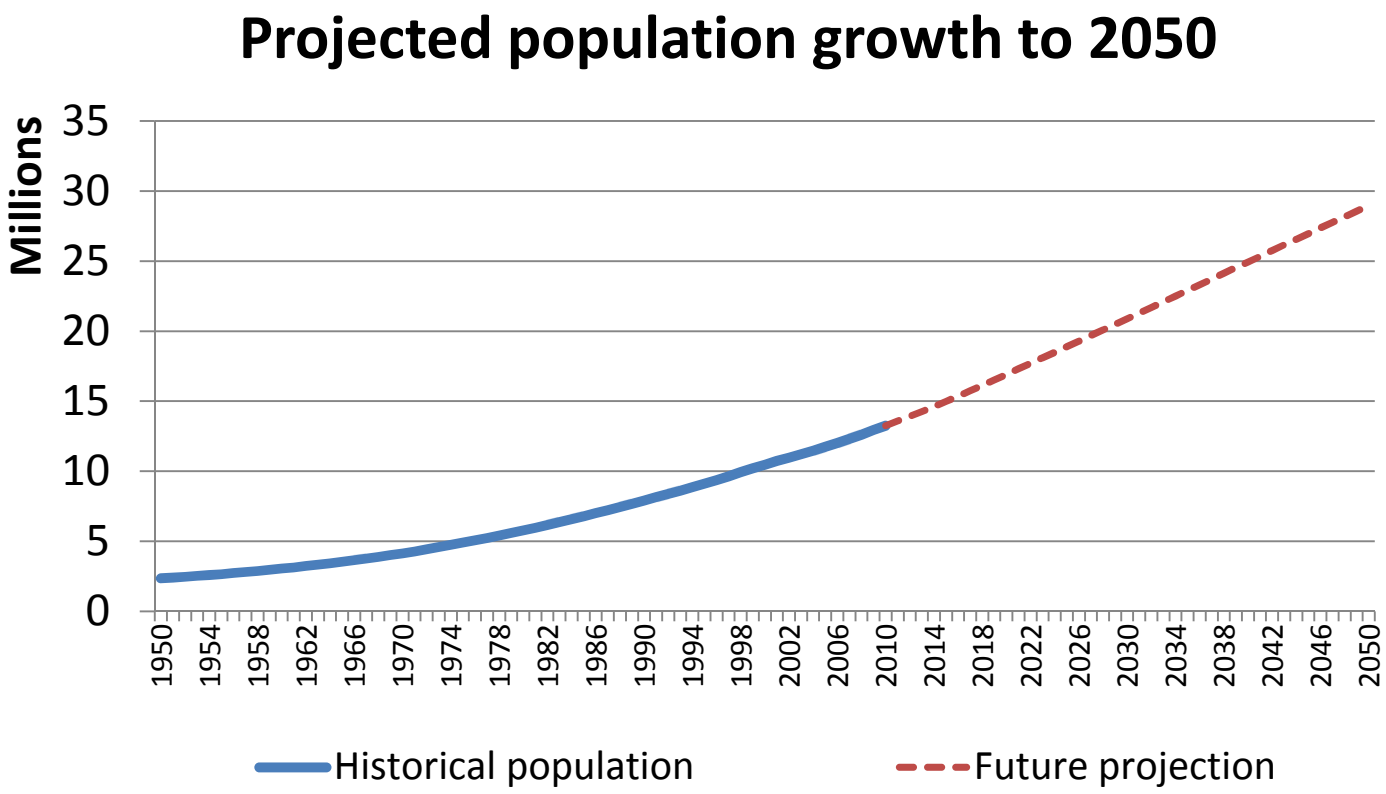
Yet major barriers to accessible and sustainable water services persist...



Around one third of handpumps in Zambia are thought to be non-functional

Sources: WHO/UNICEF Joint Monitoring Programme; Rural Water Supply Network 2007

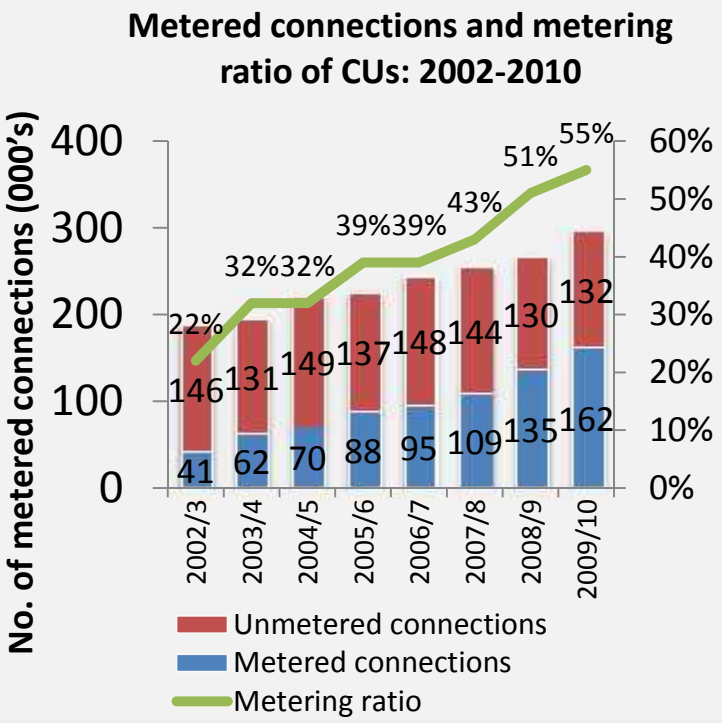
... and emerging trends may introduce new resource pressures



Sources: World Bank Databank, UN Population Projections

What are the major barriers to the sustainable provision of water services in Zambia?

45% of urban water connections are unmetered



NWASCO identifies challenges facing the water sector

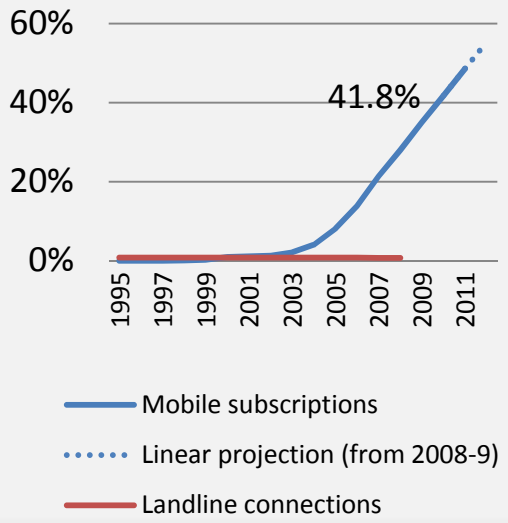
- Low investment flowing into sector
- Dilapidated and inadequate infrastructure
- Water pollution, especially from mining activities
- UfW remains high
- Lack of regulation on the use of underground water

Sources: NWASCO sector reports 2002/3 to 2009/10

What are the prospects for mobile banking in Zambia?

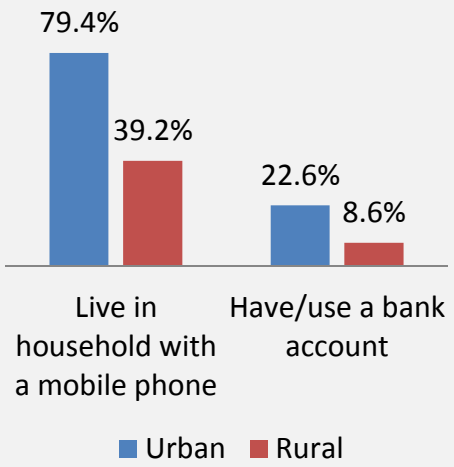
Mobile phone subscriptions are growing at a rapid rate

Phone access in Zambia (per 100 people): 1995-2009



Mobile phones now more accessible than bank accounts

Mobile phone vs bank account ownership 2009



A range of players in the mobile money arena

Sources: World Bank Databank; FinScope Survey 2009; GSMA 2010

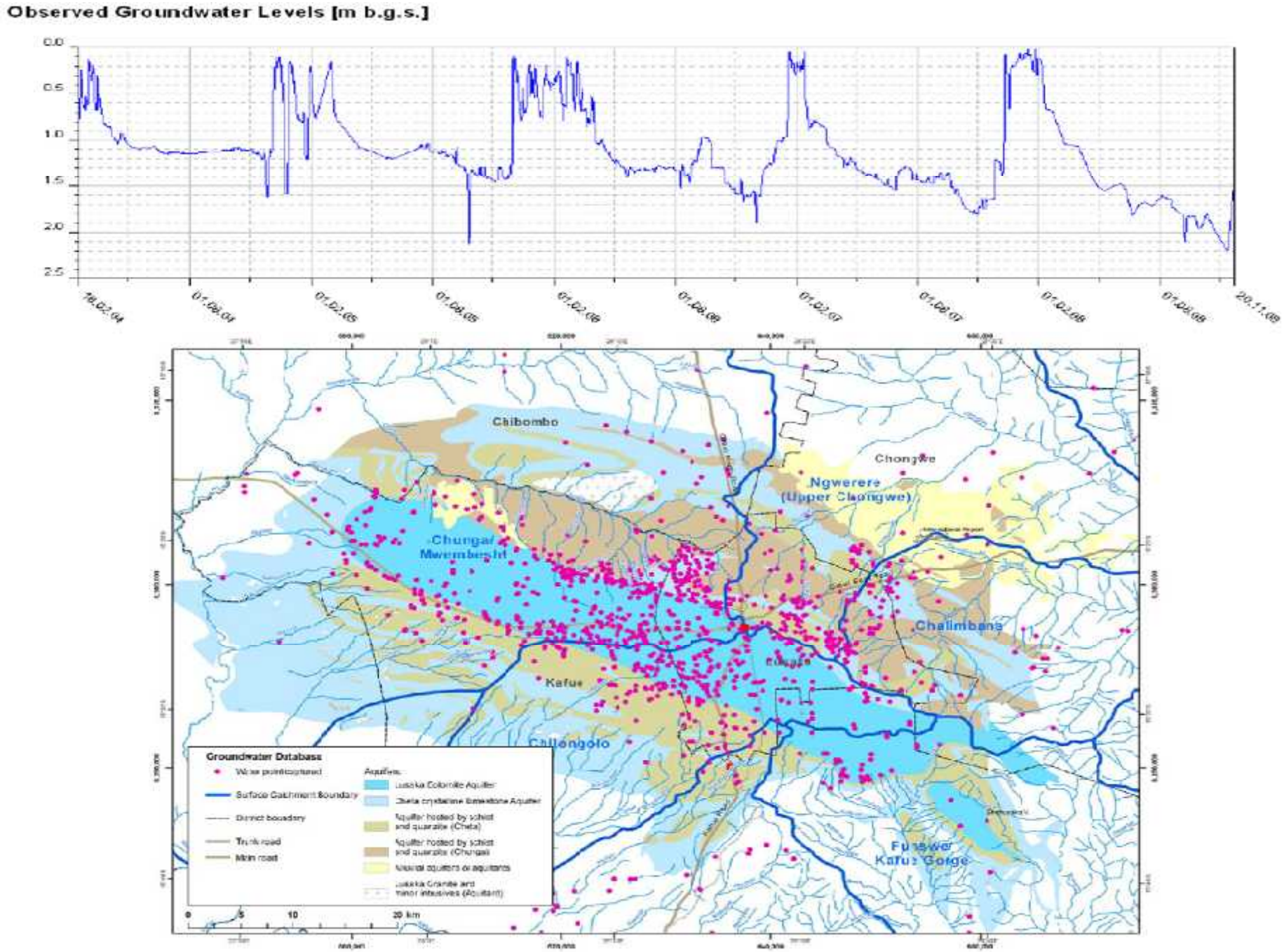
Understanding the primary resource base is fundamental to sustainable water management

Few, if any, privately-operated boreholes are metered

Example: Lusaka groundwater use

- 74% of commercial farmers in Lusaka area abstract 25M $m^3$of groundwater a year
  - Daily dry season abstraction equivalent to 75% of LWSCs groundwater abstraction
- 68% of industries abstract 4.3M m^3 of groundwater a year
  - Top three water users account for 85% of total industrial water volume abstracted

(Mayerhofer, Shamboko-Mbale & Mweene, 2010)



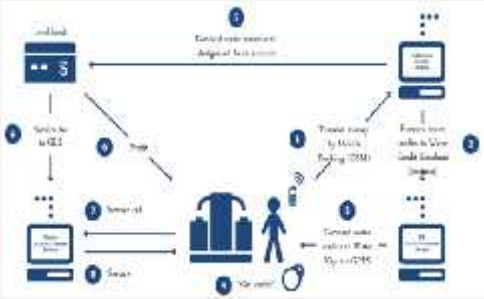
Source: Mpamba et al 2008; Baume & Kang'omba 2009

Positive steps are being taken, but how can new technologies be harnessed for effective, equitable and sustainable water management in Zambia?

Tanzania: Dar Es Salaam

Zambia: Nkana WSC

Kenya: Grundfos LIFELINK



Sources: Grundfos LIFELINK 2010; http://www.zm.celpay.com; http://www.dawasco.com/publications.htm

Break-out groups

- Random group assignment into break-out groups;
- Groups self-identify a Chair and Rapporteur;
- 20 minutes to identify a) scope of potential, and b) practical constraints of SWS for Zambia
- Rapporteurs report back to plenary;
- Findings discussed and documented.

Key Benefit Analysis

Aim – to evaluate the key benefits of smart water systems based on qualitative, ranked priorities by senior and expert institutional actors in Zambia

This exercise is voluntary, anonymous and important in helping to understand the opportunities and challenges for smart water systems in Zambia.

We will present back the data to the group this afternoon.

1.	**Which sector best describes your organisation?** ***(tick one only)***	
-	Government/ policy/ regulation	
-	Commercial utility	
-	Mobile telephony/banking	X
-	Finance/investment	
-	Donor/development agency	
-	Other	
2.	**What best describes your disciplinary expertise?** ***(tick one only)***	
-	Management, policy, commerce	
-	Technical/ engineering	
-	Economics/ finance	X
-	Social development	
-	Finance/ banking	
-	Other	
3.	**How many years have you worked in your field?**	
	14 years	
4.	**Gender:**	
-	Female	X
-	Male	
5.	**What is your highest academic qualification?** ***(tick one only)***	
-	PhD	
-	Masters	
-	Honours degree	X
-	Other	

Based on this definition, please rank by importance the potential benefits of smart water systems.

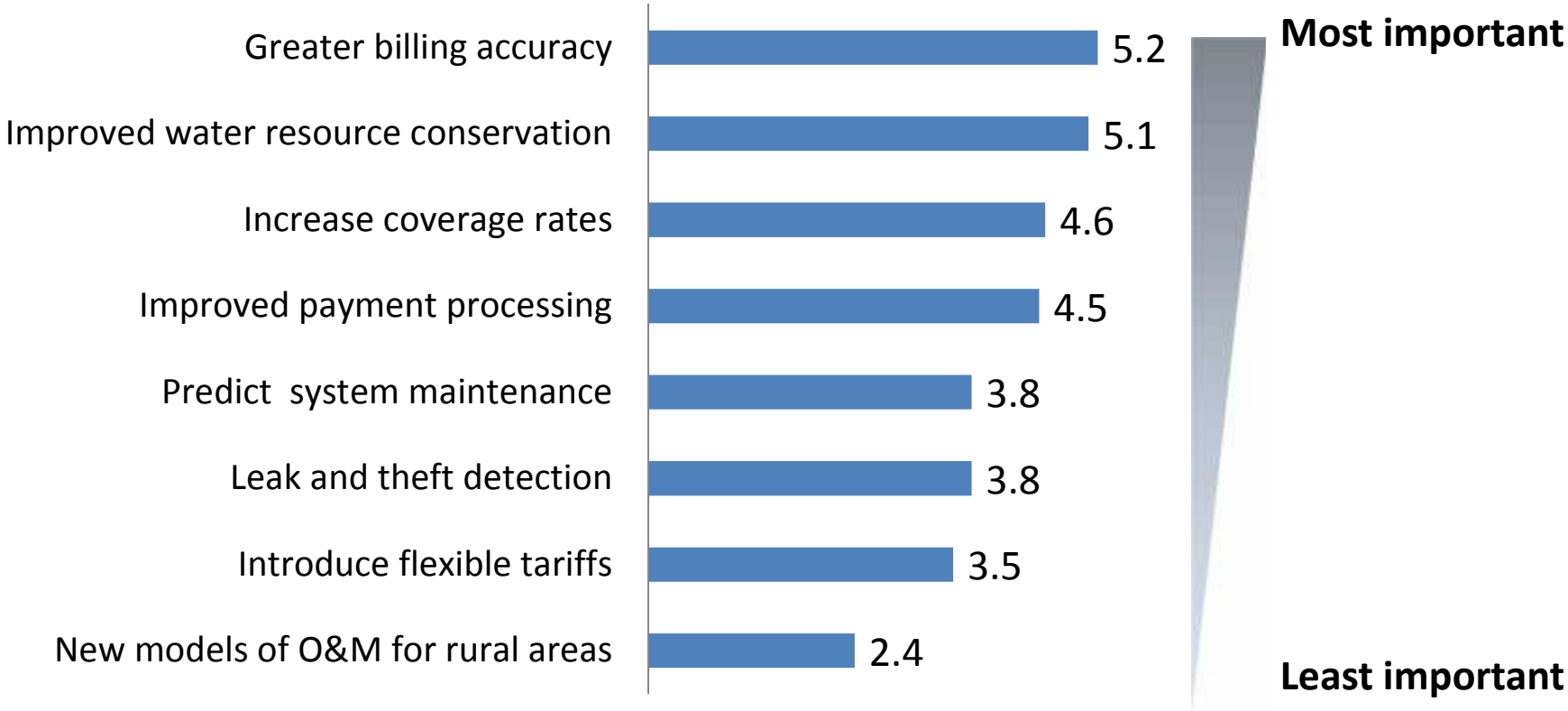
(*1 is most important, 8 is least important*).

