Fachhochschule Köln
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Institute for Technology and Resources Management
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The Effects of Metering on the Level of Non-Revenue Water:

A Case Study of a discrete Supply Zone of Kafubu Water & Sewerage Company, Ndola, Zambia

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Introduction

- Challenges for the WSS sector
- Challenges for water service providers
- Research Objectives

Study Area

- Zambia at a glance
- Kafubu Water & Sewerage Company

Case Study

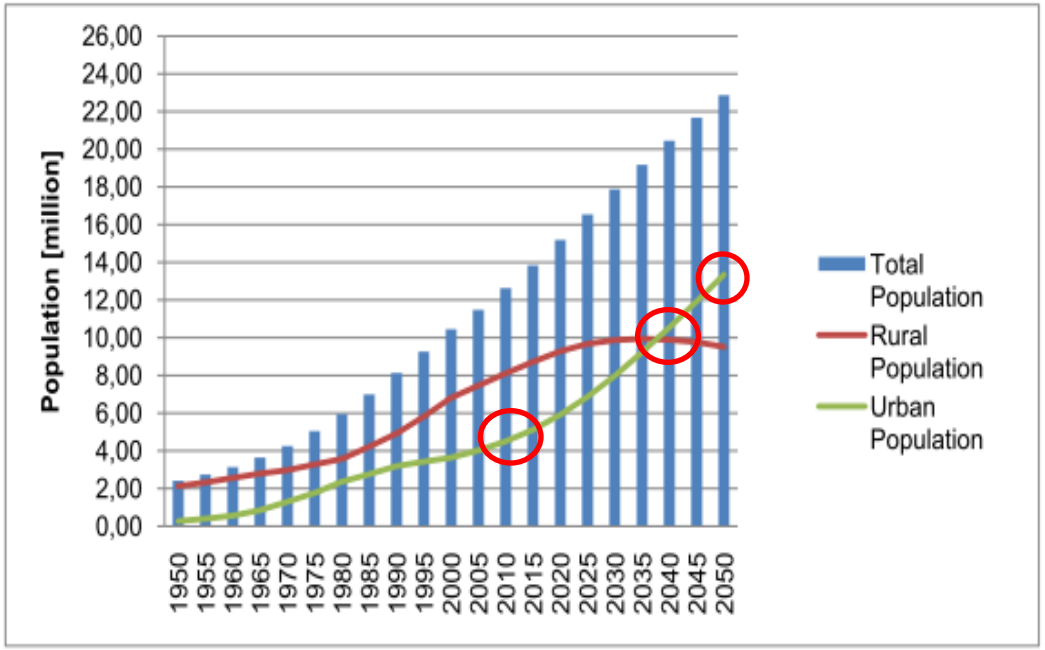
- Lubuto Metering project
- Ex ante, ex post analysis

Conclusions

Challenges for the WSS sector

Urbanisation

- ~ 45% - 5.8 Mio. (2008)
- Between 2035-2040 urban population has exceeded the rural population
- ~ 60% - 13,35 Mio. (2050)

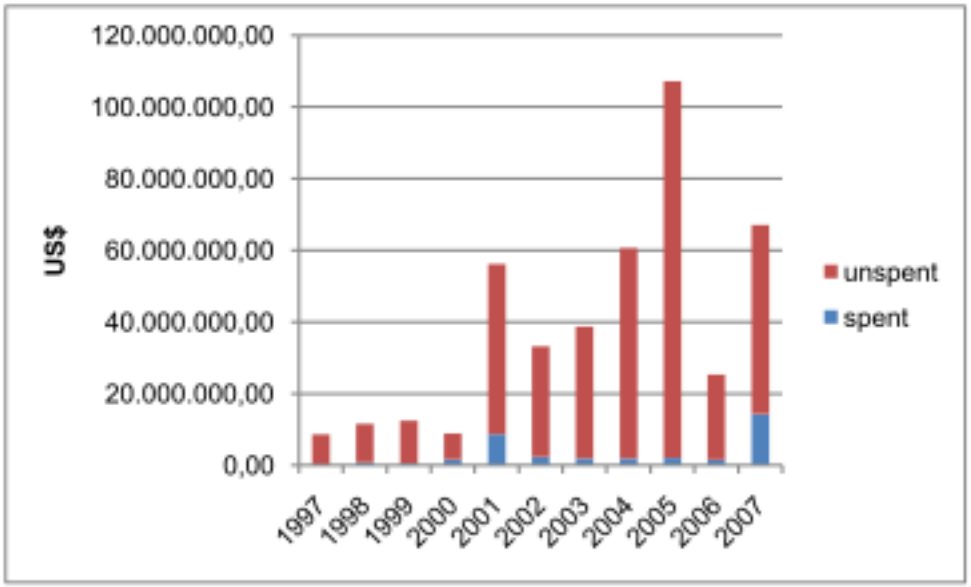


(Source: Based on: World Urbanization Prospects: The 2007 Revision Population Database)

