Life-cycle Cost Recovery of Rural Community-managed Water Supplies:

Experience from Malawi and Uganda

Water Missions International

Andrew M. Armstrong, MS Env Eng (aarmstrong@watermissions.org) *– Water Missions International, 1150 Kinzer St. Bldg. 1605, North Charleston, SC 29405-2043, USA (www.watermissions.org)*

Solar pumping and treatment systems installed in Uganda (top) and Malawi (bottom left) by WMI. Water committee training session in Uganda (bottom right).

Introduction

The quest to identify and address factors that enable lasting delivery of water services in rural settings has driven innovation in various management and support arrangements. However, better understanding of the financial mechanisms required to establish and maintain water service delivery under these models is needed. Recent efforts by the IRC International Water and Sanitation Centre to identify the cost of sustaining water, sanitation and hygiene (WASH) services[1] have helped stakeholders understand and plan for coverage of all costs incurred throughout the full life-cycle of water treatment and supply systems. Still, relatively little is known about the costs incurred by traditional community-managed water supplies and even less is known about the ability of local water committees to actually recover these costs.

This study identifies the full life-cycle costs associated with implementing and maintaining community-managed water services supported by Water Missions International (WMI) in 24 rural villages in Malawi and Uganda. The ability of these costs to be recovered through revenue generated from water collection fees and tariffs is also reported.

Methodology

Sites in Malawi (8) and Uganda (16) were selected from among those supported by WMI based on geographic proximity, uniformity of implementation strategy, and age (≥1 year post-commissioning). Capital expenditures (see description in table below) were tracked with WMI's accounting platform (Quickbooks Enterprise Solutions, Manufacturing and Wholesale Ed. 13.0). As reported in water committee logbooks, the revenues from container-based collection fees (in Uganda), monthly tariffs paid by households (in Malawi), and expenditures on operation and minor maintenance were recorded for a period of one year after system commissioning. Historical average exchange rates were used to convert all revenues and expenses from local currency to USD. Capital maintenance expenditures were estimated based on an assumed inflation rate of 2.8 percent USD per year with a 10-year lifespan on pumps and 20-year lifespan on all other equipment and infrastructure. Labor and travel expenditures incurred within the one-year period after commissioning are assumed to represent the cost of direct support to water committees.

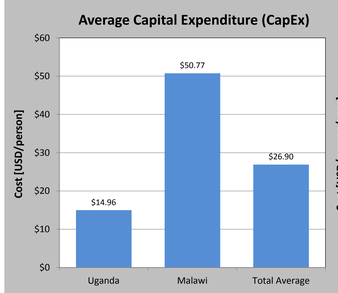
Cost Component	Name	Description
CapEx	Capital expenditure	Up-front expenditure including cost of infrastructure, equipment and labor required for installation, community engagement and training of local operators and water committees
OpEx	Operating and minor maintenance expenditure	Expenditures associated with operation, administration, and local oversight of water treatment and distribution systems
CapManEx	Capital maintenance expenditure	Future expenditure on major maintenance and depreciation of infrastructure and equipment
ExpDS	Expenditure on direct support	Expenditure on administrative support, refresher training, conflict resolution and monitoring

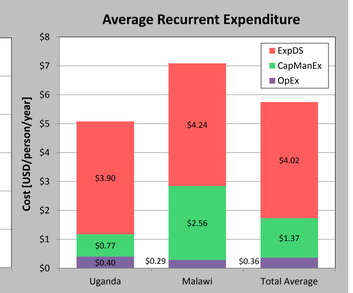
Limitations

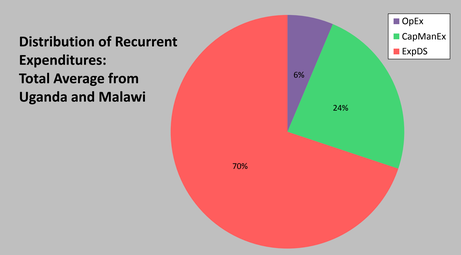
- ExpDS likely overestimated due to:
  - Inclusion of staff labor required for installations made after commissioning (a CapEx expense).
  - Inclusion of staff labor required for minor repairs made after commissioning (an OpEx expense).
  - Need for greater administrative support during first year of operations than subsequent years.
- CapEx and OpEx likely underestimated due to reasons stated above and exclusion of value of volunteer labor contributed by community.