Potential benefits of smart water systems	Ranking
Improved water resource conservation by accurate measurement of ALL water resource abstraction volumes from surface water and groundwater.	4
Greater billing accuracy and information for consumers to understand and potentially reduce water consumption.	8
Opportunity to use improved water system performance to increase coverage rates to lower-income households.	7
Introducing flexible water tariffs to charge for variable (high/low) use or peak demand.	3
Improved payment processing and collection efficiency to strengthen the revenue base.	1
Leak and theft detection in piped water supplies.	5
Develop new models of operation and maintenance systems for rural water supply based on a more reliable revenue base.	6
Ability to predict water system maintenance problems and conduct preventative maintenance.	2

Smart Water Systems
Lusaka Workshop
7 December 2010

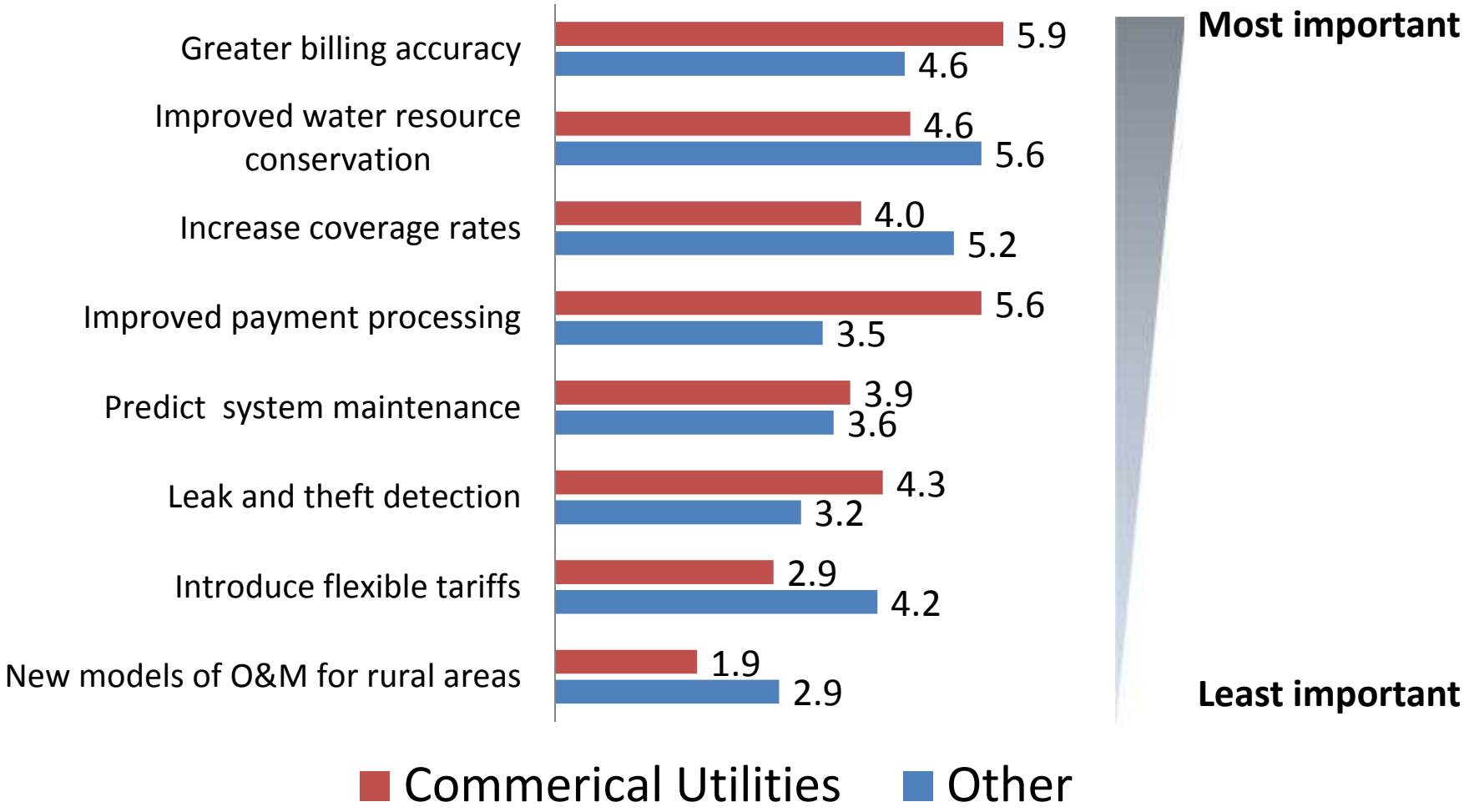
Key Benefit Analysis

Ranked importance of potential benefits of Smart Water Systems (*n*=28)



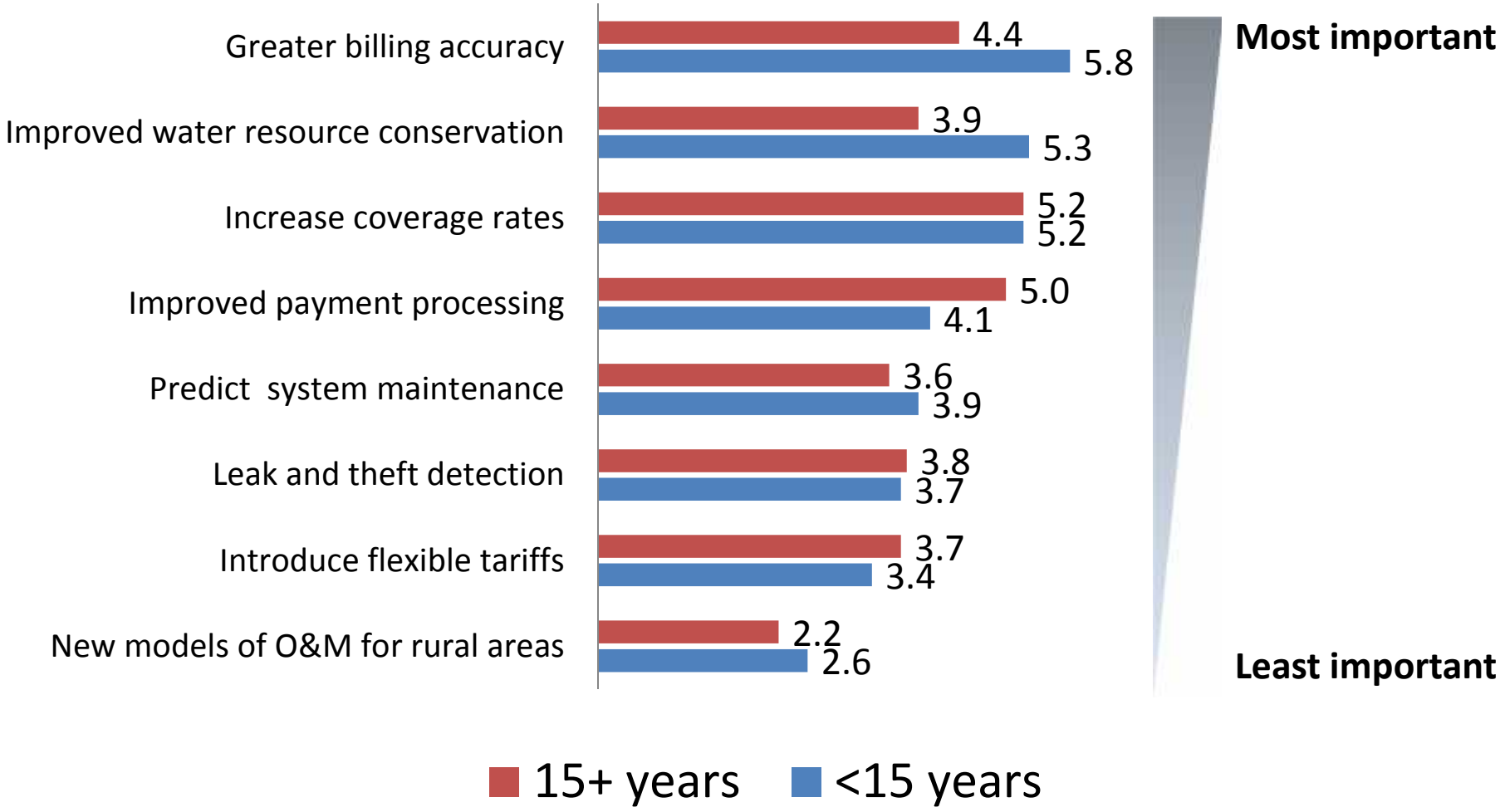
Lusaka Workshop, 7 December 2010

Ranked importance of potential benefits: Commercial Utilities (*n*=14) vs Others (*n*=14)



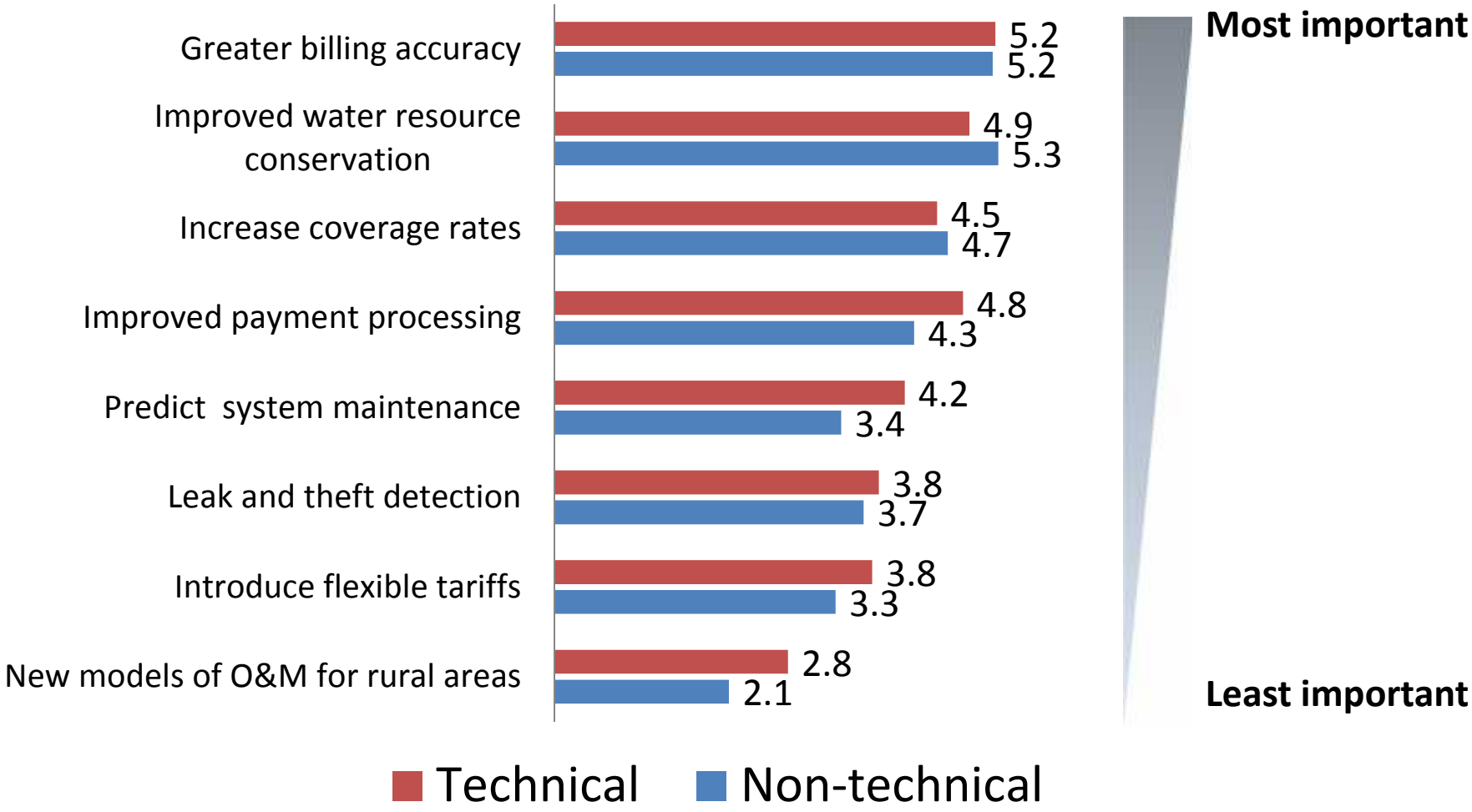
Lusaka Workshop, 7 December 2010

Ranked importance of potential benefits:
15+ yrs experience (*n*=14) vs <15 yrs experience (*n*=14)



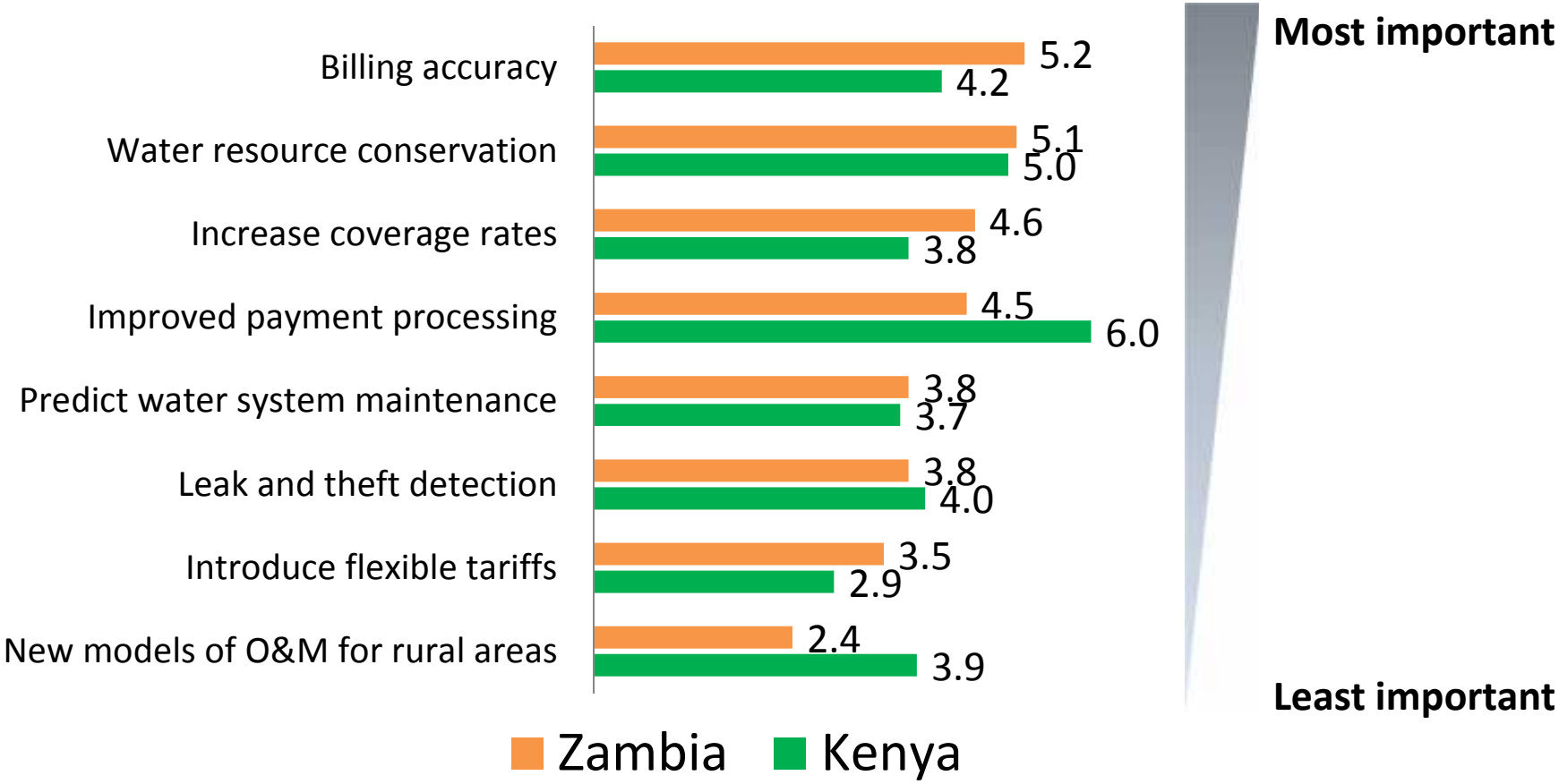
Lusaka Workshop, 7 December 2010

Ranked importance of potential benefits: Technical discipline (*n*=13) vs non-technical discipline (*n*=15)



Lusaka Workshop, 7 December 2010

Ranked importance of potential benefits of Smart Water Systems: Kenya vs Zambia



Smart Water Systems Workshop Participants, Lusaka 7th December 2010

Name	Organisation	Sector
A. Rassem	El Sewedy	Technology
M. Simwanda	Copperbelt University	Research
E. Mutalima	Lusaka WSC	Water Services
F. Nigulukusa	Geotech	Drilling
H. Chinokoro	Lusaka WSC	Water Services
H. Sichingabula	University of Zambia	Research
M. Chishimba	Chambeshi WSC	Water Services
L. Simwanda	Zambian Development Authority	Government
G. Ndongwe	Lusaka WSC	Water Services
S. Alik	Luapula WSC	Water Services
N. Elias	Lukanga WSC	Water Services
C. Moses	University of Zambia	Research
K. Phiri	Airtel	Technology
M. Banda	Celpay	Technology
M. Muleya	Ministry for Local Govt and Housing	Government
C. Mulambo	Ministry for Local Govt and Housing	Government
M. Mbulo	Rural Finance	Finance/Donor/Trust Fund
W. Changani	Eastern WSC	Water Services
S. Chilekwa	Luapula WSC	Water Services
C. Chingwengwezi	Carlchi Ltd	Other
M. Okada	JICA	Finance/Donor/Trust Fund
B. Halubanza	Chambeshi WSC	Water Services
A. Masuphaa	Southern WSC	Water Services
K. Nyinenda	Kafubu WSC	Water Services
P. Lubambo	Ministry for Local Govt and Housing	Government
W. Kilunga	Environmental Council of Zambia	Government
S. Nair	Ion Exchange Ltd	Technology
P. Karnik	Ion Exchange Ltd	Technology
J. Liyali	Western WSC	Water Services
W. Makondo	Lukanga WSC	Water Services
M. Mubita	Western WSC	Water Services
K. Chense	Nkana WSC	Water Services
E. Kachusha	Eastern WSC	Water Services
N. Mpamba	Ministry of Energy of Water Devt	Government
M. Mutale	Mulonga WSC	Water Services
C. Shindaile	Southern WSC	Water Services

Additional stakeholder meetings in Lusaka, December 2010

Organisation	Attendees
Ministry of Energy and Water Development	Hon. K. Konga, Minister
UNICEF	S. Gaya, Chief of WASH
National Water Supply and Sanitation Council	K. Chitumbo, Director P. Mutale, Chief Inspector
Lusaka Water and Sewerage Company	G. Ndongwe, Managing Director
Devolution Trust Fund	J. Kafuko, Engineer S. Gonga, Manager R. Ingle, Junior Expert R. van Waesberghe, GTZ Advisor
Airtel	D. Mutale, Manager K. Phiri, M-Commerce Sales Manager

Smart Water Systems

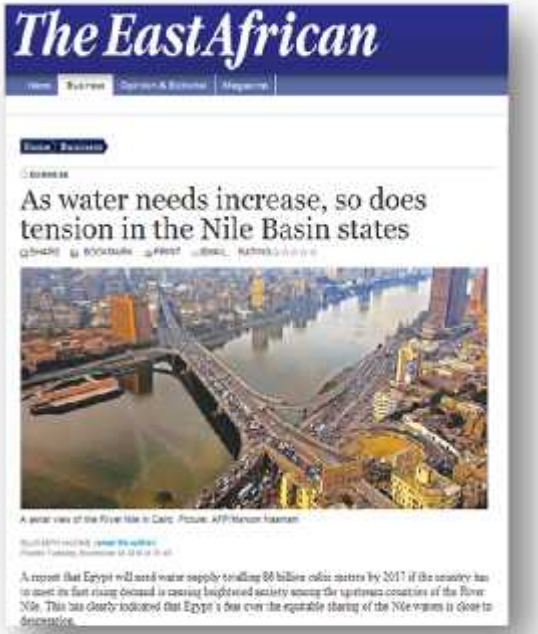
Thursday 13th January, 2011

Silver Springs Hotel

Nairobi, Kenya

ZamDEx

Challenges and prospects of water management in Kenya



Disruptive technologies and developmental impacts

*"*Mobile telephony… can contribute meaningfully to every single MDG. The gains are breathtaking in promoting livelihoods, improved health, better schools, and other areas."

- *Prof Jeffrey Sachs, special adviser to the UN Secretary General on the MDGs*

"New technology-based solutions that did not exists when the [Millennium Development] goals were endorsed can and should be leveraged to allow for rapid scaling up. The most important of these technologies involve use of mobile telephones, broadband internet and other information and communication technologies"

- *UN Secretary General Ban Ki Moon*

Africa leads the way in the mobile money revolution

Africa now has 506 million mobile subscribers

16.11.2010

Categories: Mobile, Communications, Mobility, Wireless Communications

Tags: Mobile Phones, Mobile Broadband, Africa

Share: Tweet 5 Like Share 8 + more

Africa is shaping up to be the next hotbed of mobile innovation after it emerged the number of active mobile subscribers on the continent has crossed the half a billion mark.

At the end of September, Africa reached 506 million mobile subscribers, according to Informa Telecoms & Media.

At the end of the third quarter, Africa accounted for 10pc of the world's mobile subscriptions and was one of the world's fastest-growing regions – with the subscription numbers increasing 18pc over the year to September – as a result of the still low mobile penetration rate on the continent, as well as demand for new services, such as mobile internet access, that increase the need for telecoms connectivity.

Mobile's next frontier – Africa was breached the half a billion mobile subscriber mark, don't be surprised to see some of the next major innovations in wireless to emerge from this region

Forbes

PERSONAL FINANCE

Names You Need To Know in 2011: Mobile Money

Nov. 16 2010 - 5:52 pm | 494 views | 0 recommendations | 1 comments

Mobile Money. Mobile Commerce. It's so new it's too early to say what name will ultimately stick, but over the next year we're going to be hearing a lot more about our ability to zap funds between one-another without the shackles of coins, paper bills, plastic cards or checks.