Challenges for the WSS sector

Insufficient sector financing

- Investments by GRZ only 10%
- From 1998 – 2002: US$ 30-45 mio./a from donors, whereas GRZ 0.1 – 0.5 mio/a
- Inadequate disbursement of allocated funds



(Source: Based on: *National Urban Water Supply and Sanitation Programme 2009-2030*, 2009)

Challenges for the Water Service Providers

High levels of Non-Revenue Water

- 46% (2009/2010)

NRW = Total water supplied – the amount of water sold

Low metering ratio

- 58% (2009/2010)

Low revenue-to-cost-ratio

- 106% (2009/2010)

Limited investment capital

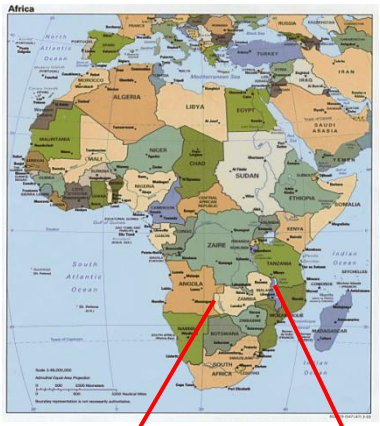
Research Objective

To assess

- the impact of a small scale metering scheme (of a discrete supply zone) on the reduction of NRW and the operational and financial performance of a water utility in a low-cost urban area of Zambia

Republic of Zambia

- Area: 752.610km²
- ~13mio. inh.
- 9 Provinces, 72 Districts
- 45% of people in urban areas
- Uneven distribution of water sources
- Economic water scarcity



(Source: http://www.zambia-mining.com/province%20map.jpg)

Kafubu Water & Sewerage Co. (KWSC)

- Ndola third largest urban centre
- Total Customers ~ 48.500 (2010)

Operational Performance 2003-2009

Indicator	Year						
	02/03	03/04	04/05	05/06	06/07	07/08	08/09
NRW	59% (52%)	58% (50%)	57% (49%)	57% (48%)	58% (47%)	48% (45%)	46% (45%)
Metering ratio	6% (22%)	7% (32%)	7% (32%)	8% (39%)	11% (39%)	26% (43%)	32 % (51%)
Water service coverage	84% (69%)	90% (72%)	93% (58%)	95% (73%)	92% (71%)	88% (71%)	84% (74%)
Sanitation coverage	50% (30%)	78% (37%)	66% (32%)	65% (32%)	67% (34%)	52% (29%)	46% (34%)
Staff per 1000 connections	9 (-)	7 (-)	8 (-)	8 (-)	8 (-)	8 (-)	9 (-)
Collection efficiency	30% (-)	52% (68%)	65% (74%)	58% (77%)	85% (84%)	96% (95%)	68% (78%)
Hours of supply	15 (-)	16 (-)	14 (-)	15 (-)	15 (-)	15 (-)	15 (-)

(Source: Based on: NWASCO, Urban and Peri-Urban Water Supply and Sanitation Sector Reports 2002-2009)

(..) national average

rounded values

Lubuto Metering Project

- Township within the city Ndola
- About 4.000 households
- Population ~ 23.000
- Funded by the DTF under the PEF
- Project start in August 2009
- Installation of 4,075 meters

(Source: Adopted from a digital map, purchased at the mapping office of the Ministry of Lands, Lusaka)

Lubuto Metering Project

Objectives:

1. to promote efficient use of water on the customer side to minimise water wastage
2. to reduce the level of Non-Revenue Water;
3. to improve the supply hours in Lubuto township;
4. to control the network pressure;
5. to increase the billed quantities of water and thus increase the revenue collection by the CU and;
6. to introduce a volume based water tariff system

Lubuto Metering Project (Ex ante)

- Network survived its normal life span
- Leakages along the transportation mains
- Water wastage at customer premises
- Uncontrolled water use
- Low network pressure
- Intermittent supply (6hrs/day)
- No customer meters
- Level of NRW = 59%
- Collection efficiency = 47%
- Flat fee billing

(Source: Author, 2010)

(Source: Courtesy KWSC Ltd.)