Results

Life-cycle Costs





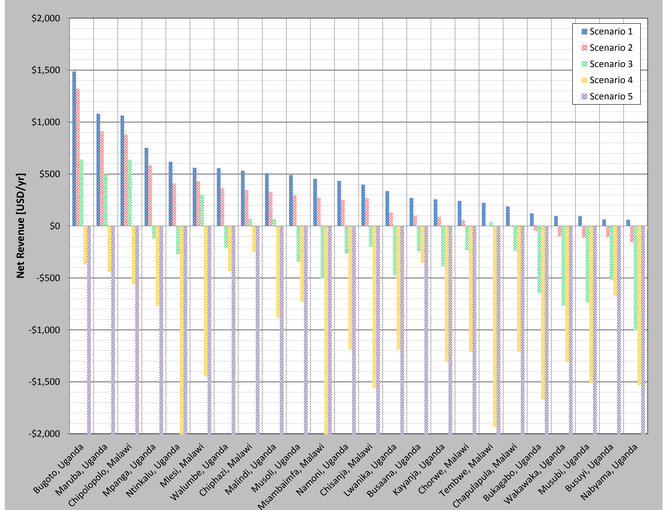


WASHCost Benchmark[1] Comparison

	CapEx [USD] ($30-$131)	OpEx [USD/per./yr] ($0.50-$5)	CapManEx [USD/per./yr] ($1.50-$7)	ExpDS [USD/per./yr] ($1-$3)
Bugoto, Uganda	Below	Below	Below	Within
Bukagabo, Uganda	Below	Below	Below	Above
Busaana, Uganda	Below	Below	Below	Above
Busuyi, Uganda	Below	Below	Below	Within
Kayanja, Uganda	Within	Within	Within	Above
Lwanika, Uganda	Below	Below	Below	Below
Malindi, Uganda	Below	Below	Below	Within
Maruba, Uganda	Below	Within	Below	Within
Mpanga, Uganda	Below	Within	Below	Above
Musoli, Uganda	Below	Below	Below	Above
Musubi, Uganda	Below	Below	Below	Above
Nabyama, Uganda	Below	Below	Below	Within
Namoni, Uganda	Below	Below	Below	Within
Ntinkalu, Uganda	Within	Below	Below	Within
Wakawaka, Uganda	Below	Within	Below	Above
Walumbe, Uganda	Below	Within	Below	Above
Chapulapula, Malawi	Within	Below	Within	Above
Chiphazi, Malawi	Below	Below	Below	Within
Chipolopolo, Malawi	Within	Within	Within	Above
Chisanja, Malawi	Within	Within	Within	Above
Chorwe, Malawi	Within	Below	Below	Within
Mlesi, Malawi	Within	Below	Within	Within
Msambaimfa, Malawi	Within	Below	Within	Above
Tembwe, Malawi	Within	Below	Within	Above
Uganda	Below	Below	Below	Above
Malawi	Within	Below	Within	Above
Total Average	Below	Below	Below	Above

Cost Recovery

Cost Recovery Scenario	Definition	Formula
Scenario 1	Recovery of annual operating and minor maintenance expenditure	Net Revenue [USD/yr] = Annual Revenue - OpEx
Scenario 2	Recovery of annual expenditure on operating and minor maintenance and capital maintenance for solar pump only	Net Revenue [USD/yr] = Annual Revenue - OpEx - $CapManEx_{pump}$
Scenario 3	Recovery of annual expenditure on operating and minor maintenance and capital maintenance for solar pumping and treatment equipment only	Net Revenue [USD/yr] = Annual Revenue - OpEx - $CapManEx_{equipment}$
Scenario 4	Recovery of annual expenditure on operating and minor maintenance and capital maintenance for all materials and equipment	Net Revenue [USD/yr] = Annual Revenue - OpEx - $CapManEx_{total}$
Scenario 5	Recovery of annual expenditure on operating and minor maintenance, capital maintenance for all materials and equipment, and direct support	Net Revenue [USD/yr] = Annual Revenue - OpEx - $CapManEx_{total}$ - ExpDS



Key Findings

- In general, CapEx, OpEx and CapManEx were found to be within or slightly below WASHCost benchmark ranges for small to medium schemes that include mechanized boreholes and mixed piping supplies.
- Revenues generated by collection fees and tariffs were sufficient to cover OpEx (Scenario 1) in all 24 communities.
- Revenues in excess of OpEx were sufficient to cover CapManEx targets for solar pumps (Scenario 2), the piece of equipment with the shortest anticipated life-span, in all but five cases.
- Revenues in excess of OpEx were sufficient to cover CapManEx targets for all pumping and treatment equipment (Scenario 3) in only seven communities.
- None of the communities were able to meet savings targets for capital maintenance of all equipment and infrastructure (Scenario 4).
- Expenditures on direct support activities, which comprised the largest fraction of recurrent expenditure and were funded by donor support during the study period, would not have been covered in any case (Scenario 5).

Conclusions

These findings indicate that revenue generated by community-managed water supplies can be sufficient to cover OpEx and capital maintenance of some equipment in certain contexts. Water committees in these communities will have difficulty recovering costs associated with major capital maintenance and direct support unless precautions are taken to increase household penetration and water consumption. External financing, alternative financial arrangements, or additional revenue sources will need to be utilized in order to ensure lasting water service delivery.

2013 Water and Health: Where Science Meets Policy conference; The University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

1. WASHCost (2012). WASHCost Infosheet 1. Providing a basic level of water and sanitation services that last: Cost Benchmarks. Available at http://www.washcost.info/page/2386.