Image via Crunchflow

Mobile banking revolution gathers pace, opens new frontier for profits

Money transfer, mobile cash transfers now stand at an average 3m billion a day. File

By Robin Gaster [email the author]
Market Technology, November 1st 2010 at 08:13

Kenya has been the birthplace of a banking revolution: with 65 per cent of mobile phone users now interested in adopting mobile banking services over traditional banking, according to a global survey last month by Netherlands technology firm Fundbox and research firm Alto

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Market Data | Your Money | Economy | Companies

30 November 2010 Last updated at 08:33

M-Pesa: Kenya's mobile wallet revolution

By Fiona Graham
Technology of business reporter, BBC News

Why has the developed world been so slow to adopt the mobile wallet?

Think of the developing world, and the first thing that springs to

Airtel Kenya hits the ground running

AIRTEL Kenya, the second largest cellular mobile operator in Kenya has hit the ground running barely two weeks after re-branding, with the release of an additional 2.5million lines covering five numbers prefixes.

The company has unveiled new mobile number prefixes in the range of 0739, 0786, 0787, 0788 and 0789.

In a statement, Airtel Kenya Managing Director Rene Meza said that the increased demand for Airtel Kenya lines in the market in recent days had necessitated the release of new prefixes.

M-Pesa boosts war against poverty

Pay | Sell NOW: The micro-finance bank has pioneered M-Pesa security in an attempt to stem the tide of crime, it plans to roll out in the year in the poor. The service provides a low cost money transfer and savings service

By Tom Rhodes, Digital Development Correspondent, Reuters, 10:00 GMT 10 Nov 2010

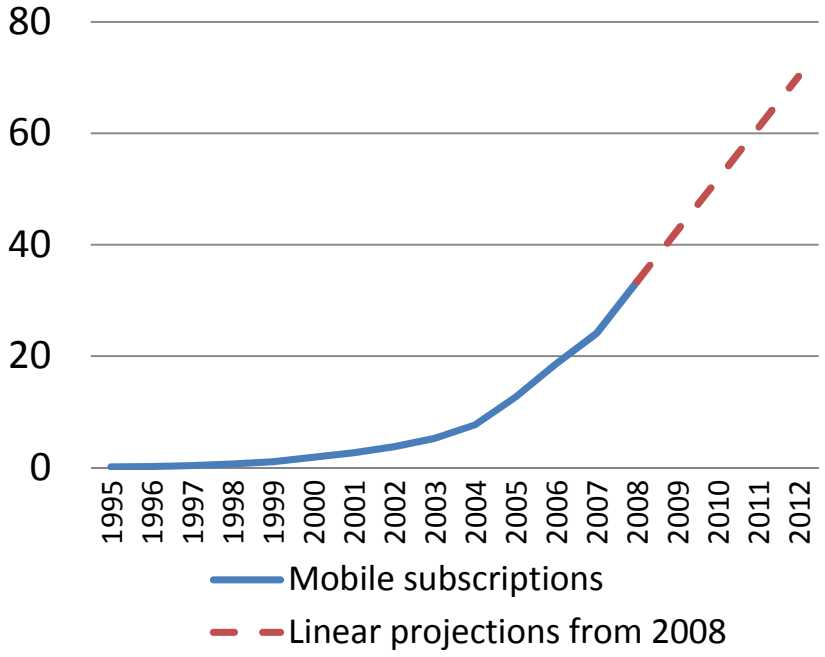
- Kenyan
- Africa has a culture of saving but people who do not have the mechanisms to save

The M-Pesa network is a model for taking banking services to the paupers, the World Bank has said.

The managing director, Nic Hughes Olunya Dennis, said M-Pesa is the ideal story of why it pays to invest in the poor.

Mobile money is leapfrogging traditional modes of banking in Sub-Saharan Africa

Mobile phone subscribers in SSA (per 100 people): 1995-2008



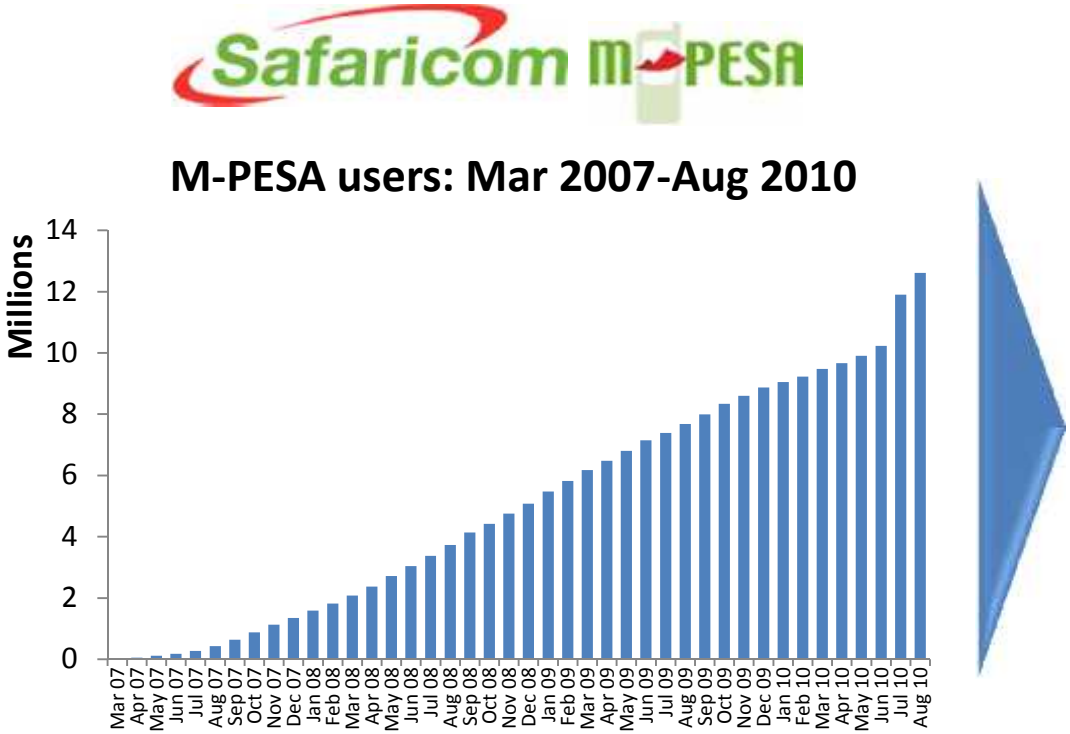
In comparison, there are only 16.3 bank accounts per 100 adults in Sub-Saharan Africa

Rapid expansion of mobile banking services in Sub-Saharan Africa: 2007-2011

Sources: World Bank Databank; Financial Access 2010 (World Bank and CGAP)

M-PESA is the iconic success story

13 million users in just three and a half years



Mobile money products now used by 2 in 3 Kenyan adults

M-PESA

M-KESHO
M-PESA EQUITY ACCOUNT

yu CASH

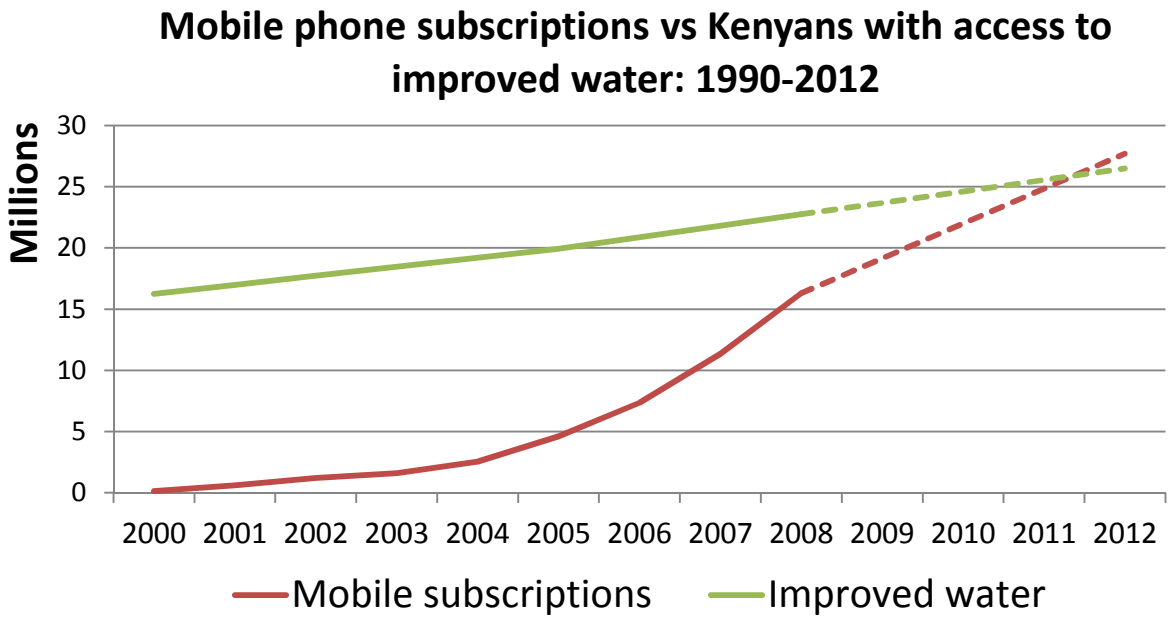
airtel

Orange Money

Now over 70% of households in Kenya and over 50% of the poor, unbanked and rural populations use M-PESA

Sources: CGAP 2010; Central Bank of Kenya 2010

What are the prospects for mobile banking in the water sector?



MPESA can now be used to pay water bills for metered customers in Eldoret, Kisumu, Nairobi and Nakuru

Sources: World Bank Databank; WHO/UNICEF Joint Monitoring Programme

Global growth of smart systems technology

The Economist

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A special report on smart systems

Making every drop count

Utilities are getting wise to smart meters and grids

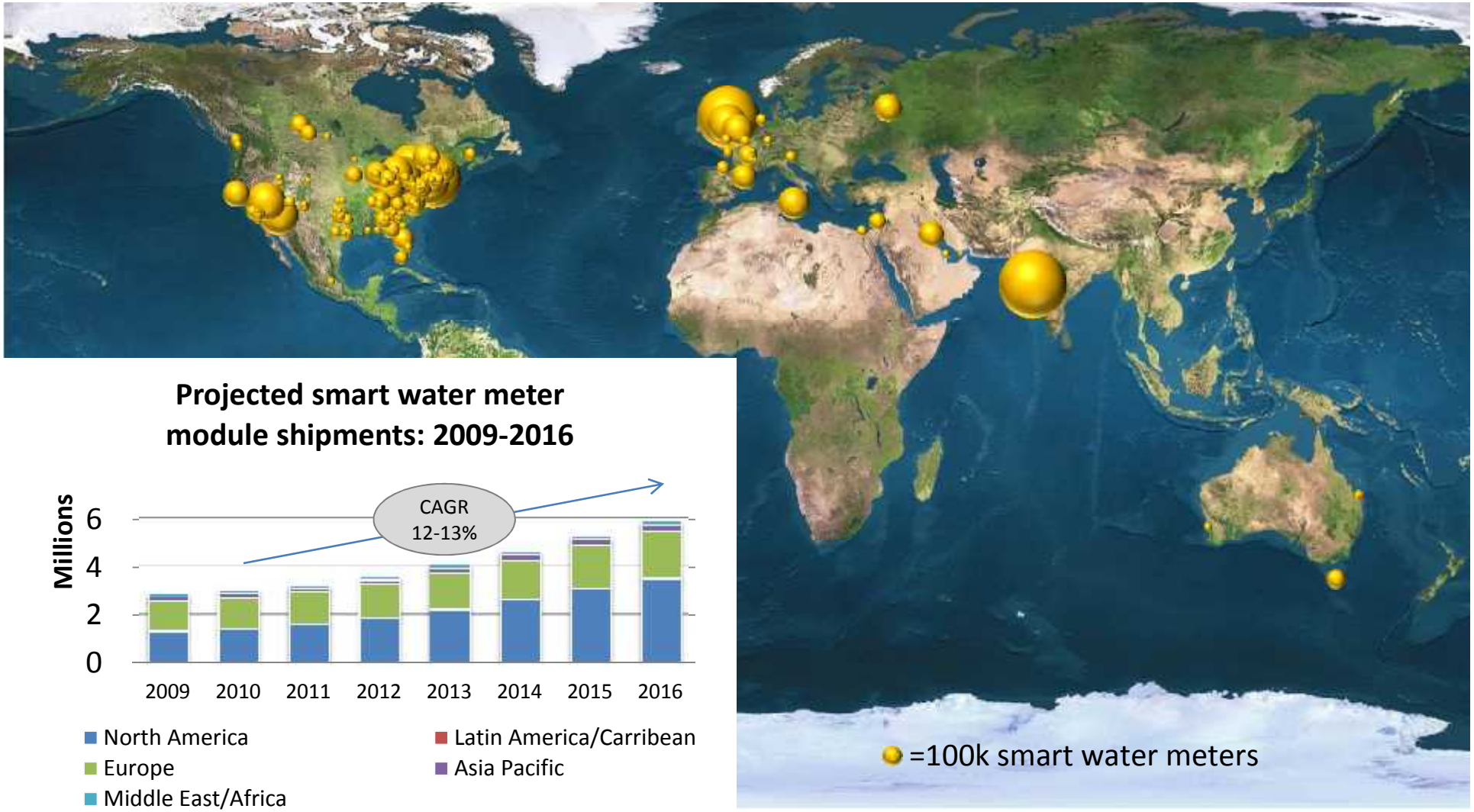
Nov 4th 2010

LONDON'S streets can be a bit of a maze, but below ground things are even more complex. Water pipes crisscross the city in all directions. Some areas used to have competing water companies, each of which built its own system. Not even Thames Water, the utility that operates the British capital's water-supply network today, knows exactly where all the pipes run.

Moreover, the network is ageing. Only a few years ago more than half of the 10,000 miles (16,000km) of water pipes below the streets of London were over a hundred years old and often burst. It did not help that over many years Thames Water, which was privatised in 1989, failed to invest enough. By the mid-2000s London had one of the leakiest water-supply systems in the rich world. Every day nearly 900m litres of treated water were lost and 240 leaks had to be fixed.

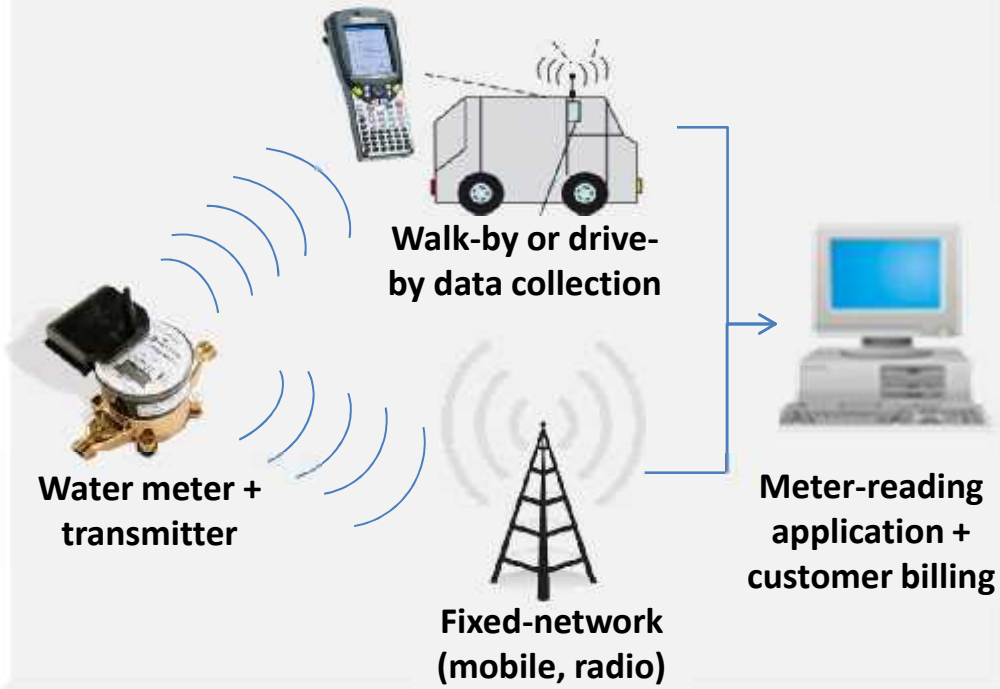
Smart water metering projects are expanding rapidly