(Source: Courtesy KWSC Ltd.)

Lubuto Metering Project (Ex post)

- No repairs on the mains, only household connections
- Repair of wasteful plumbing devices
- 14 hrs/day water supply
- Increased network pressure

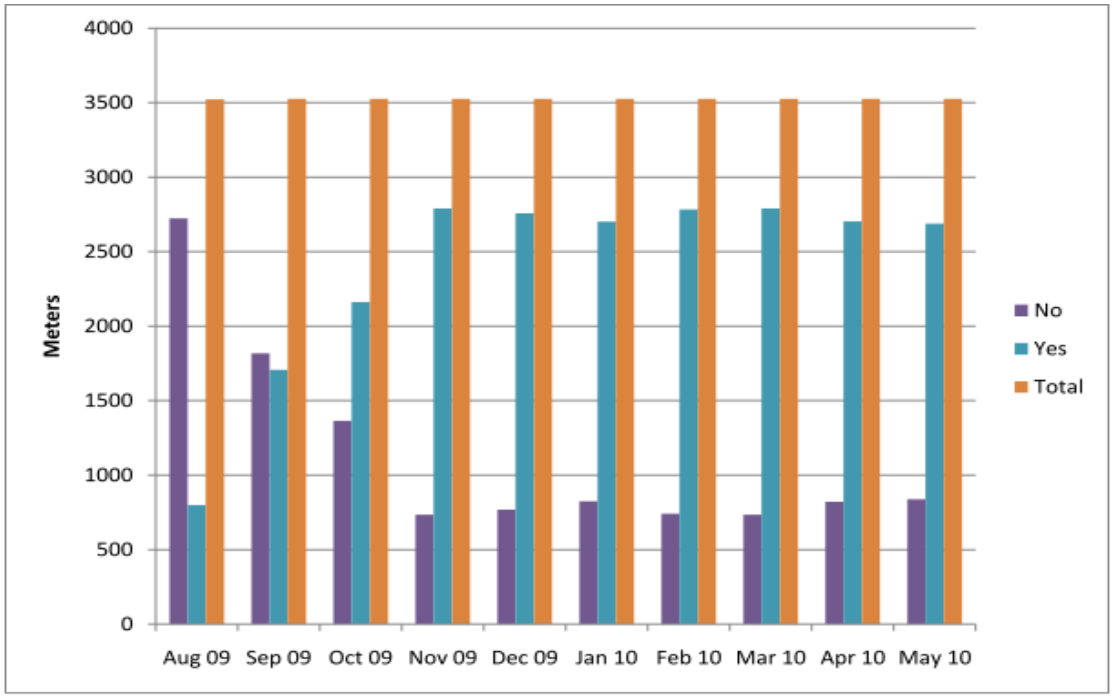
Point of measurement	Pressure [bar]
At customer premise (low lying area)	2.8
At customer premise (medium elevation)	1.4
At customer premise (high lying area)[23]	0.2
At PRV medium height	1.5

(Source: Author)

(Source: Author, 2010)

Lubuto Metering Project (Ex post)

