

The Market For Small-Scale Piped Water Systems In Kenya

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INTRODUCTION

Over half of the population of Kenya lacks access to clean and reliable sources of drinking water. A large share of this unserved population lives outside of urban centers and relies on decentralized, small-scale water delivery systems. Although such systems distribute relatively low volumes of water, there is evidence that with the right combination of investment and professional management, they can expand access to this vital service.



The opportunities and challenges in this market are assessed in a recent IFC study, *Small-Scale Water System Survey and Market Assessment: Kenya*. The study reviewed the scope of small-scale piped water provision in the country's peri-urban and rural areas, and conducted an in-depth analysis of five such systems to determine the opportunities for expanding commercial investment and private sector participation.¹ The research was conducted under the auspices of IFC's Sanitation and Safe Water for All (SSAWA) program, which had identified the lack of information on small piped water systems as one of the barriers to market development.

There are at least 1,200 small water service providers in Kenya's rural and peri-urban areas. These community-managed projects generally serve between 50 and 2,500 connections, including both household and shared connections. Many of these systems need to improve both the quality and quantity of water that they supply. Yet given the country's developmental needs, public and donor funds are unable to meet the national demand for widespread and decentralized infrastructure investment.

1. The primary data was obtained from Kenya's eight Water Services Boards, which have the mandate for service provision, supplemented by visits to projects selected for in-depth assessment.

Expanding private sector participation in water provision means navigating several commercial challenges, including high volumes of unaccounted-for water, weak revenue collection, and management structures that cannot meet demand for better services, improved accountability, and tighter regulation. While these challenges are tangible, there is also a potential opportunity for private finance and private management services to improve service delivery if a conducive investment climate can be created. Many small water service providers have proven that they are able to repay loans at commercial rates given the right financing structure, effective management, and tariff flexibility.

Maji Ni Maisha (Water is Life): *innovative microfinance*

K-Rep Bank's Maji Ni Maisha is an innovative program providing loan finance to small community water projects. The program provides a combination of subsidies and commercial finance to enable these projects to expand service and achieve financial sustainability.

Maji Ni Maisha uses an output-based aid approach to leverage co-financing from K-Rep, a commercial bank. The capital subsidy is paid only upon the delivery of pre-determined and agreed outputs. As a result:

- The subsidy reduces total loan sizes and ensures that debt service remains affordable.
- The subsidy and project development support provide better risk management for the lender.
- Incentives for project completion and subsequent performance are increased.

Small, community-owned water projects obtain loans and make debt service payments to K-Rep bank. The loan from the bank amounts to 80 percent of the total investment, with the remaining 20 percent provided by the community as an equity contribution. The grant subsidy, equal to 40 percent of project costs and up to a maximum of 50 percent of

the loan amount, is then used to reduce the loan principal upon successful delivery of the outputs.

Outputs are measured in two ways:

- *Change in the service coverage*, such as an increase in household or community service points.
- *Change in revenues collected*, as a result of increased service and improved payment collection.

Each community project defines the level of outputs it plans to achieve, which will be built into its loan agreement with K-Rep Bank. Output verification is done by an independent auditor.

As of December 2010, 10 projects had secured \$1 million in debt finance from K-Rep Bank and an additional \$300,000 in equity contributions. The design of the project in Kenya has been facilitated by the Water and Sanitation Program, and is supported through additional financial assistance from the Public Private Infrastructure Advisory Facility and the Global Partnership for Output-based Aid.



PIPED WATER SYSTEMS: A VAST MARKET

The IFC study, completed in 2011, reveals that the scale of small water service projects in Kenya is much larger than previously thought – as is the scale of the commercial opportunity.

Small and very small water service providers make up 96.6 percent of Kenya's estimated 1,297 water delivery systems.² These systems account for 27 percent (about 2.6 billion Kenyan shillings, or \$31 million) of the total turnover, and serve some 40 percent (3.7 million) of the total population who receive piped water.³ By contrast, the 23 very large and large urban water utilities serve 53 percent of the population, and receive 67 percent of total turnover.

2. The study excluded 350 borehole systems in the Northern Water Service Board area because they are a specialized subset of the piped water supply systems.

3. This report uses the base exchange rate of \$1 = 85 Kenyan shillings. All dollar conversions are approximate.



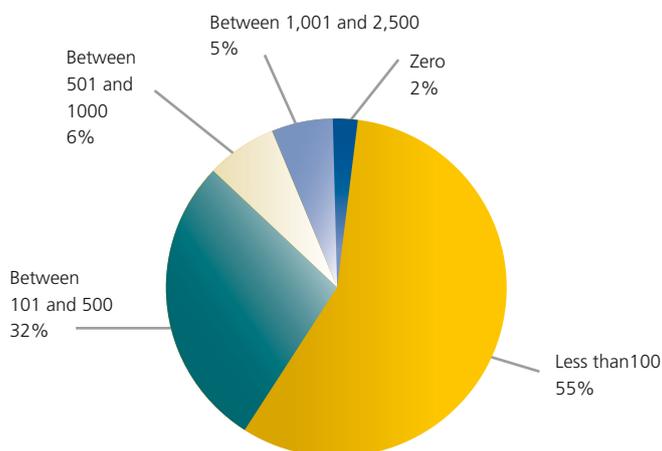
This information demonstrates that small projects play a major role in the provision of piped water to the Kenyan population. Yet owing to the lack of accurate data on this subsector, such systems are frequently overlooked, and do not receive adequate regulatory, management, and financial support to improve service performance.