Global shipments of smart water meter modules predicted to double by 2016



Smart water metering offers a range of potential benefits for urban areas…

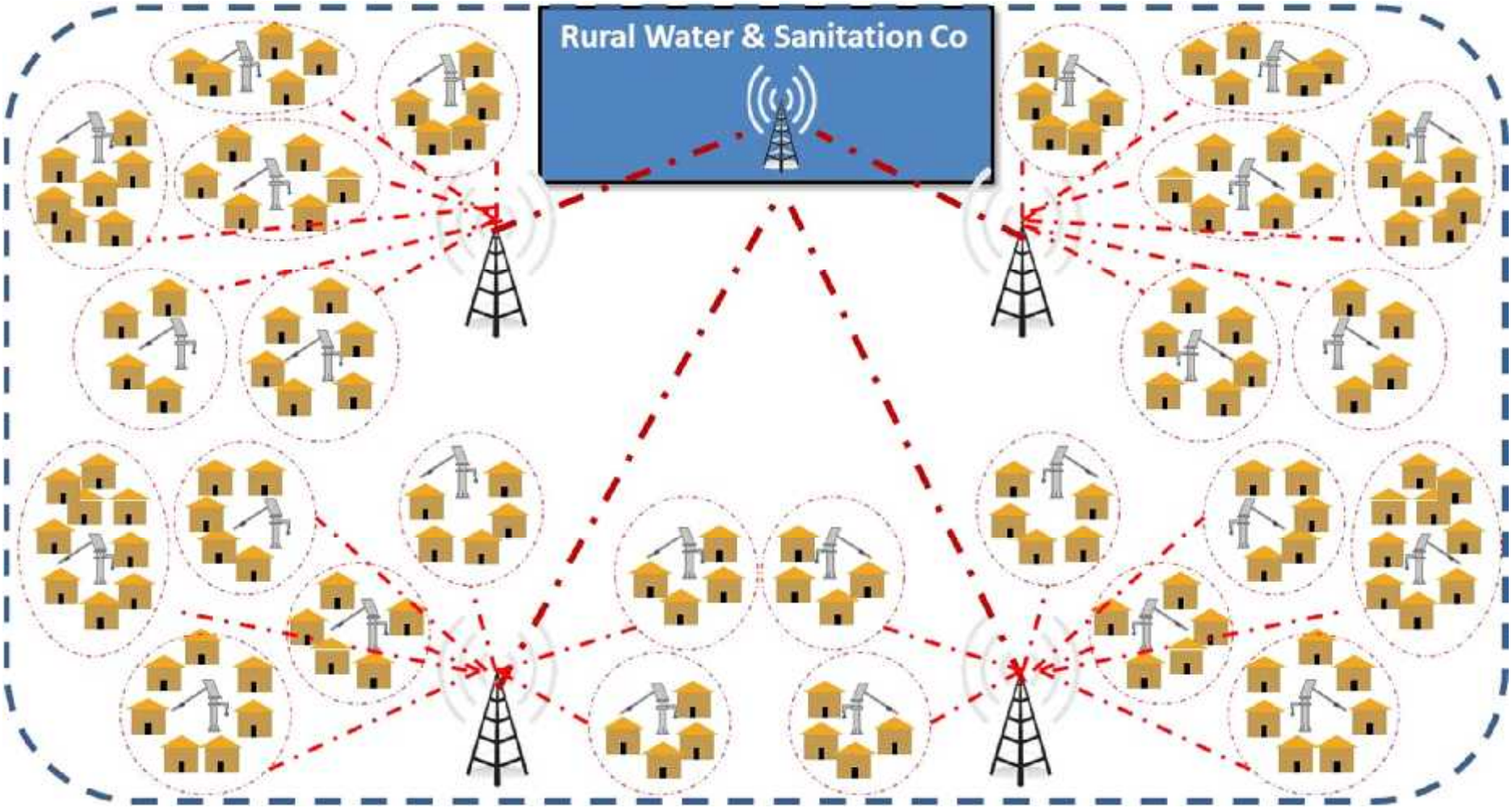
Typical AMR/AMI configuration



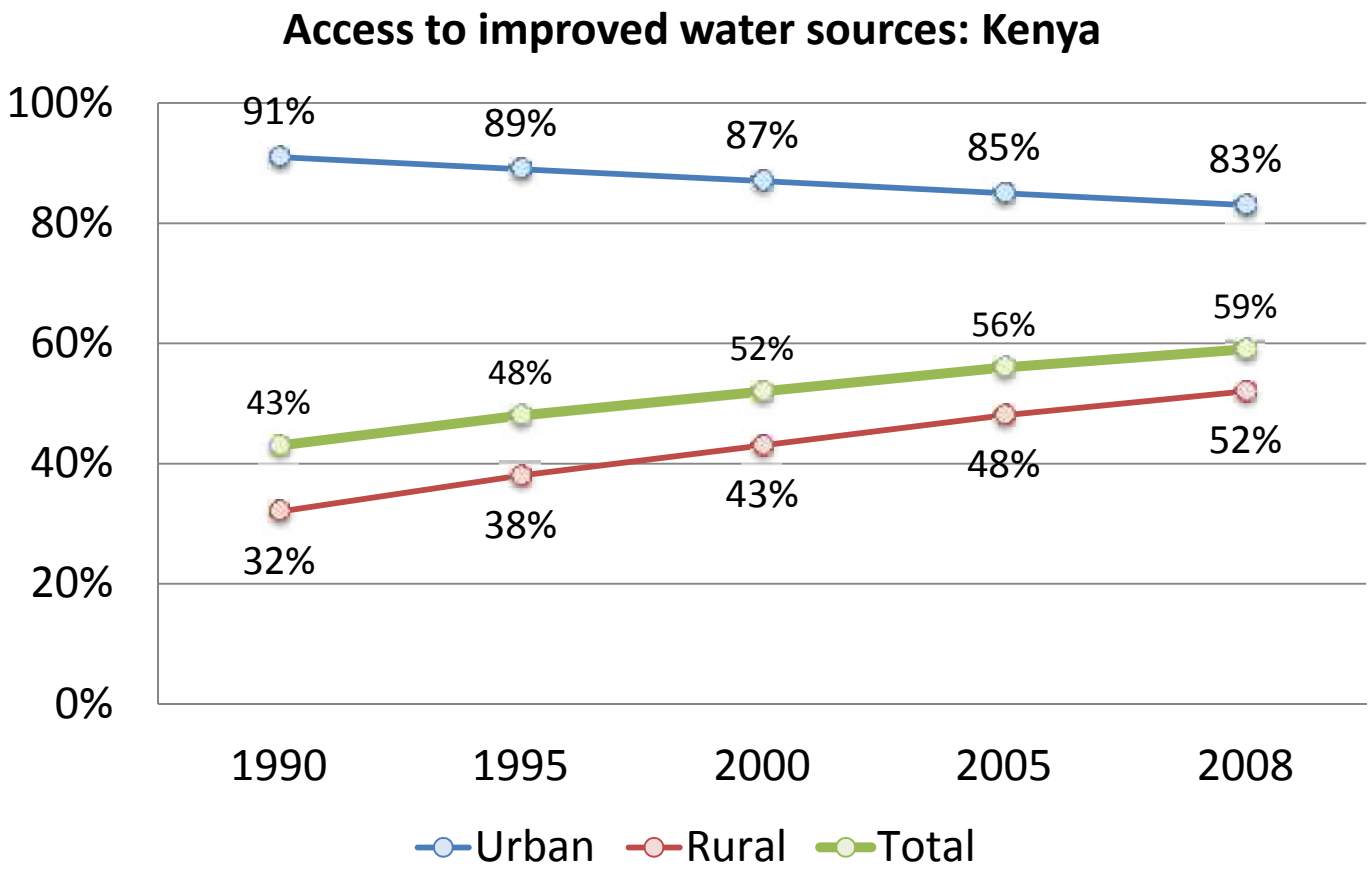
Potential benefits

- Faster/more efficient meter reading
- Theft and leak detection
- Accurate measurement of UfW
- Billing accuracy
- Enabling a flexible tariff structure
- Improved debt collection
- Monitoring resource use

… and opportunities to unlock to new models of operation, maintenance and fee collection in rural areas

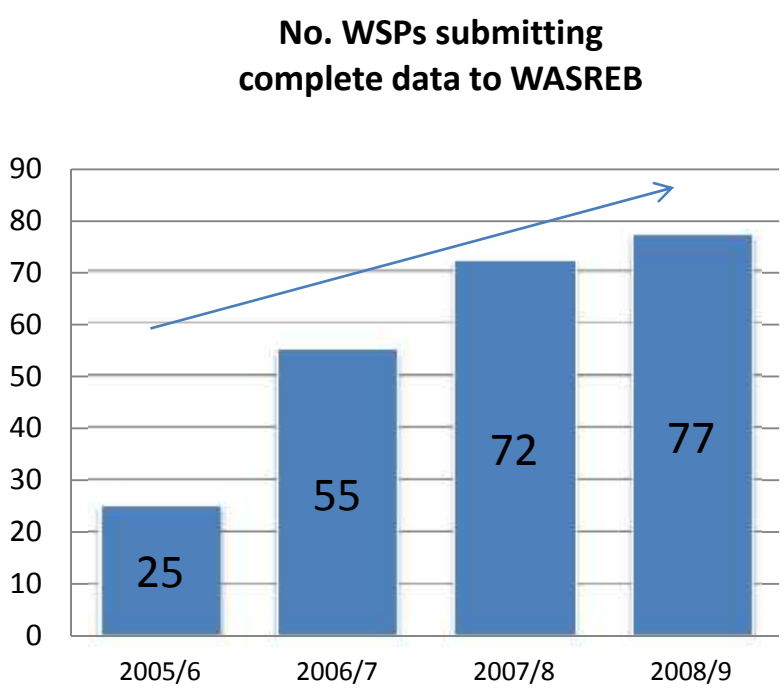


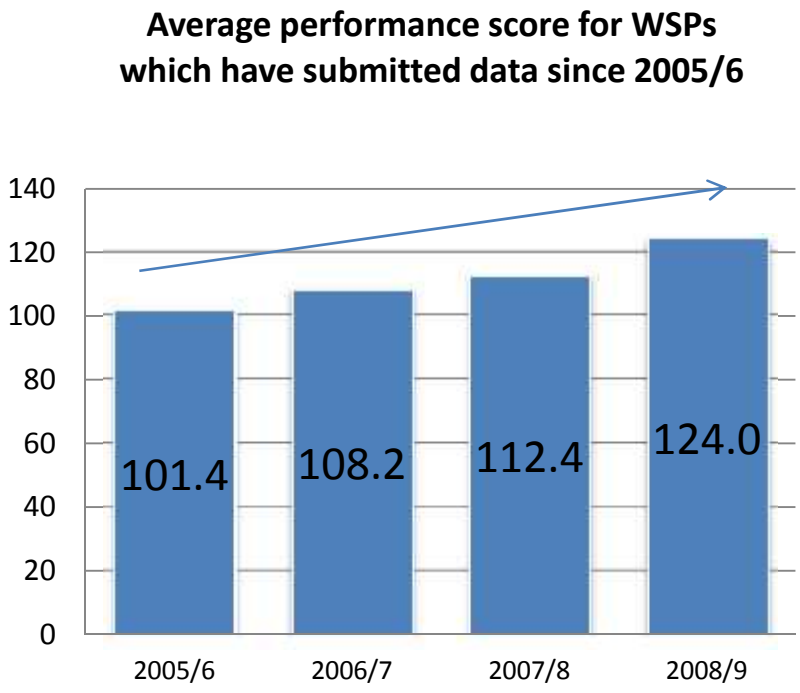
In Kenya, more people have access to improved water services than ever before...



Sources: WHO/UNICEF Joint Monitoring Programme

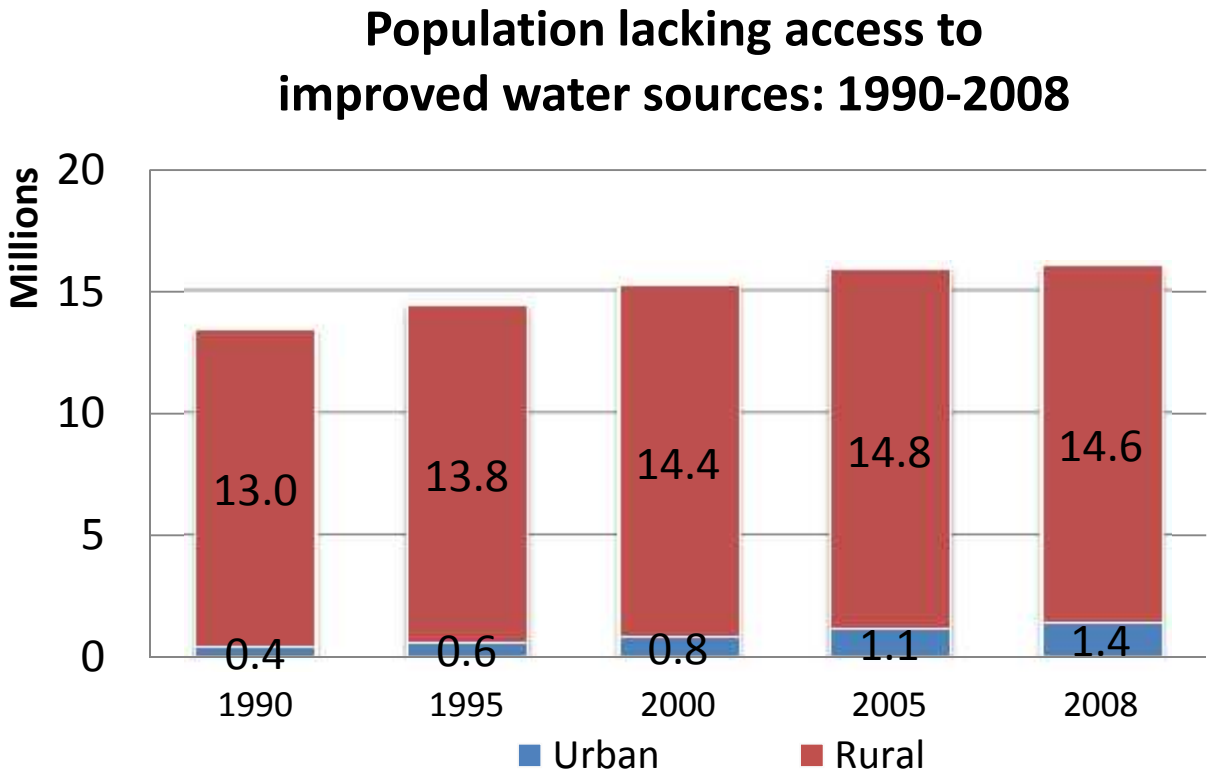
... and water sector reforms are beginning to yield dividends in urban areas





Sources: WASREB Impact Reports 1, 2 & 3

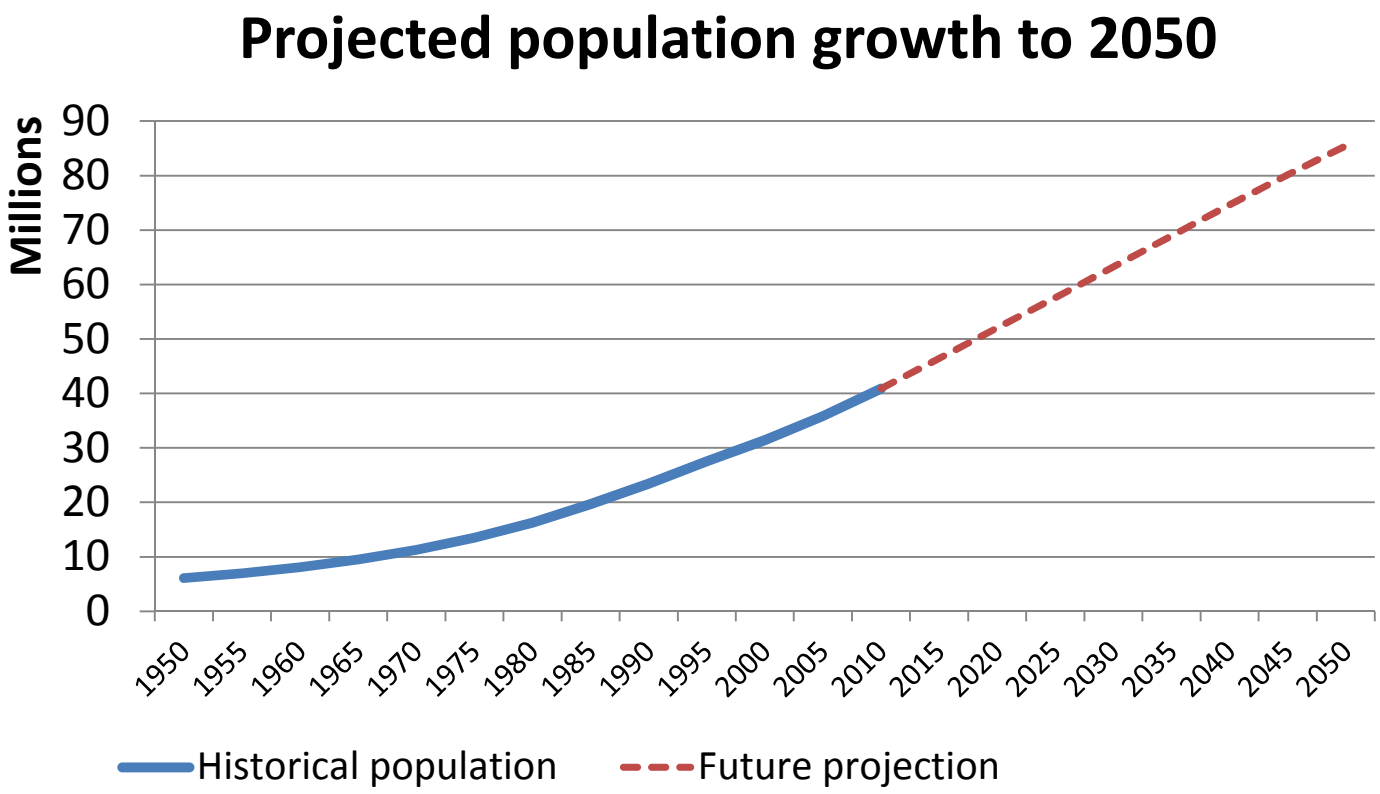
Yet major barriers to accessible and sustainable water services persist...



Almost one-third of handpumps in Kenya are thought to be non-functional

Sources: WHO/UNICEF Joint Monitoring Programme; Rural Water Supply Network 2007

... and emerging trends may introduce new resource pressures

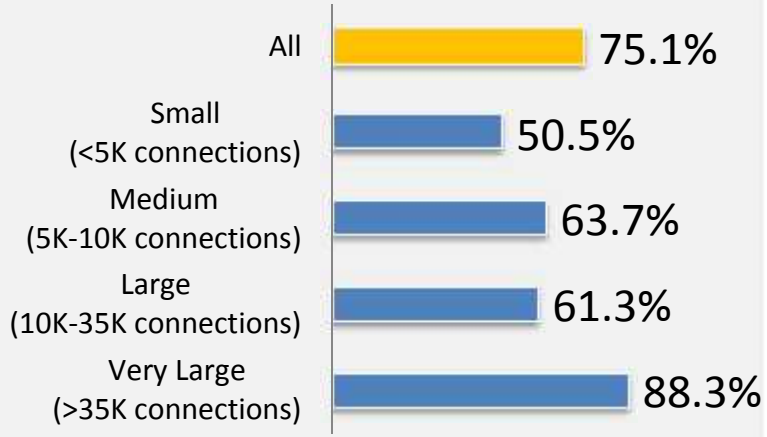


Sources: World Bank Databank, UN Population Database

What are the major barriers to the financial sustainability of water service provision in Kenya?

One quarter of urban connections are unmetered

Metering ratio in Kenya by utility size : 2008/9



A 2005 survey in Nairobi found **88.5%** of respondents had functional water meters**,** yet **28.5%** had never received a water bill

Systemic issues undermine financial sustainability

In 2008/9, Kenyan water service providers:

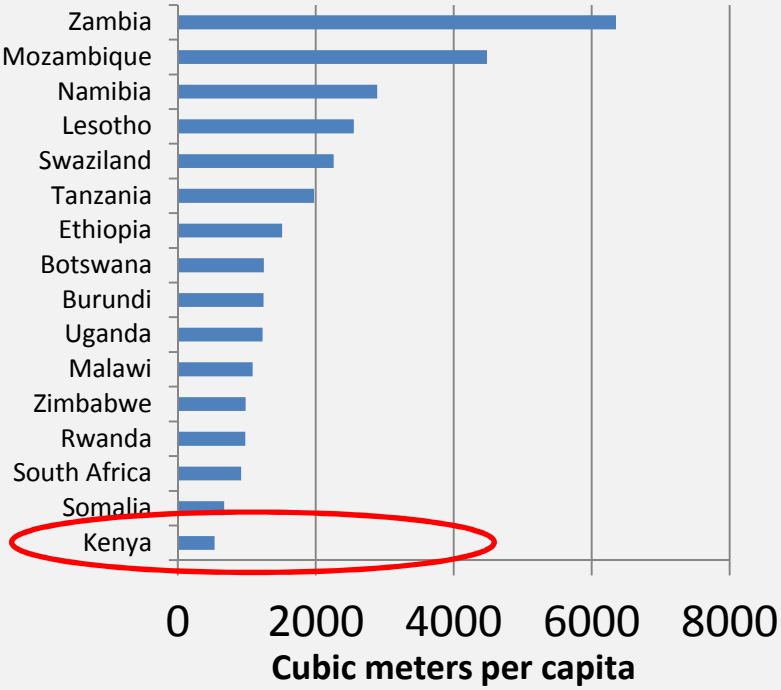
- Had an average collection efficiency of **~84%**
- Lost **~46%** of all water produced through leakages and illegal connections, amounting to a value of ~**Kshs**. **6.8 billion** - more than **25%** of the sector budget

Sources: Analysis based on data contained in WASREB Impact Report 2008/9; Transparency International Kenya 2006, 2009

Understanding the primary resource base is fundamental to sustainable water management

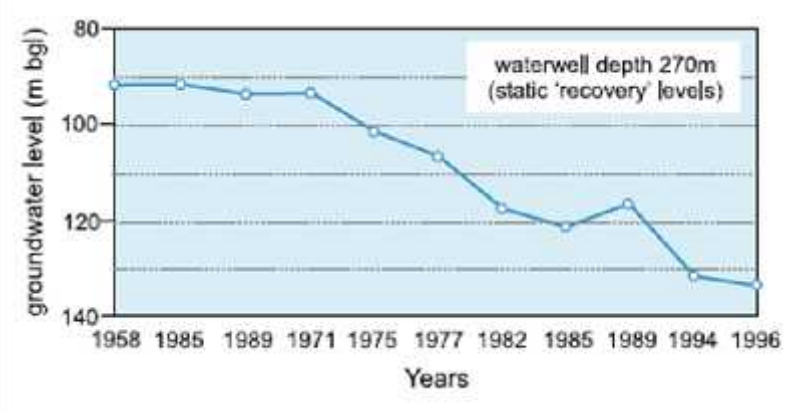
Kenya is one of the most water scarce countries in the region

Renewable internal freshwater resources in Southern and East Africa: 2008



Gaps in monitoring water abstractions

Groundwater level hydrograph for a water well in Nairobi



In a recent survey of large-scale water users, **46%** did not have a meter for measuring abstraction from water sources

Sources: World Bank Databank; Transparency International 2009; World Bank 2005

Innovative mobile payment and metering mechanisms are emerging rapidly across Sub-Saharan Africa

Positive steps are being taken, but how can new technologies be harnessed for effective, equitable and sustainable water management in Kenya?