- Operating meters 87%



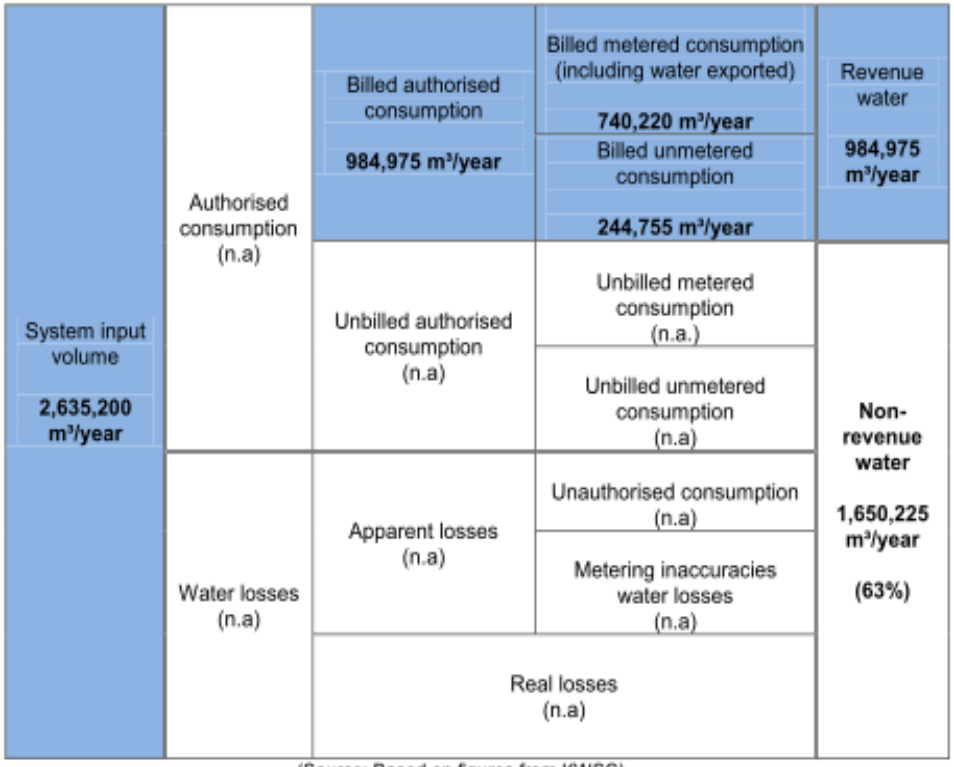
(Source: Based on data obtained from KWSC)

Lubuto Metering Project (Ex post)

- Level of NRW = 63%

Result from limited value because:

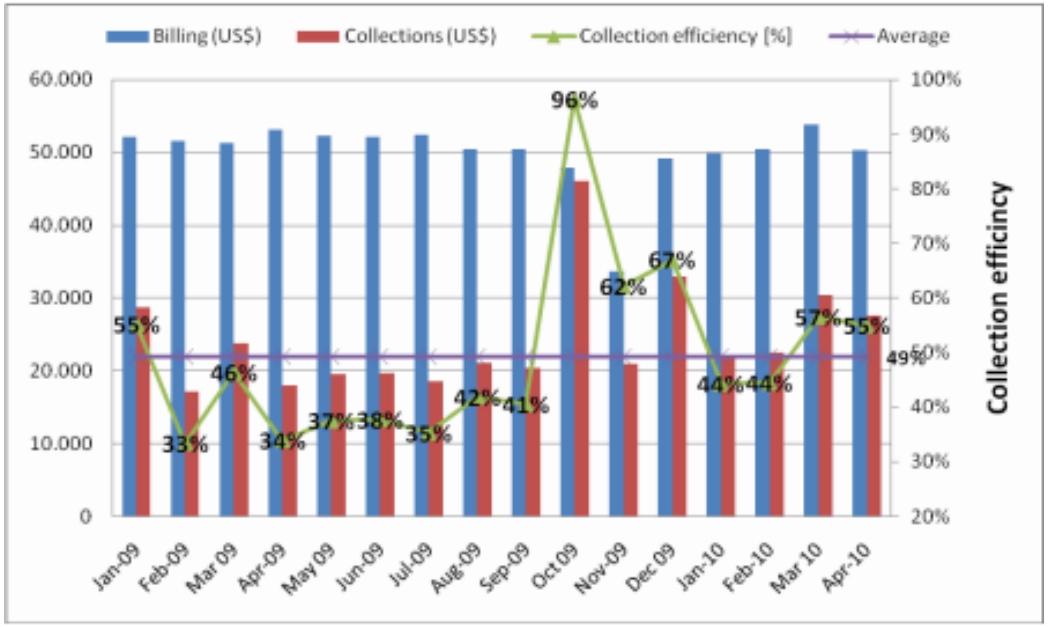
- No bulk meter reading
- System input volume estimated
- Consumption data estimated (ex ante)
- No figures for the billed unmetered consumption, and
- Uncontrolled outflow from the supply area



(Source: Based on figures from KWSC)

Lubuto Metering Project (Ex post)