A snapshot of small-scale water systems

The size of Kenya's small-scale water systems varies greatly: more than half supply less than 100m³ of water per day, while just over 10 percent supply between 500 and 2,500 m³ of water per day.

To put this in perspective, using an estimated demand figure of 50 liters per person per day, a project supplying 1,000m³ per day could serve about 20,000 people.

Production volumes of small-scale water systems in Kenya (cubic meters per day)



Other notable features of these systems are as follows:

- 55 percent rely on surface water, and 41 percent on ground water.
- 37 percent rely on pumps, and 59 percent are gravity fed.
- Only 24 percent of small-scale water projects were reported to pay for management services, with 66 percent relying on voluntary arrangements, and 10 percent on government.
- The 1,220 very small water systems serve an estimated 3.7 million people.

These results have been compiled from data on file with Kenya's eight Water Services Boards. There are, however, a great many information gaps. Based on a comparative analysis with other available databases, the study concludes that there may be up to twice as many small-scale water systems throughout the country.

This information suggests the need for a sharp revision of the common understanding of how water services are provided in Kenya. Small-scale systems play a greater role in bringing basic services to the population than previously considered, which means that any investment or management models need to consider appropriate arrangements for such systems.

OPPORTUNITIES FOR COMMERCIAL FINANCE AND PROFESSIONAL MANAGEMENT

The table below presents an estimate of the size of the market for small-scale water systems in Kenya. These figures are based on approximate estimates of the investment and management fee requirements for systems of different sizes.

Potential Size of the Small-Scale Piped Water Market in Kenya

Project size (households served)	Number of projects	Estimated management fees (Kenyan shillings/year)	Total management value (million shillings/year)	Estimated investment required per project (million shillings)	Total investment potential (million shillings)
Blank/unknown	246	576,000	142	3	738
0 to 200	460	576,000	265	3	1,380
201 to 1,000	358	1,400,000	501	6	2,148
1,001 to 5,001	156	3,100,000	484	35	5,460
Total	1,220		1,391		9,726

These figures suggest a total investment potential of 9.7 billion Kenyan shillings (\$114.1 million) across the 1,220 systems in the sample.

The table also shows that investment needs are concentrated in the larger systems in the sample, with more than 50 percent of the total investment required in the 156 projects that serve

between 1,000 and 5,000 households.

Estimates from the study also suggest that these projects could have a total annual turnover of up to 5.4 billion Kenyan shillings (\$63.5 million) against a current annual turnover estimated at 1.7 billion Kenyan shillings (\$20 million).





Courtesy of the Water and Sanitation Program - Kenya

In general, projects are not operating nearly as efficiently as they could be, nor are they achieving their potential income levels. The key to increased revenue will be improved management and tariff reform. Across the sample projects, the potential value of management services per year is estimated to be around 1.4 billion Kenyan shillings (\$16.5 million).

Detailed system analysis shows that the most suitable areas for commercial financing are to expand coverage areas, develop alternative water sources, bolster reliability by upgrading storage and improving management, and enhance water quality.

Expanding coverage areas

Expanding coverage areas for existing supplies usually means installing more distribution lines, and possibly more storage tanks. Costs range from 3,700 to 5,100 Kenyan shillings (\$44 - \$60) per additional person served, and may be lower depending on the original design.

Most small-scale systems are likely to require between 5 million and 15 million Kenyan shillings for expansion. Repayments for expanded coverage can generally be made through a combination of new connections, increased volume of water supplied, and an increase in tariffs.

Developing alternative water sources

Developing alternative sources is a risky undertaking. Groundwater sources can be dry or fail to meet expectations. Surface water sources can dry up during drought. Piping water from the new source into the existing water supply system can require a large investment.

For these reasons, K-Rep Bank's Maji Ni Maisha program requires communities to confirm the feasibility of the source

development before they can qualify for a loan.

Most small-scale projects would require between 2 million and 4 million Kenyan shillings (\$23,500 - \$47,000) to develop an alternate source, with the cost of connecting such sources running anywhere from 1 million to 10 million shillings (\$11,765 - \$117,650). Repayments for alternate source development are likely to come from increased water volumes and from customer growth. Tariffs may also need to be adjusted.

Improving reliability through upgrading storage

Small-scale storage

Small-scale storage development involves building tanks within a distribution system to ease peak flows and to allow for storage during periods of low use. Construction costs range from 1 million to 2.5 million Kenyan shillings per tank. Loan repayments would be generated from the increased volume of water or higher tariffs.