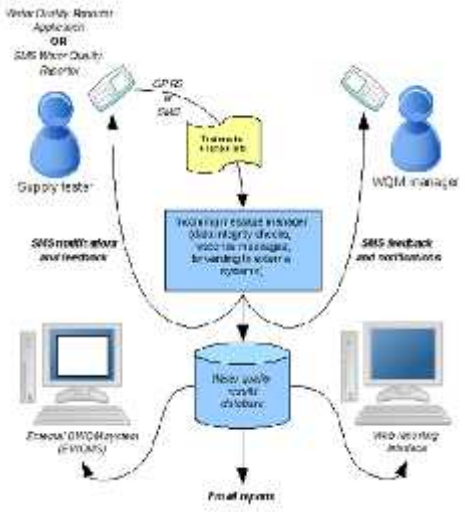
Operational performance monitoring in Senegal & Mali

Water quality & pricing information in Nairobi

Fault reporting in urban Zanzibar

Fault reporting in rural southern Tanzania

Water quality testing in South Africa



Water point monitoring in Malawi

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Research Project: Smart Water Systems

Smart Water Systems

Zambia – Kenya – UK

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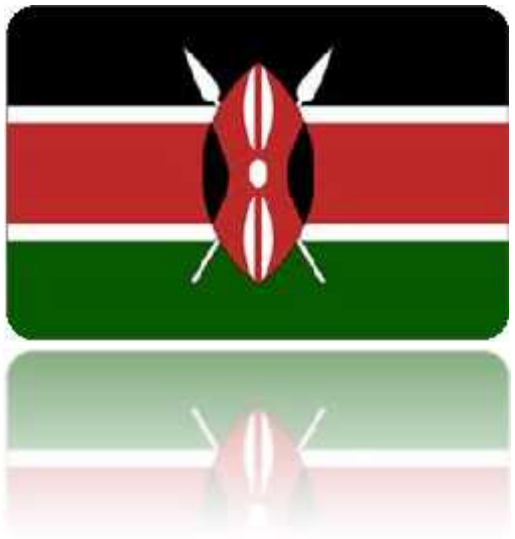
Smart Water Systems aim to harness the transformative potential of mobile communication innovations to unlock sustainable water resource and water service challenges for poverty reduction and economic growth. Research examines how rapid advances in mobile communication technologies in developing regions can unlock water security challenges of a) increasing and sustaining water service access for the rural poor, b) creating new business models for urban water services, c) achieving strategic water decision-making at scale, and d) leveraging human developmental impacts and policy action at scale.

http://owfp.ouce.ox.ac.uk/was/smart-water-systems.php

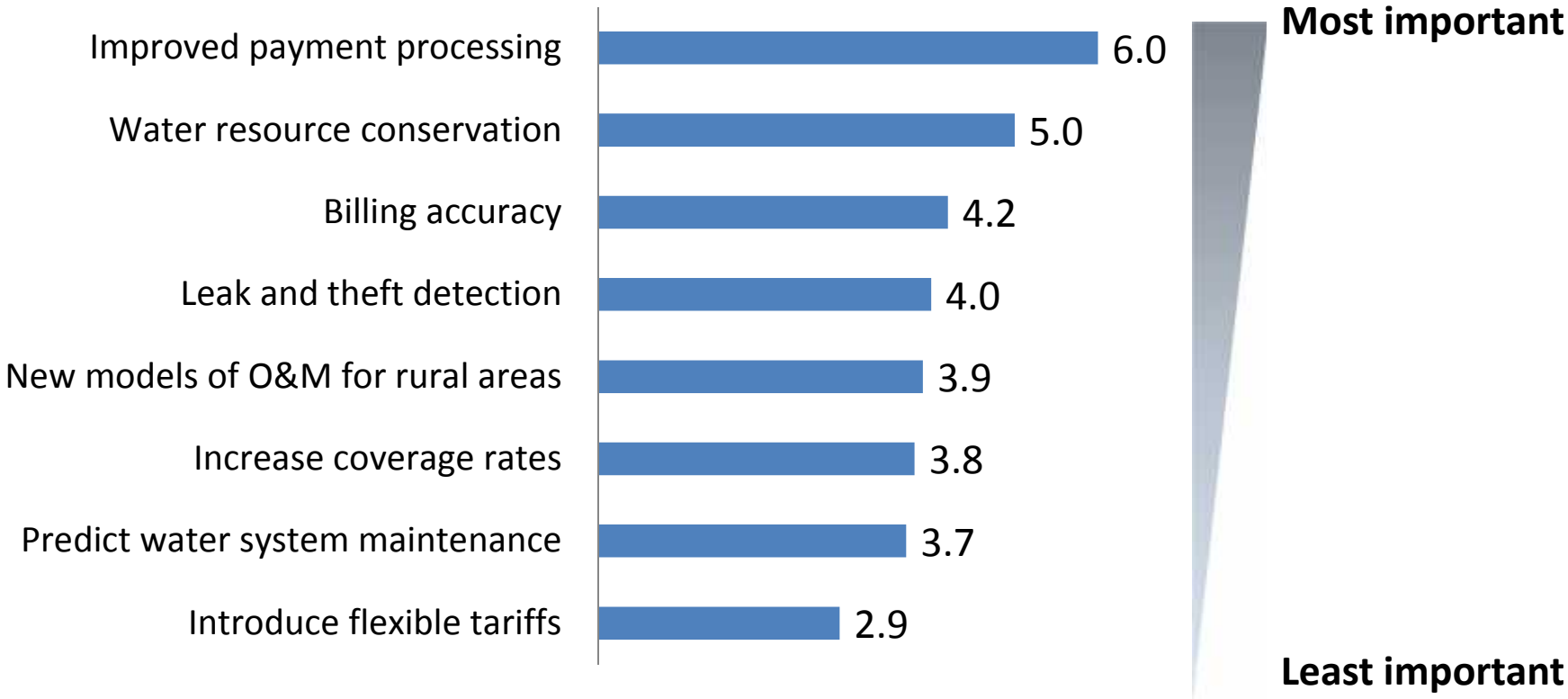


Smart Water Systems
Nairobi Workshop
13 January 2011

Key Benefit Analysis

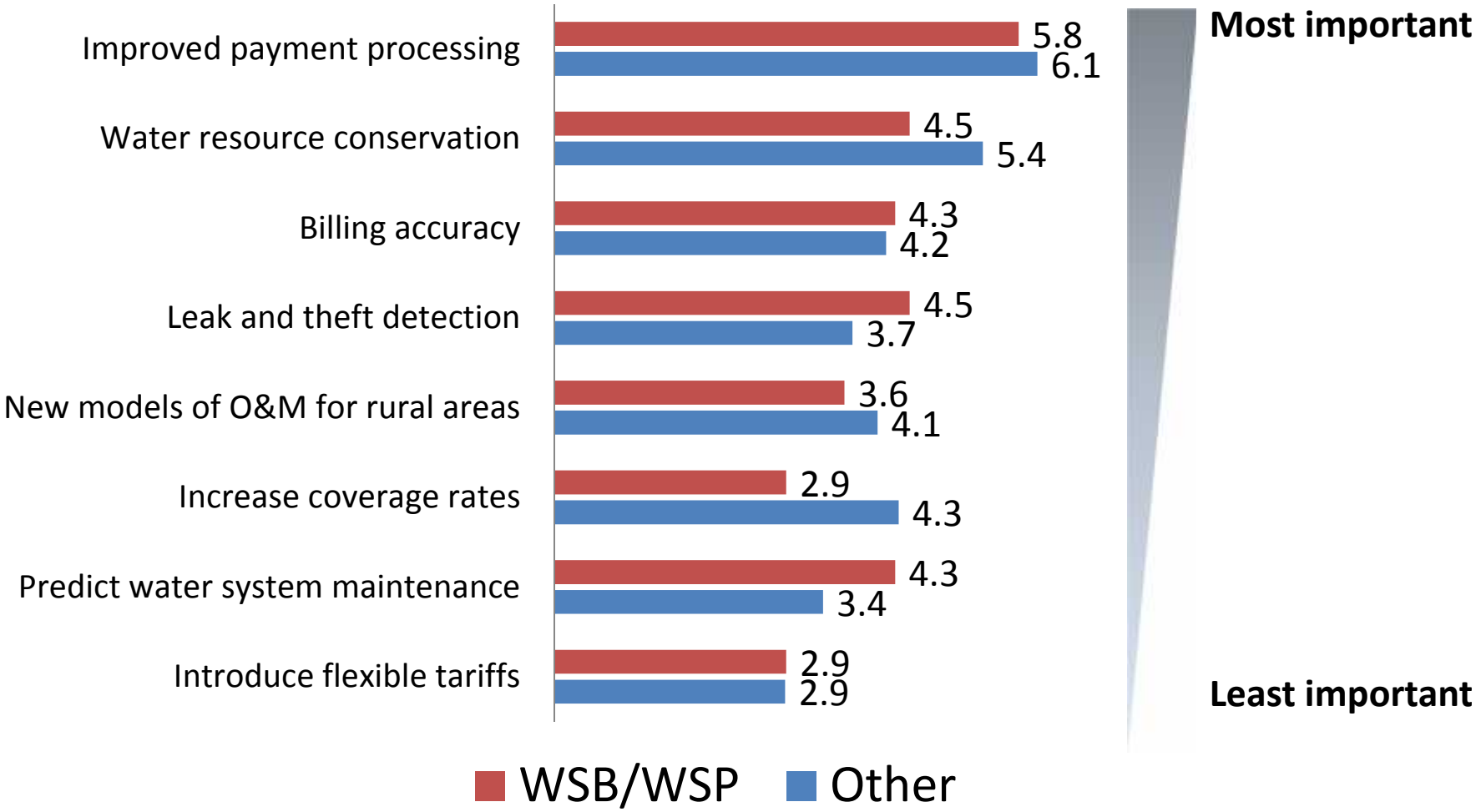
Nairobi Workshop, 13 January 2011

Ranked importance of potential benefits of Smart Water Systems (*n*=30)



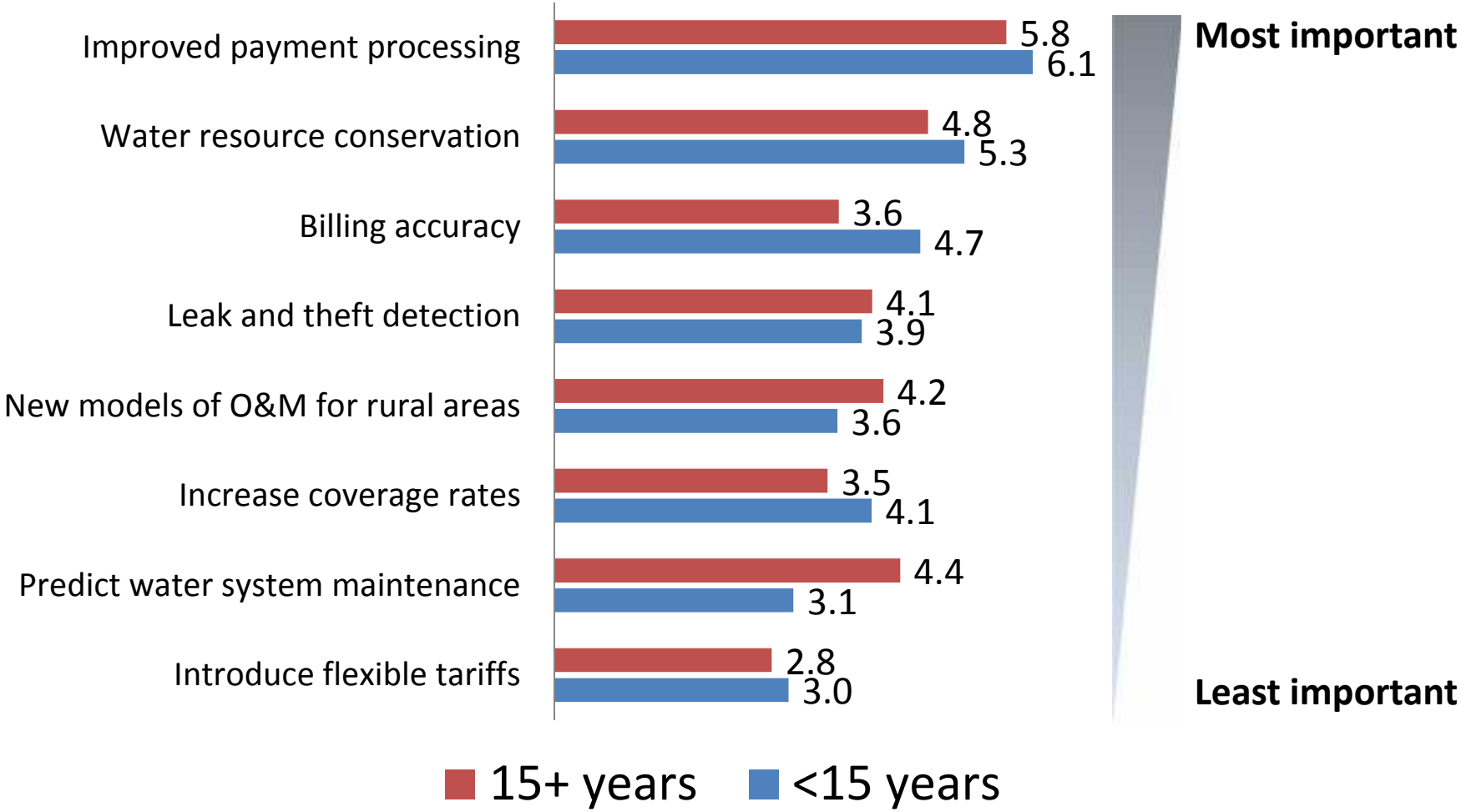
Nairobi Workshop, 13 January 2011

Ranked importance of potential benefits: WSB/WSPs (*n*=11) vs Others (*n*=19)



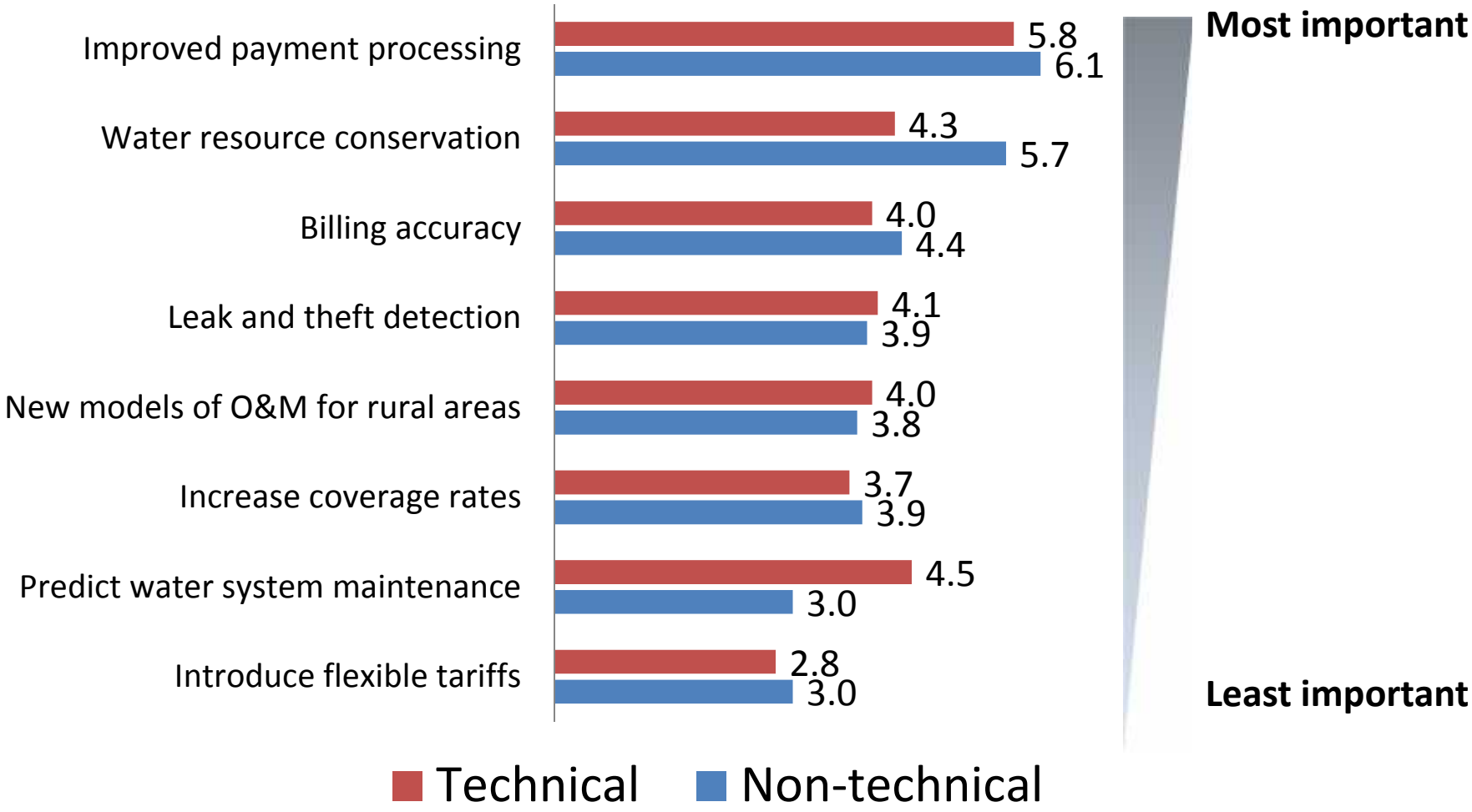
Nairobi Workshop, 13 January 2011

Ranked importance of potential benefits:
>15 yrs experience (*n*=14) vs <15 yrs experience (*n*=16)



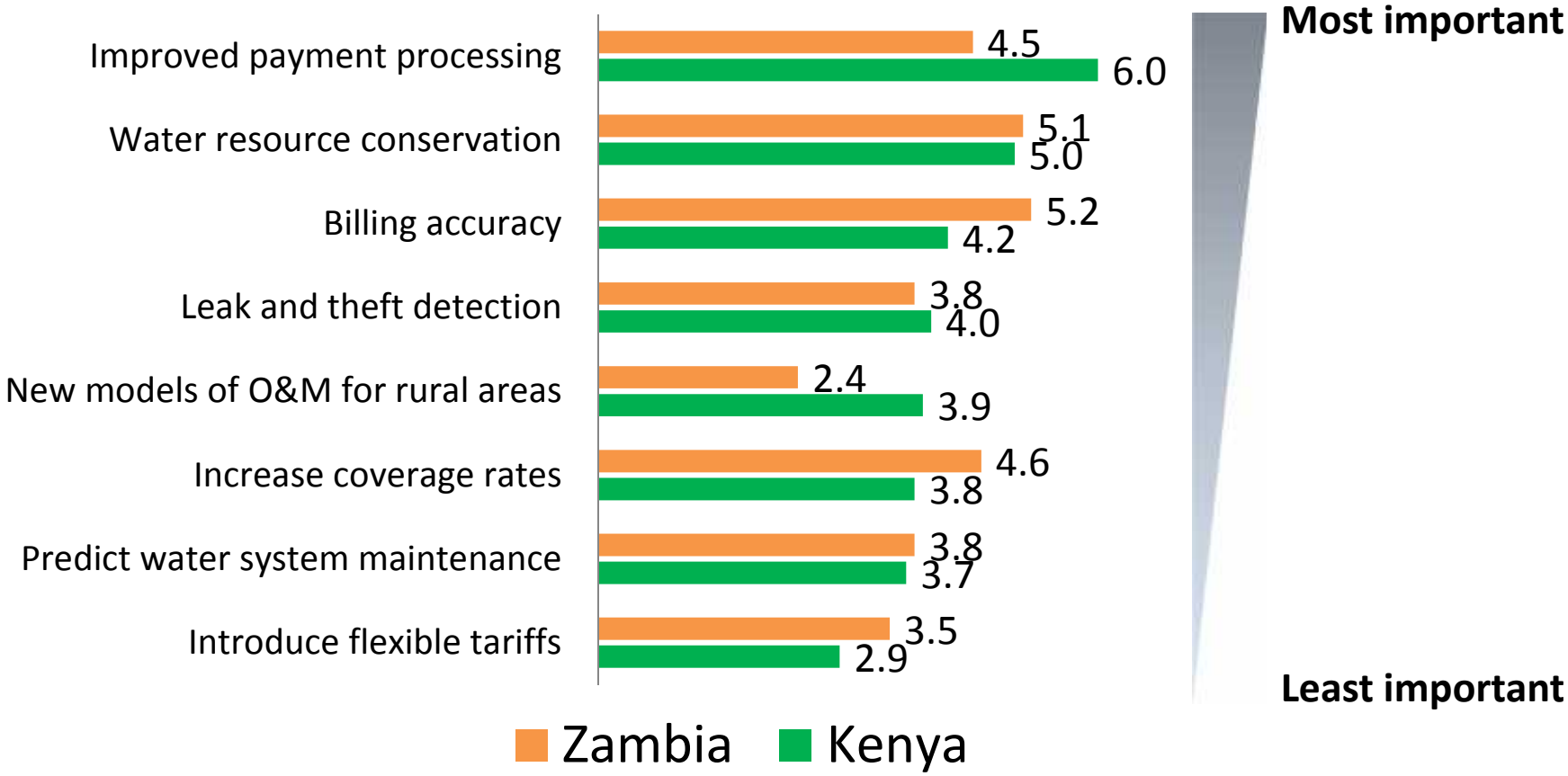
Nairobi Workshop, 13 January 2011

Ranked importance of potential benefits: Technical discipline (*n*=14) vs non-technical discipline (*n*=16)