- Collection efficiency = 49%

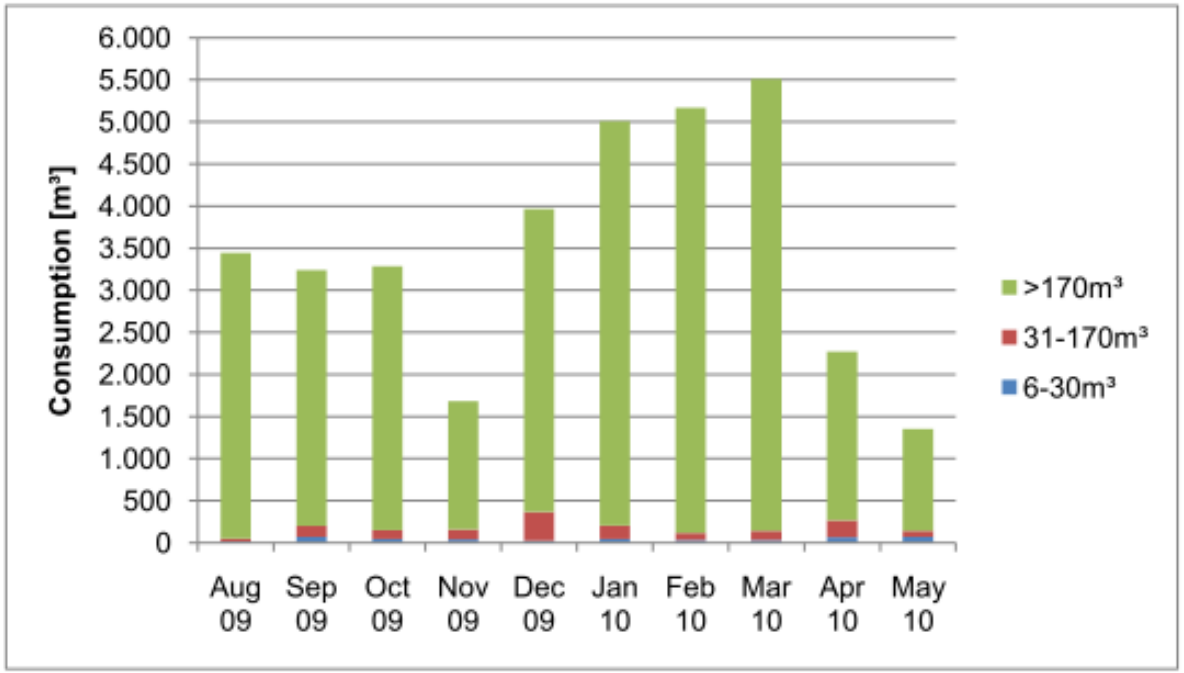


(Authors compilation based on figures obtained from KWSC)

- Unawareness of customers
- Inconsistent bills delivery
- Weak payment enforcement

Lubuto Metering Project (Ex post)

- Weak payment enforcement



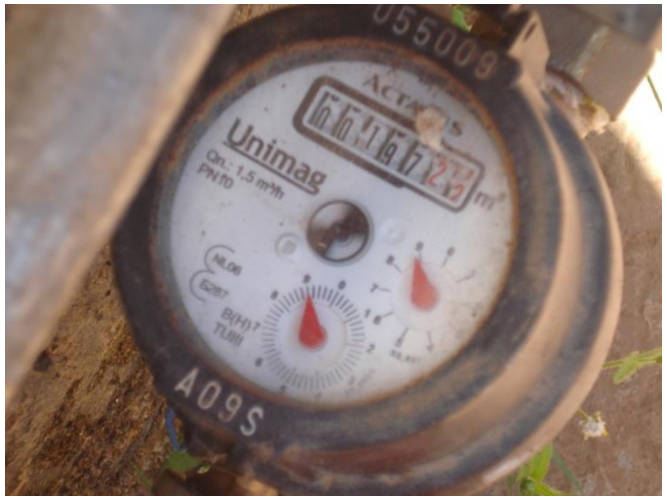
(Authors compilation based on figures obtained from KWSC)

Lubuto Metering Project (Ex post)

Volume based billing

Major challenges:

- Collection of consistent consumption figures
- Customer billing system
- Loyalty of customers



(Source: Author, 2010)

Lessons Learnt

- Reducing the demand for water through efficiency and conservation measures
- Metering is one option to conserve and manage water supply
- To assess the impact of metering on the level of NRW, reliable figures are required to obtain meaningful results
- Most positve short-term effect of the metering scheme was the increased availability of water
- Revenue collection still fluctuating
- Sound consumption data handling and an up to date billing system supports decission making processes on NRW reduction strategies.
- Pilot projects are recommendable, before introducing a strategy companywide


Schukran!
Thank you for your Attention!

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