Nairobi Workshop, 13 January 2011

Ranked importance of potential benefits of Smart Water Systems: Kenya & Zambia



Smart Water Systems Workshop Participants, Nairobi 13th January 2011

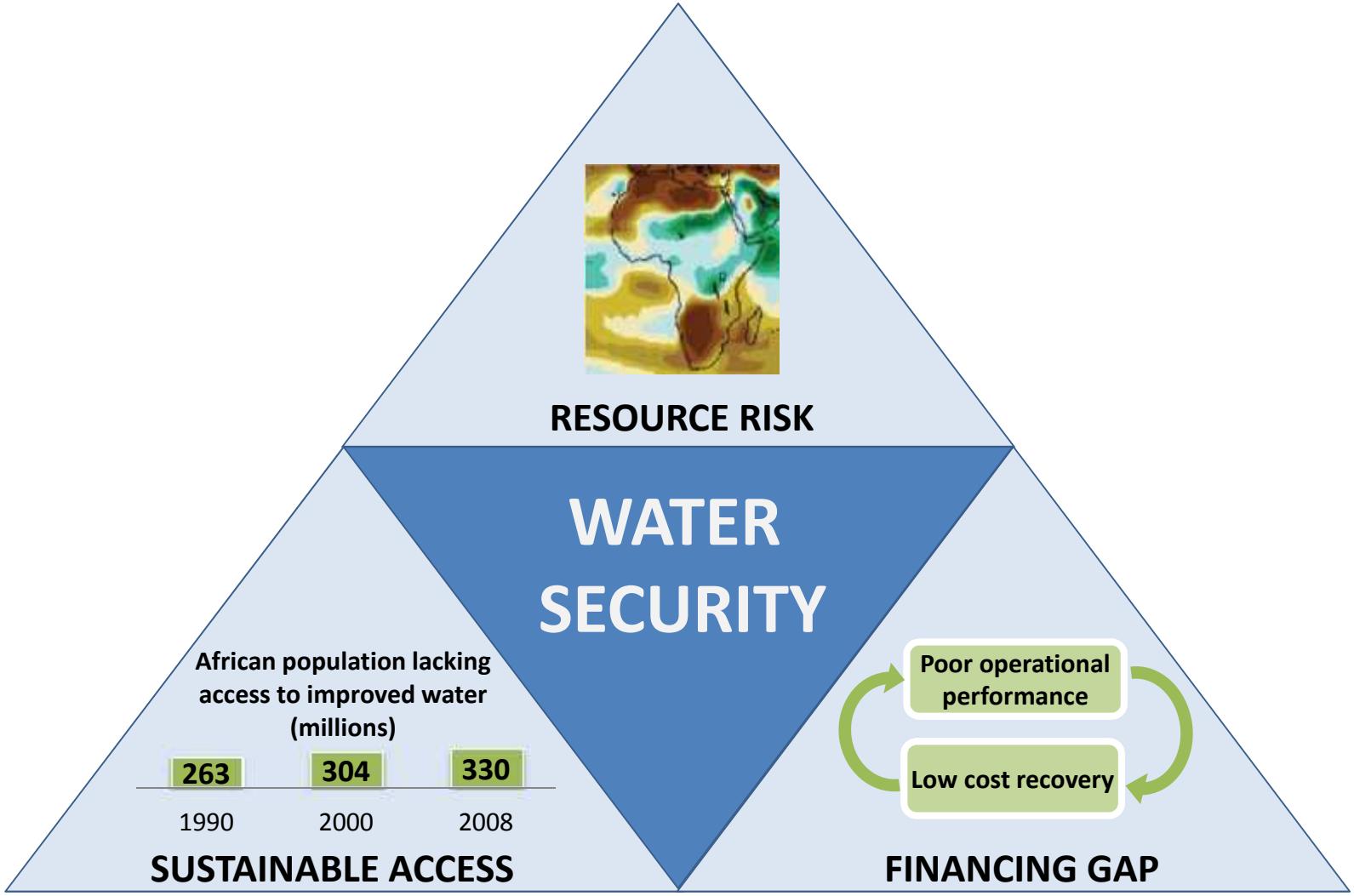
Name	Organisation	Sector
L. Andersson	Water Services Trust Fund	Finance/Donor/Trust Fund
J. Randu	Malindi WSC	Water Services
Eng. R. Gakubia	Water Services Regulatory Board	Regulator
Eng. J. Muchiri	Nyeri Water Company	Water Services
B. Chebet	Nakuru Rural WASCO	Water Services
R. Advani	World Bank	Finance/Donor/Trust Fund
H. Patel	Nairobi Ironmongers	Technology
P. Kilonzo	Grundfos LIFELINK	Technology
M. Mutuku	Ministry of Planning	Government
P. Orengo	The Standard	Technology
S. Gatabaki	Airtel	Technology
J. Kayemba	K-Rep Bank	Finance/Donor/Trust Fund
R. Wachira	Nairobi WSC	Water Services
J. Shiyanguya	Lake Victoria South WSB	Water Services
M. Chamia	Central WSB	Water Services
A. Ndingo	Tanathi WSB	Water Services
N. Khaemba	Lake Victoria South WSB	Water Services
M. Notley	Water Services Trust Fund	Finance/Donor/Trust Fund
P. Supeyo	Water Resources Management Authority	Water Resources
A. Tufvesson	SIDA	Finance/Donor/Trust Fund
W. Davies	World Bank IFC	Finance/Donor/Trust Fund
A. Adongo	Sana International	NGO
K. Mokogi	Telkom Kenya/Orange	Technology
R. Ndungu	African Enterprise Challenge Fund	Finance/Donor/Trust Fund
F. Domde	UNICEF	Finance/Donor/Trust Fund
B. Darche	World Bank	Finance/Donor/Trust Fund

M-Water

A global partnership for water security

Wellcome Trust, London
23rd March, 2011

The nature of the challenge



Source(s): WHO/UNICEF Joint Monitoring Programme (2010)

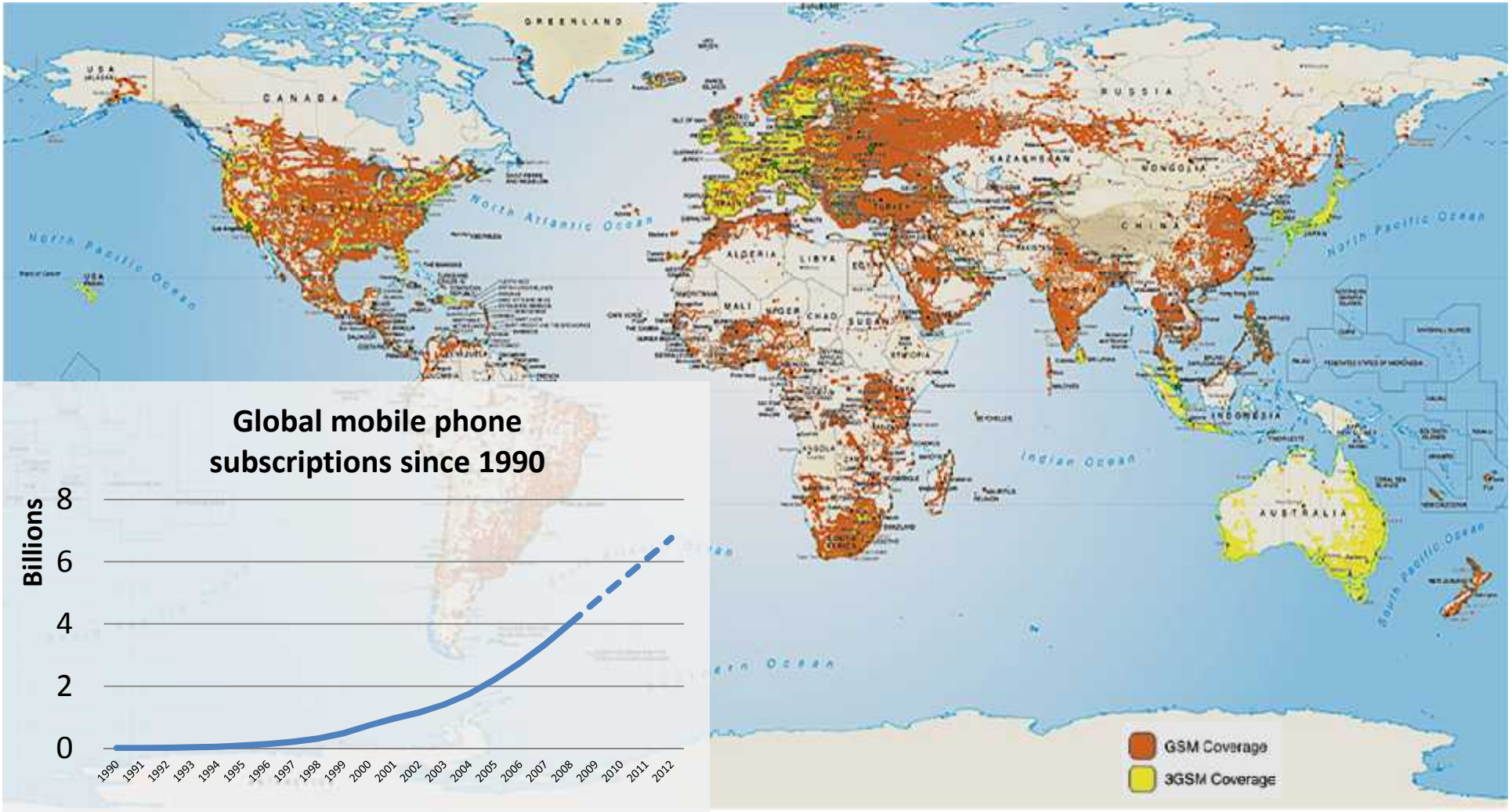
The Missing Elements – Some Critical Factors

- Poor cost recovery inhibits investment and leads to unsustainable water supply systems
- A lack of easy-instalment payment systems is particularly damaging for the poor
- Much higher than necessary refurbishment costs due to poor information on system condition
- Inability to manage water resource uncertainty due to lack of real time information

What is M-Water?

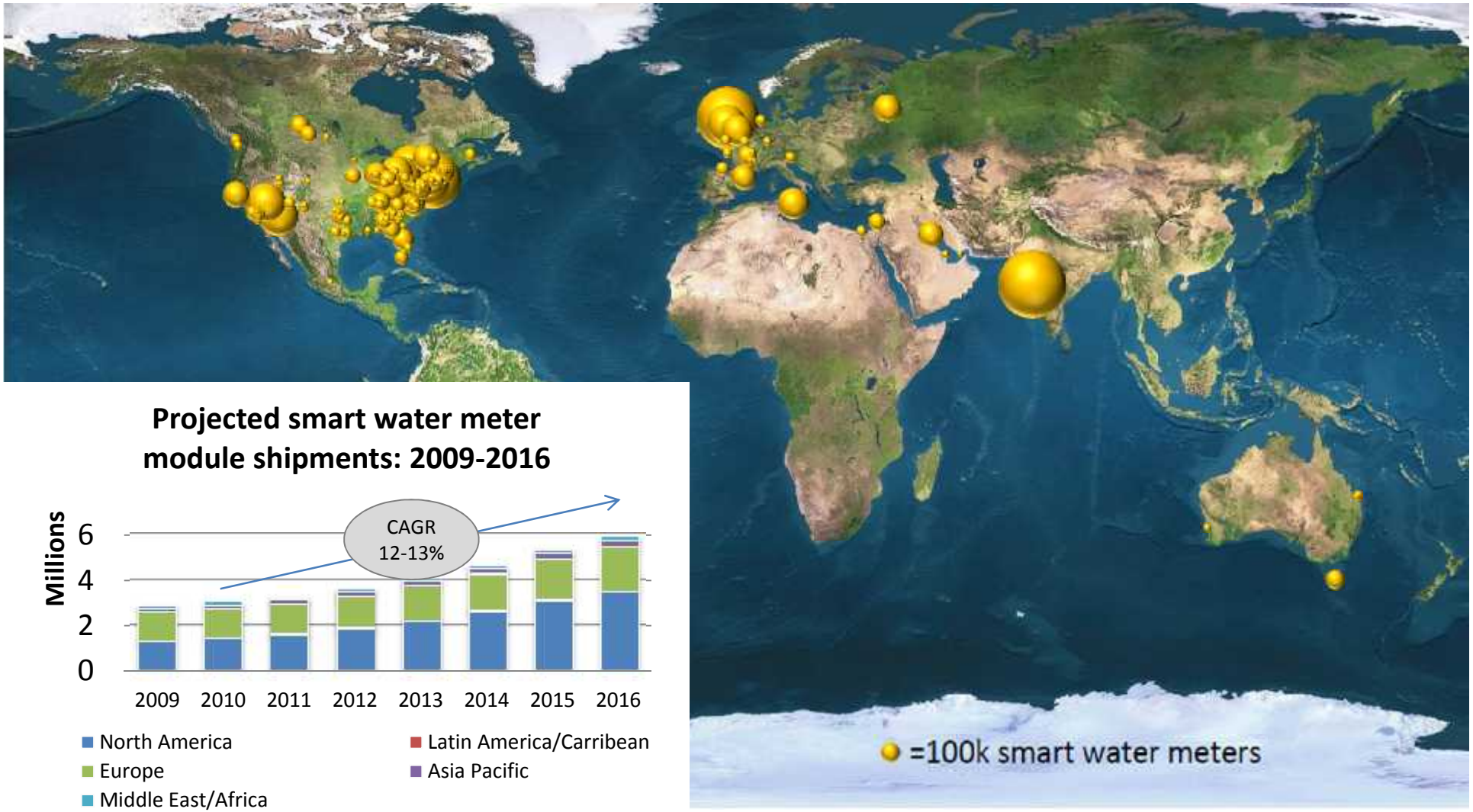
M-Water is a new approach to harness mobile technology innovations to deliver more sustainable water service provision and improve water resource management for water security and human development

Developing countries account for two thirds of the world's mobile handsets



Source(s): World Bank Development Indicators (2010); Europa Technologies (2009)

Smart water metering projects are expanding rapidly, with global shipments expected to double by 2016

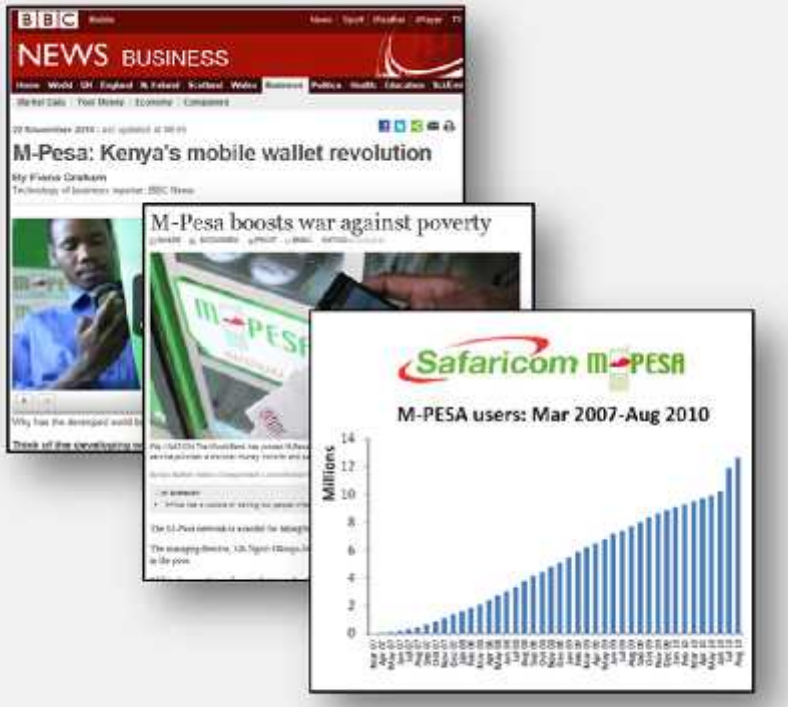


Projected smart water meter module shipments: 2009-2016

Source(s): Author's analysis (2011); Pike Research (2010)

Mobile money is dramatically increasing financial inclusion amongst the poor and unbanked in Africa

Mobile money has attracted 15 million Kenyan users in less than four years



Rapid growth of mobile banking services across sub-Saharan Africa since 2007

Source(s): Central Bank of Kenya (2010); World Bank (2010); BBC (2010); Daily Nation (2010)

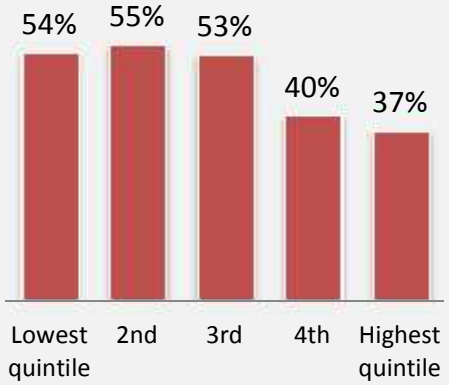
Mobile money offers innovative water sector applications which can benefit both utilities and consumers globally

Mobile water payments now offered in six African countries…

… affording important benefits to water service providers…

… and water users alike

Adoption of mobile water payments in Kiamumbi, Kenya within two months of launch



Household monthly water consumption

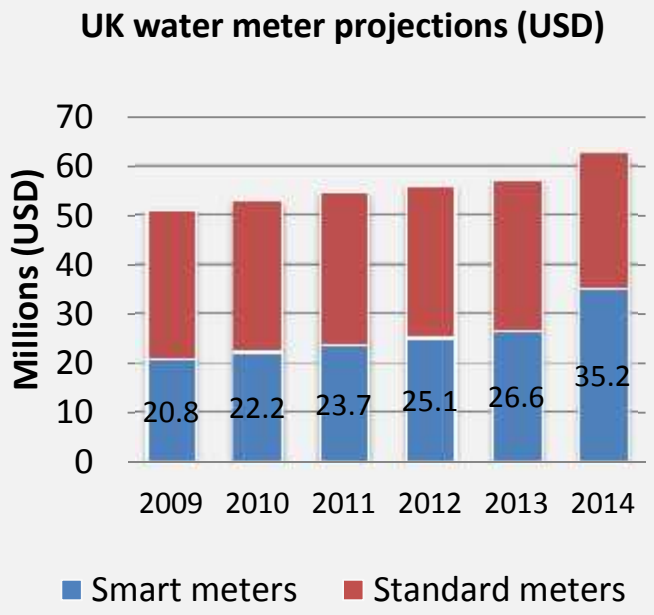
Source(s): Daily Monitor (2011); Kiamumbi Water Trust billing data (2011)

M-Water innovations could have important implications for the UK water sector

More than five million UK households currently owe money on their water bills

- At the end of 2008-9, household customers owed **£1.4bn** to water companies
- The cost to water companies of debt recovery exceeds **£75m per year**, with an additional **£100m** being written off each year
- Overall, this adds **£12 a year** to every household's water bill

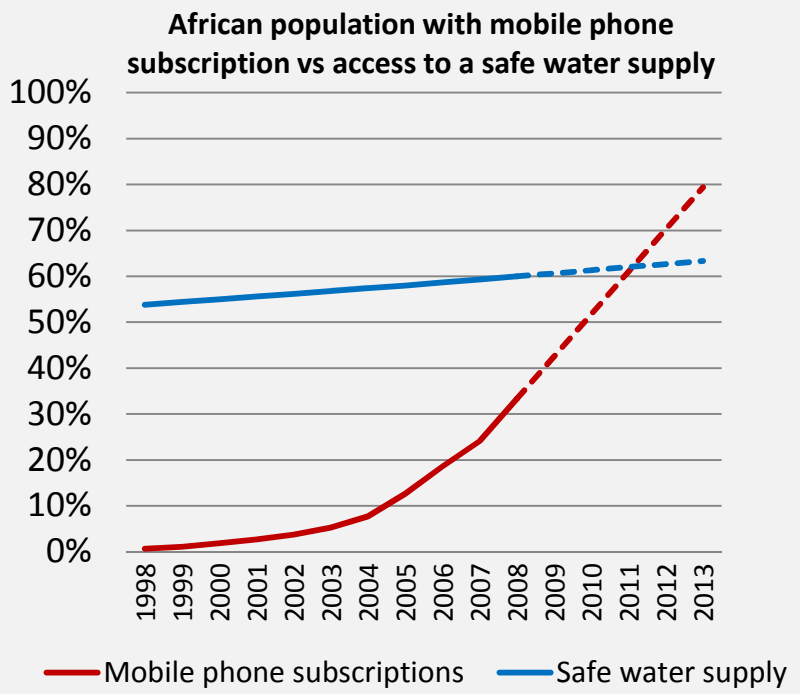
Annual UK smart water meter orders expected to grow by 12% p.a. to 2014



Source(s): Ofwat (2011); LEK (2009)

Africa's mobile technology revolution already being harnessed to improve water supply sustainability

By 2012, more Africans will have a mobile phone than access to safe drinking water



Emerging initiatives using mobile technology for water payments and monitoring

Source(s): WHO/UNICEF Joint Monitoring Programme (2010); World Bank Databank (2010)

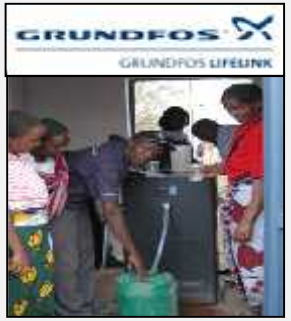
Smart meters offer a range of benefits in developed and developing regions

Smart metering offers a range of benefits for water utilities

Potential benefits include:

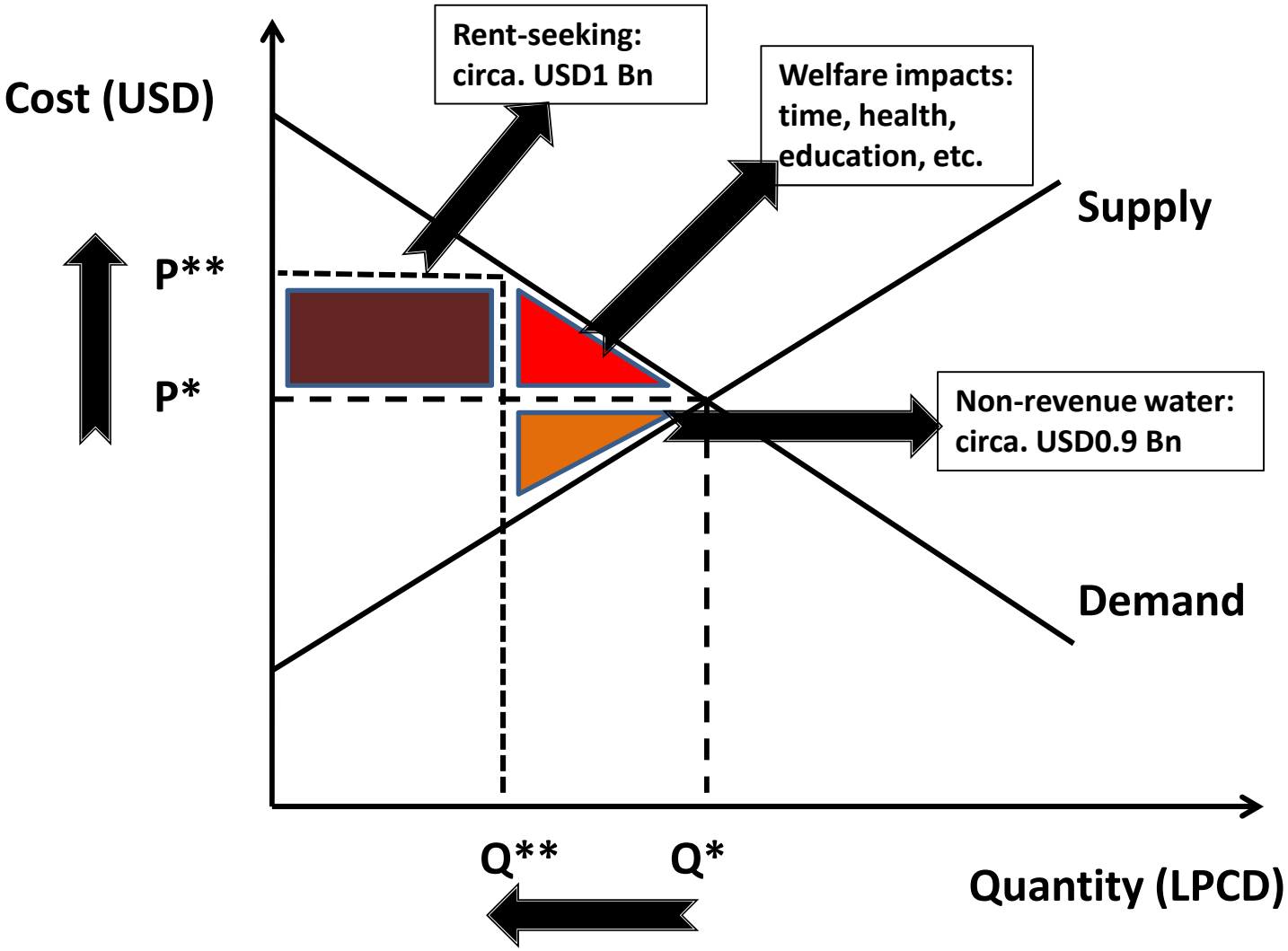
- Faster/more efficient meter reading
- Theft and leak detection
- Accurate measurement of UfW
- Billing accuracy
- Enabling a flexible tariff structure
- Monitoring resource use

Smart standpipe innovations beginning to target 'base-of-pyramid' market



Economics of M-Water

The case of urban water services in low-income Africa (n=29)



M-Water as a 'liberation technology' with significant and under-exploited developmental impacts

"Mobile telephony… can contribute meaningfully to every single MDG. The gains are breathtaking in promoting livelihoods, improved health, better schools, and other areas"

- Prof Jeffrey Sachs, special adviser to the UN Secretary General on the MDGs

"New technology-based solutions, that did not exist when the MDGs were endorsed, can and should be leveraged to allow for rapid scaling up. The most important of these new technologies are mobile phones, broadband internet, and other information and communications technologies"

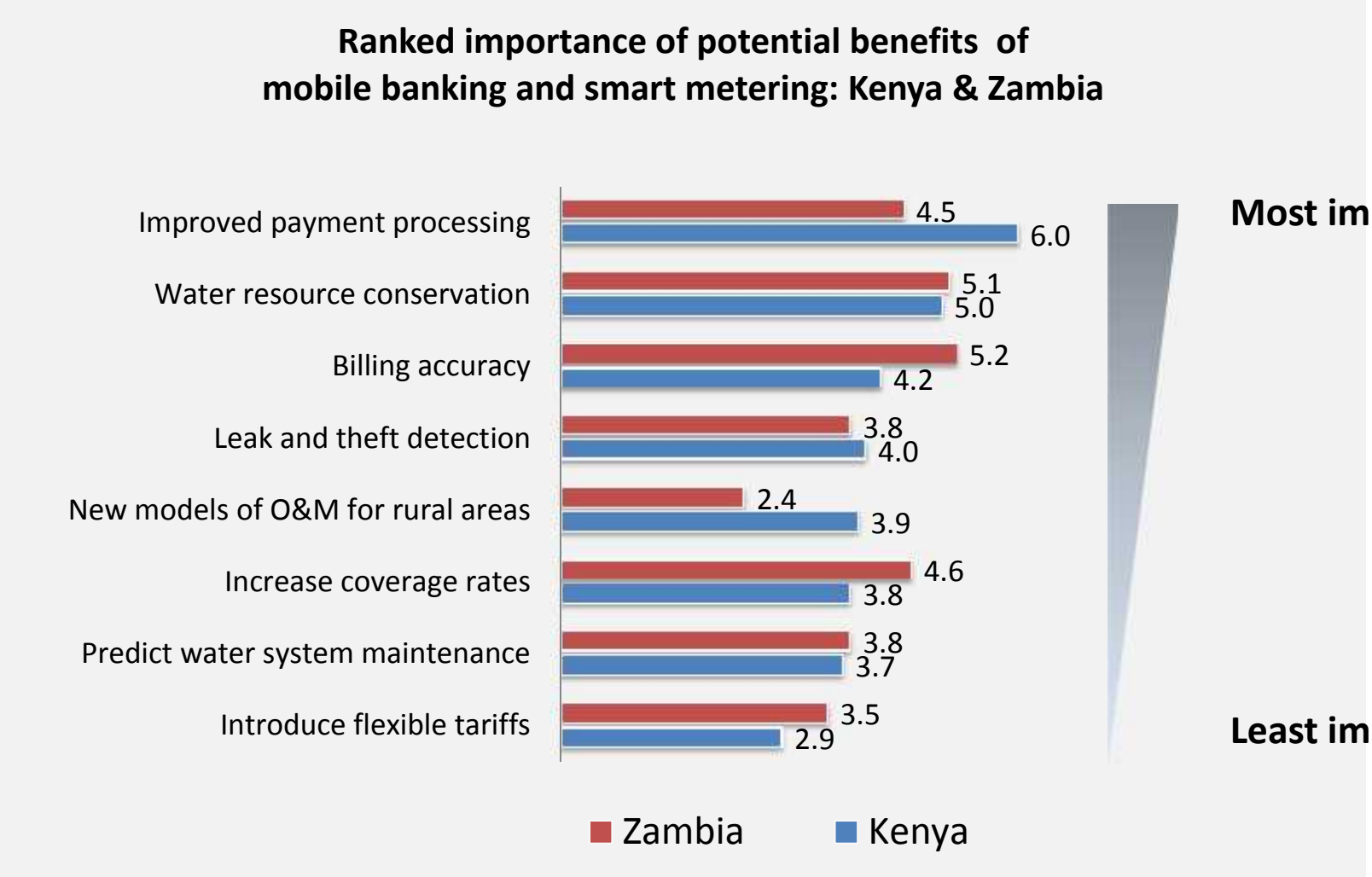
– Ban Ki-Moon, UN Secretary General

Proof-of-concept phase

Workshops in Zambia and Kenya attracted participants from a range of water sector organisations

	Zambia, December 2010		Kenya, January 2011	
Water service providers	Lusaka WSC Eastern WSC Chabeshi WSC Luapula WSC Lukanga WSC Southern WSC Western WSC	North Western WSC Kafubu WSC Nkana WSC Mulonga WSC	Nairobi WSC Malindi WSC Nakuru WSC Nanyuki WSC Nyeri WSC Embu WSC Athi WSB	Tanathi WSB Tana WSB Rift Valley WSB Lake Victoria South WSB Lake Victoria North WSB Northern WSB Coast WSB
Government and regulation	Ministry of Energy & Water Development Ministry of Local Government & Housing	National Water & Sanitation Council Zambian Development Authority National Environment Council	Ministry of Water and Irrigation Water Services Regulatory Board Water Resources Management Authority	
Mobile network operators	Airtel Celpay		Airtel Orange/Telkom	
Donors/ Finance/ Trust Funds/ NGOs	Devolution Trust Fund JICA Rural Finance Village Water UNICEF		Water Services Trust Fund Swedish International Development Agency World Bank IFC World Bank WSP	K-Rep Bank UNICEF African Enterprise Challenge Fund Sana International UN-Habitat
Others	Elsewedy Meters University of Zambia Copperbelt University		Grundfos LIFELIINK Nairobi Ironmongers	

Workshop participants identified key M-Water benefits



Workshops attracted media interest

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TECHNOLOGY

Researchers seek ways to improve water supply using mobile phones

SHARE BOOKMARK PRINT EMAIL RATING

By the end of this year more Kenyan households would have mobile phones than access to enough safe water, but this can change. Photo/FILE

Researchers are working to use the mobile phone to enhance water management in Kenya.

STANDARD Panorama

Science / Environment / Health

Water Services

ABOUT SWS TECHNOLOGY

Kenya to get smarter at water management

SWS may offer the potential to improve the lives of millions willing to pay for the water that they use

EASY TO INSTALL

Source(s): Daily Nation (2011); The Standard (2011)

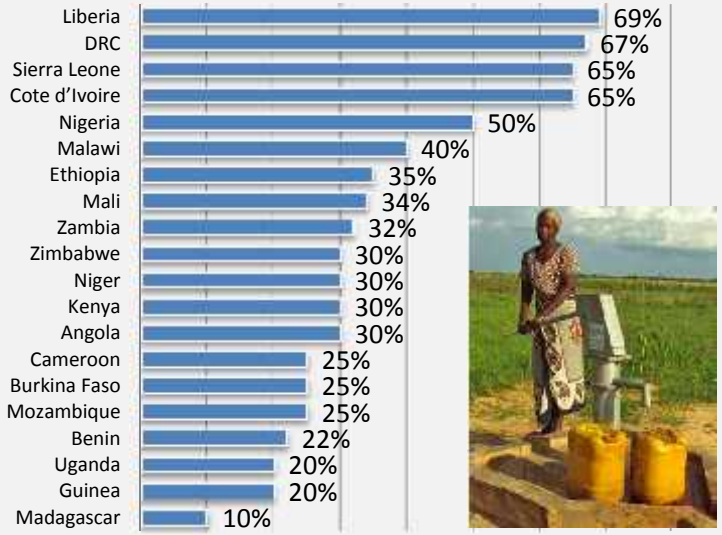
Global review has identified three key M-Water opportunities

	Sub-sector	Opportunity
1	Rural water supply	New monitoring and management models at scale to improve water service coverage and sustainability with regulatory reach
2	Urban water supply	Improve the operational efficiency of urban water services and extend reliable services based on technical and financial innovations
3	Water resource sustainability	Enable strategic water resource decision-making that reduces resource risk via innovative water abstraction and consumption information systems

Rural waterpoints in Africa are chronically unreliable, with impacts for the health and development of rural communities

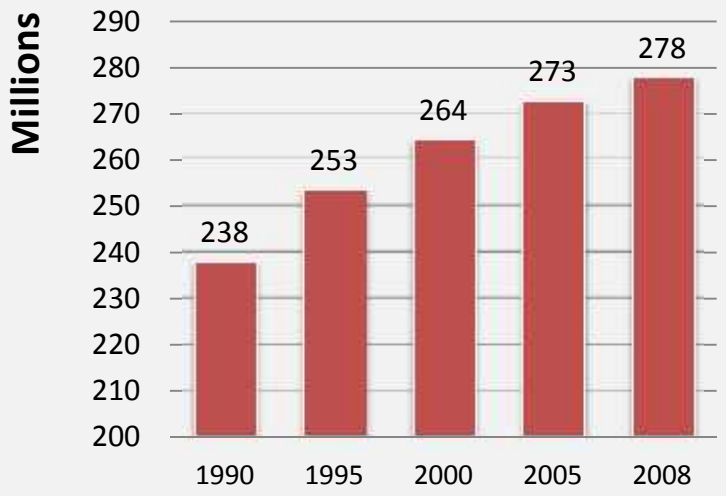
Around one-third of handpumps in Africa are non-functional

% handpumps estimated to be non-functional in African countries



Number of rural Africans without safe water has increased by 40 million since 1990

Rural population lacking access to improved water sources in Sub-Saharan Africa: 1990-2008



Unless handpump sustainability levels can be improved, the number without safe water will continue to grow

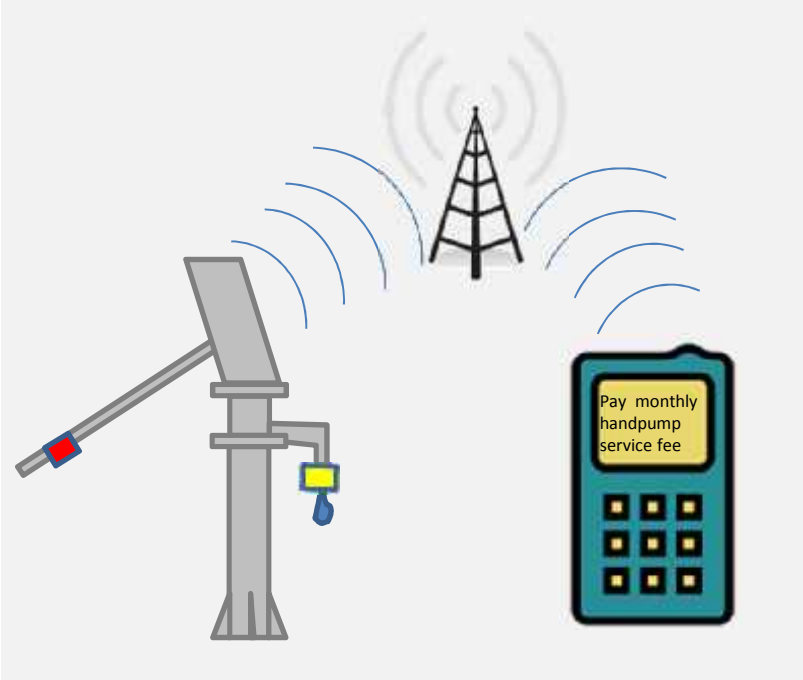
Source(s): RWSN (2007); WHO/UNICEF Joint Monitoring Programme (2010)

A waterpoint will not realise investment benefits without effective post-construction management and regulation

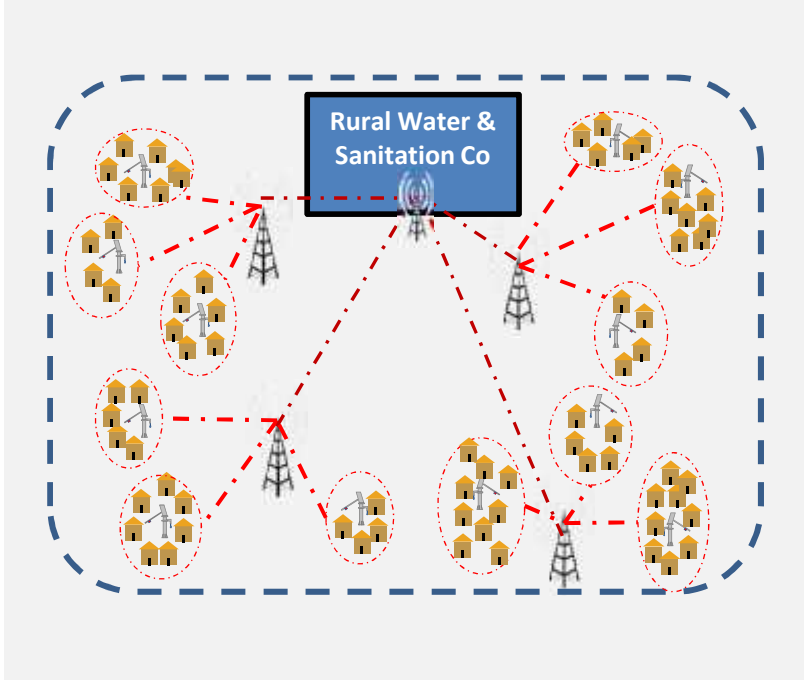
1 *Rural water supply*

Waterpoint data transmitter and mobile money could unlock innovative and scalable models of rural water O&M

Mobile network could enable remote payments and monitoring of dispersed village handpumps



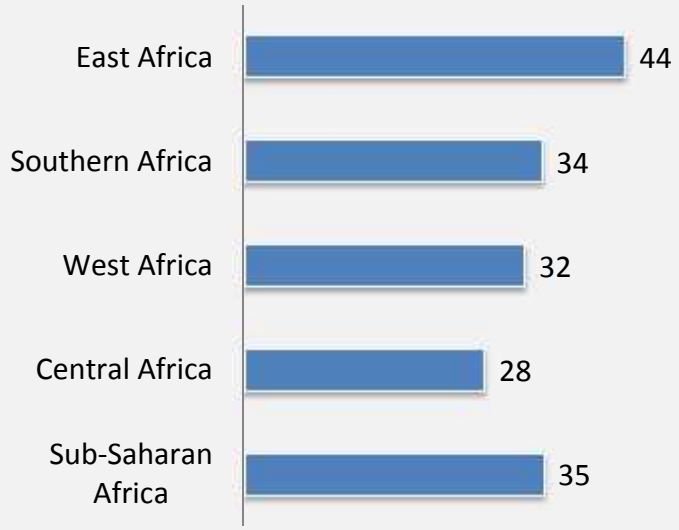
New models of O&M across large administrative units could achieve greater sustainability



Mobile payments and smart metering could address operational inefficiencies, leading to more sustainable services

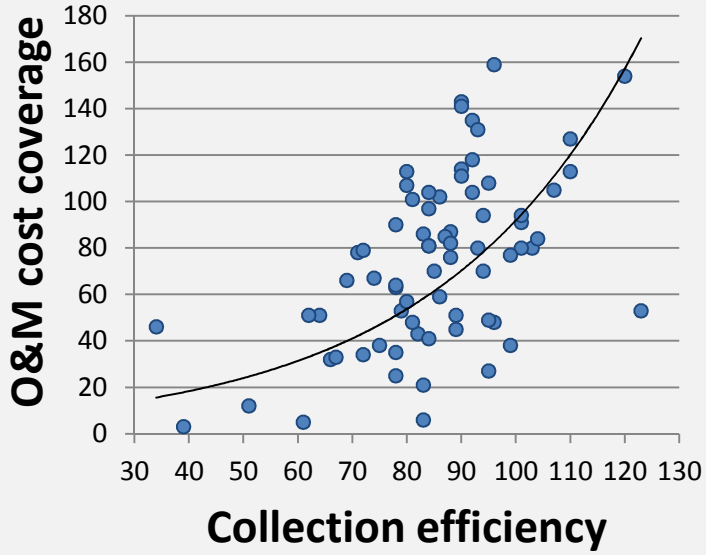
Smart metering can help reduce the 35% of water lost to theft and leakage every year

Non-revenue water in sub-Saharan Africa (%)



Mobile payments can help tackle the 10-20% of water bills that remain uncollected every year

***Example*: Collection efficiency vs O&M cost recovery, Kenya 2008-9**

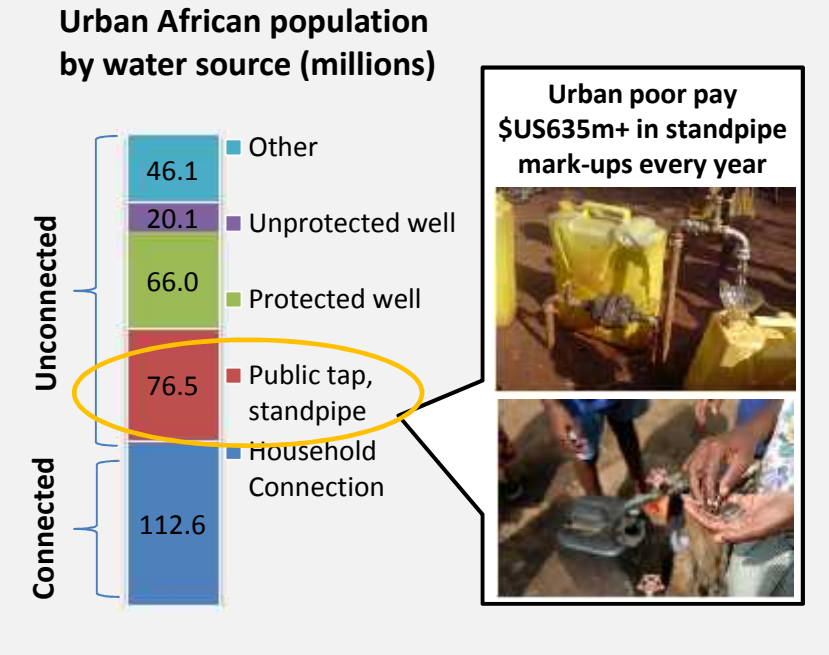


Operational inefficiencies of African water utilities likely to cost in the order of USD1 billion per year

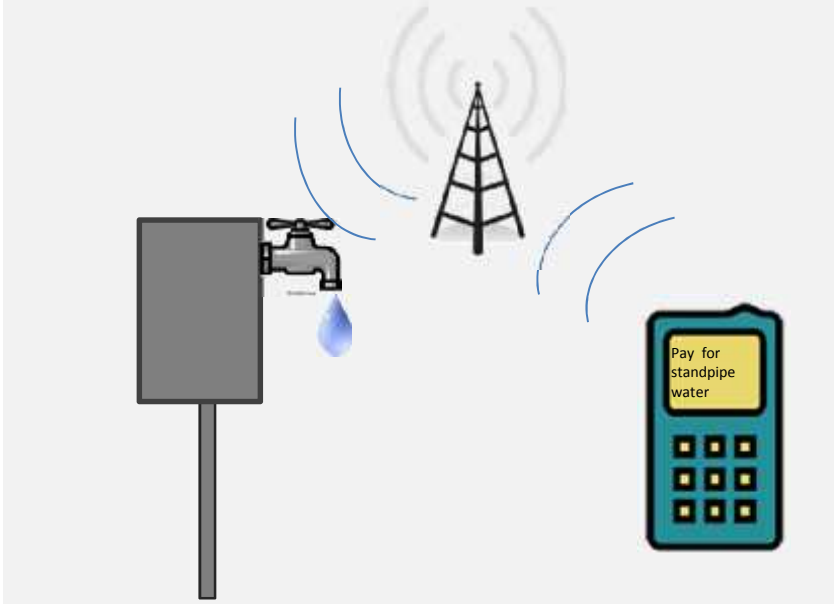
Source(s): AICD (2010); WASREB Kenya (2010)

Mobile technologies could lever standpipe innovations, so social tariffs reach the poor and revenue reaches the utility

Standpipe water is the most common supply for the poor, but is expensive, unreliable and unregulated



An automated, cashless system would circumvent middlemen and enable monitoring and regulation



The World Bank recently stated "solving this [standpipe] conundrum demands serious attention... it calls for intensive experimentation with alternative network designs and institutional setups."

Source(s): AICD (2010); Author's analysis based on data from Demographic Health Surveys and Multiple Indicator Cluster Surveys (2002-2010)

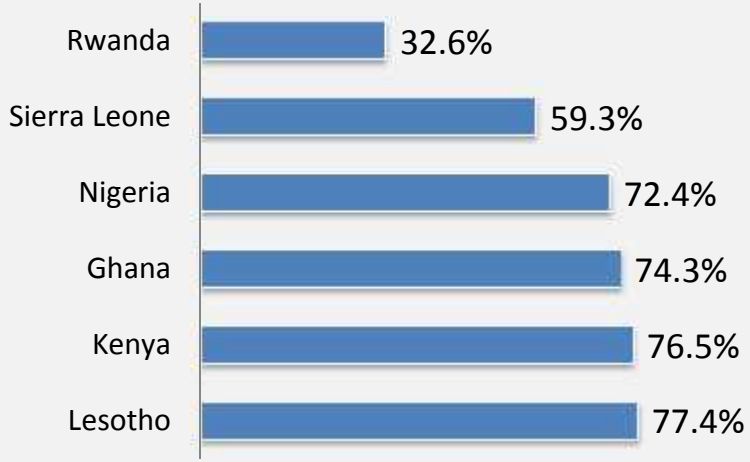
M-banking could make household connections more affordable for the poor by enabling payments in small, regular instalments

Average cost of water connection is 37% of annual income for someone earning USD1.25 a day

Upfront water connection charges in Sub-Saharan Africa (USD)

Mobile phone ownership is high even amongst households lacking piped water connections

Mobile phone ownership amongst urban households lacking piped water: 2008-9

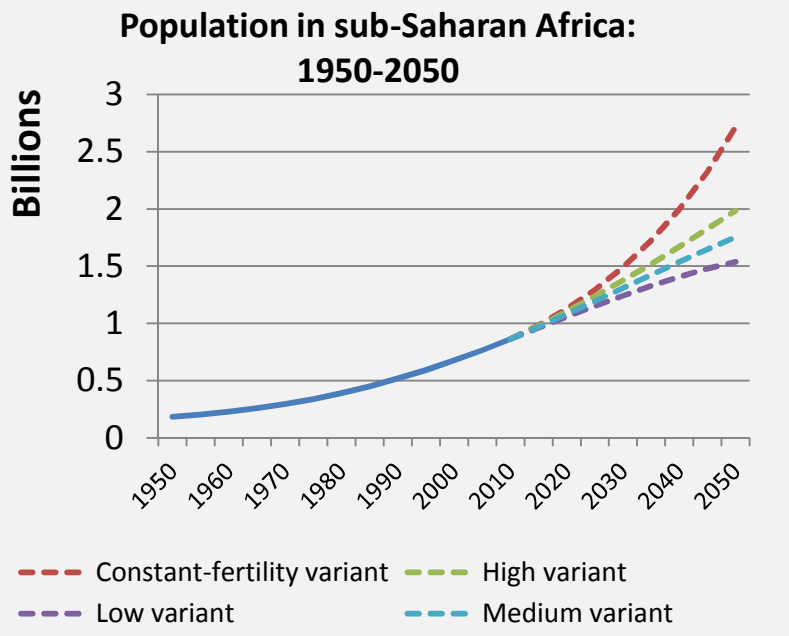


Mobile money instalments could also be used to finance construction of shared latrines

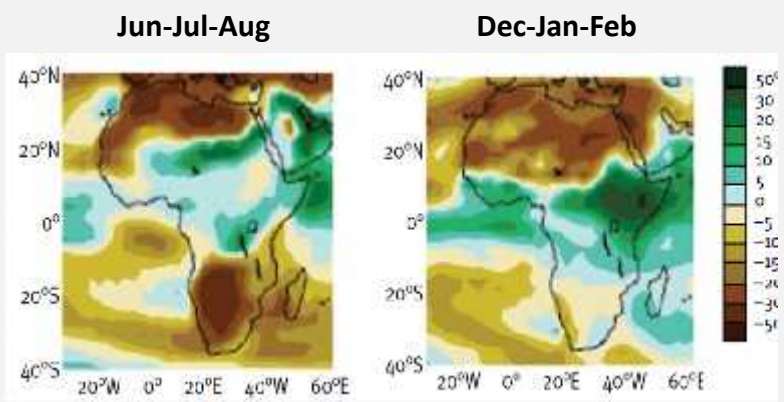
Source(s): WaterAid (2010); AICD (2010); DHS (2010)

Understanding the primary resource base is fundamental to sustainable water management

Population expected to double in sub-Saharan Africa by 2050



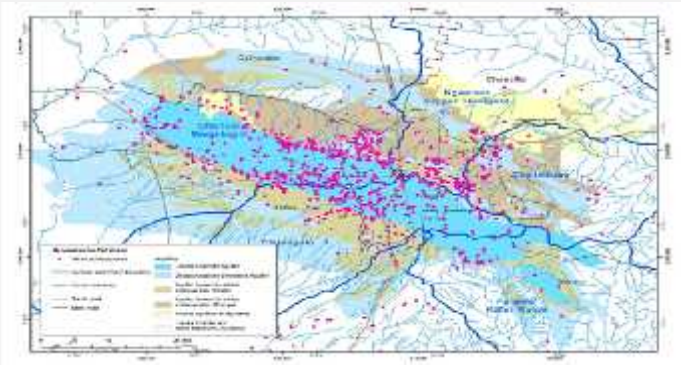
Climate change will lead to greater hydrological variability



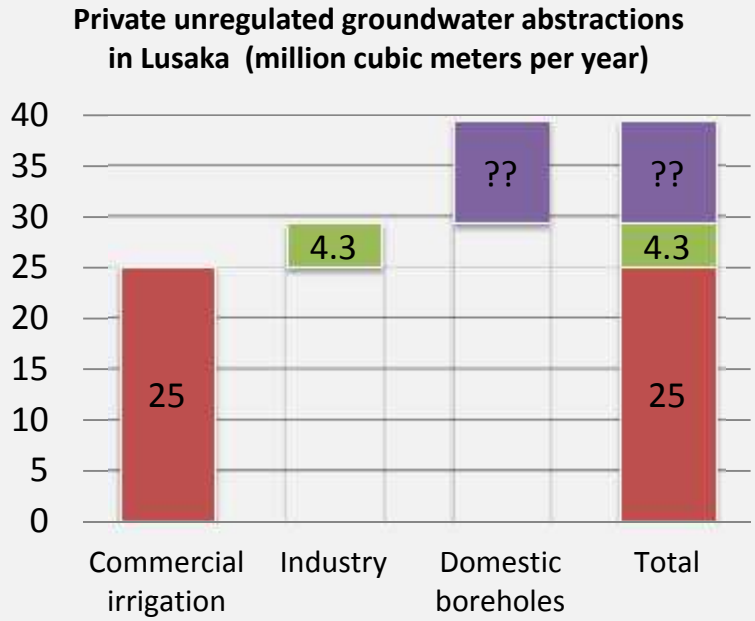
Source(s): UN Population Projections (2010); Hulme et al. (2001)

A smart metering and mobile money solution could help address the ongoing aquifer drawdown in Lusaka

Competitive water use drawing down Lusaka aquifer…



… but no system in place to monitor or charge for abstractions



Source(s): Baumle and Kang'omba (2009); Mpamba et al. (2008); Mayerhofer et al. (2010)

Next steps

M-Water Partnership – promoting innovation at scale

We seek to develop a global, interdisciplinary and multi-sectoral partnership to achieve three objectives:

1) Develop and pilot innovative M-Water initiatives
2) Evaluate and monitor initiatives to determine sustainability, transferability and welfare impacts
3) Provide a global platform to share and debate new initiatives that catalyse policy change at scale

Partners in Kenya and Zambia have committed to pilots

Zambia

Republic of Zambia
Ministry of Energy and Water Development

LUSAKA WATER AND SEWERAGE COMPANY LIMITED

ZamDEx

unicef

airtel

Kenya

WATER SERVICES REGULATORY BOARD
WASREB

WATER RESOURCES MANAGEMENT AUTHORITY

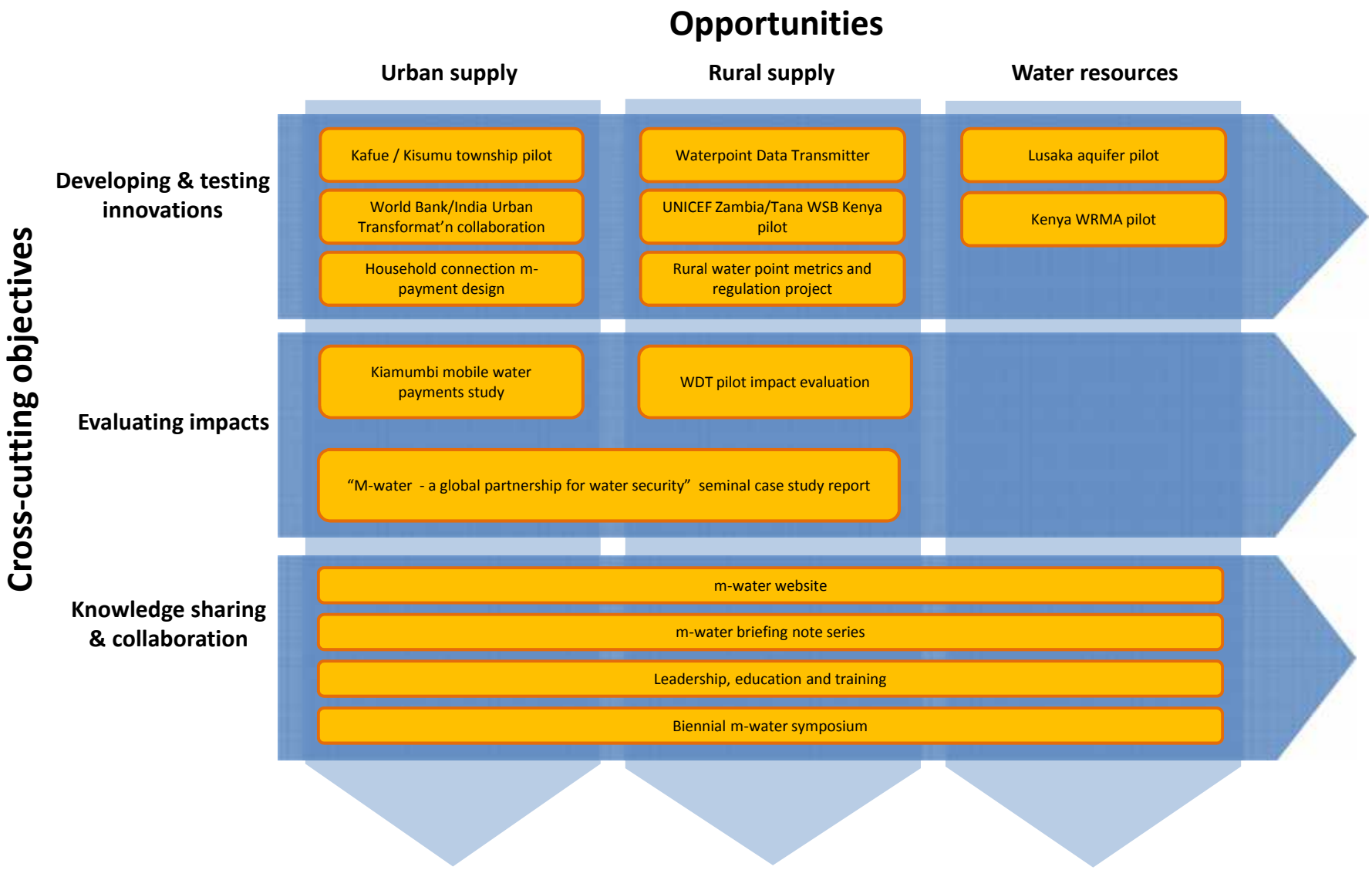
RURAL FOCUS LTD.
Engineering and Development Consultants

TANA WATER SERVICES BOARD

Ongoing discussions with key stakeholders

Smart water meters	Mobile networks	Mobile handsets
elster	airtel	NOKIA Connecting People

Proposed programme of work



M-Water – a global partnership for water security

- What is the potential of the M-Water concept?
- Who should partner, in what role?
- What is a shared vision of the partnership?
- What funding models are required, and over what time period?

For more information:

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