Large-scale storage

Large-scale storage development involves the construction of dams or lagoons to ensure supply during periods of water scarcity. Large-scale storage development is most suited to gravity systems where previously reliable sources have become seasonal. It may also be suitable to borehole/pumped projects that exceed their current water availability.

Only projects at the larger end of the small-scale range will be able to afford and/or justify such development. Most small-scale systems would be looking at between 100,000 and 1 million cubic meters of storage (at a cost estimate of between 25 million and 100 million shillings, or \$287,025 and \$1.2 million). Loan repayments would come from increased tariffs and from increased water volumes. There are currently no loan programs targeting large-scale storage.

Enhancing reliability through improved management

The reliability of small-scale water service providers can be improved through better management. However, community-managed systems are unlikely to take a loan just to improve management of supply. Improved management would generally be in the form of infrastructure development (such as installation of meters), reducing non-revenue water, and improving billing systems.

While most systems would profit from such enhancement, most water users will end up paying more for their water.

The primary management problems encountered by small systems include:

- Unrealistic flat fee charges
- Inability of users to pay fair market value for the water they are using
- Poor billing systems (or no billing systems at all)
- Large amounts of non-revenue water.

Without safe guarantees of improved water delivery, very few small-scale projects will be willing to borrow money to pay for improved management. In general, financing improved management for small systems should initially concentrate on infrastructure (meters, billing software, and computers) that can provide information to strengthen management systems. Staffing costs should be met through higher revenues.

Improving water quality

Many consumers in urban and adjacent areas would like to receive better-quality water. This means financing the capital cost of a treatment works, and the recurring costs of staffing and chemicals.

Urban and peri-urban service providers with metering systems are more likely to be able to pay the increased costs. Rural projects where a significant portion of the water supplied is not for domestic use are unlikely to agree to the higher costs involved.

Water treatment infrastructure investment is likely to range from 2 million to 6 million shillings (\$23,500 - \$70,500), depending on the size of the works. Revenue to repay the loan would need to come from increased tariffs. Staffing and chemical costs should be met directly from increased tariffs.



Summary: Opportunities for large commercial financing

Overall, the most suitable areas for large-scale commercial financing of small water systems appear to be:

- New project development
- Large-scale storage for existing projects
- Improved water treatment for existing urban and peri-urban systems.

It is unlikely that there is a market for improved management on its own. The market for such services is contingent on investment support by the lending agency, or on the clear enforcement of performance targets by Water Services Boards.

Estimating unit costs

The costs below reflect standard material, labor, design, and supervision. The estimated per capita costs of water supply development range from 1,778 Kenyan shillings for a rural piped system using a borehole and servicing 5,000 people, to 4,357 shillings for an urban piped river water system, including filtration treatment, which serves 20,000 people.

Of the five projects selected for in-depth analysis in the study, the average investment costs range from 10 million shillings at Asengo (pumped supply, no treatment, serving 2,000 people) at a per capita cost of 5,100 shillings, to 120 million shillings at Mutitu (gravity piped, household connections and kiosks, serving 42,000 people) at a per capita cost of 2,900 shillings.

The average per capita cost of water supply infrastructure development on existing projects, using the five studied projects, is 3,342 shillings (\$40) for rural projects and 4,536 shillings (\$55) for urban projects. Figures for new supplies are somewhat higher.

The study details estimates of improved management costs.

Income and expenditure ratios

Various income and expenditure ratios have been suggested. The Water Services Regulatory Board (the national regulator of water supply) recommends an operations and maintenance cost coverage of 150 percent to ensure long-term sustainability of supply. The Maji ni Maisha program recommends an operating ratio of 120 to 130 percent (with loan repayments factored in) for a business plan to be considered. Of the five projects subjected to detailed analysis, operating ratios ranged from 160 percent (Asengo) to 83 percent (Kiaguthu).



Courtesy of the Water and Sanitation Program - Kenya



Courtesy of the Water and Sanitation Program - Kenya

The Asengo water project

One of the five small-scale systems analyzed in detail was the Asengo water project in the Kisumu East district, 6km from Kisumu town. It obtains water by pumping from Asengo spring. The served area is about 3.5km² with a total population of about 10,300 persons, and a supplied population of 2,000 persons. The supply area includes parts of some high-density informal settlements. The pipeline is 4.3km long. The project

has two water kiosks and 95 individual connections.

The Asengo project obtained a loan from an international nongovernmental organization, and used this money to establish the water system. The community owns the project and a 13-member management committee oversees operations.

Range (cubic meters)	Domestic consumer (Kenyan shillings)	Commercial consumer (Kenyan shillings)	Government institutions (Kenyan shillings)	Kiosks (Kenyan shillings)
0-6	300	60	60	75 per cubic meter
6.01-20	35	70	70	
20.01-40	40	80	80	
40.01-60	50	90	90	
>60	75	100	100	

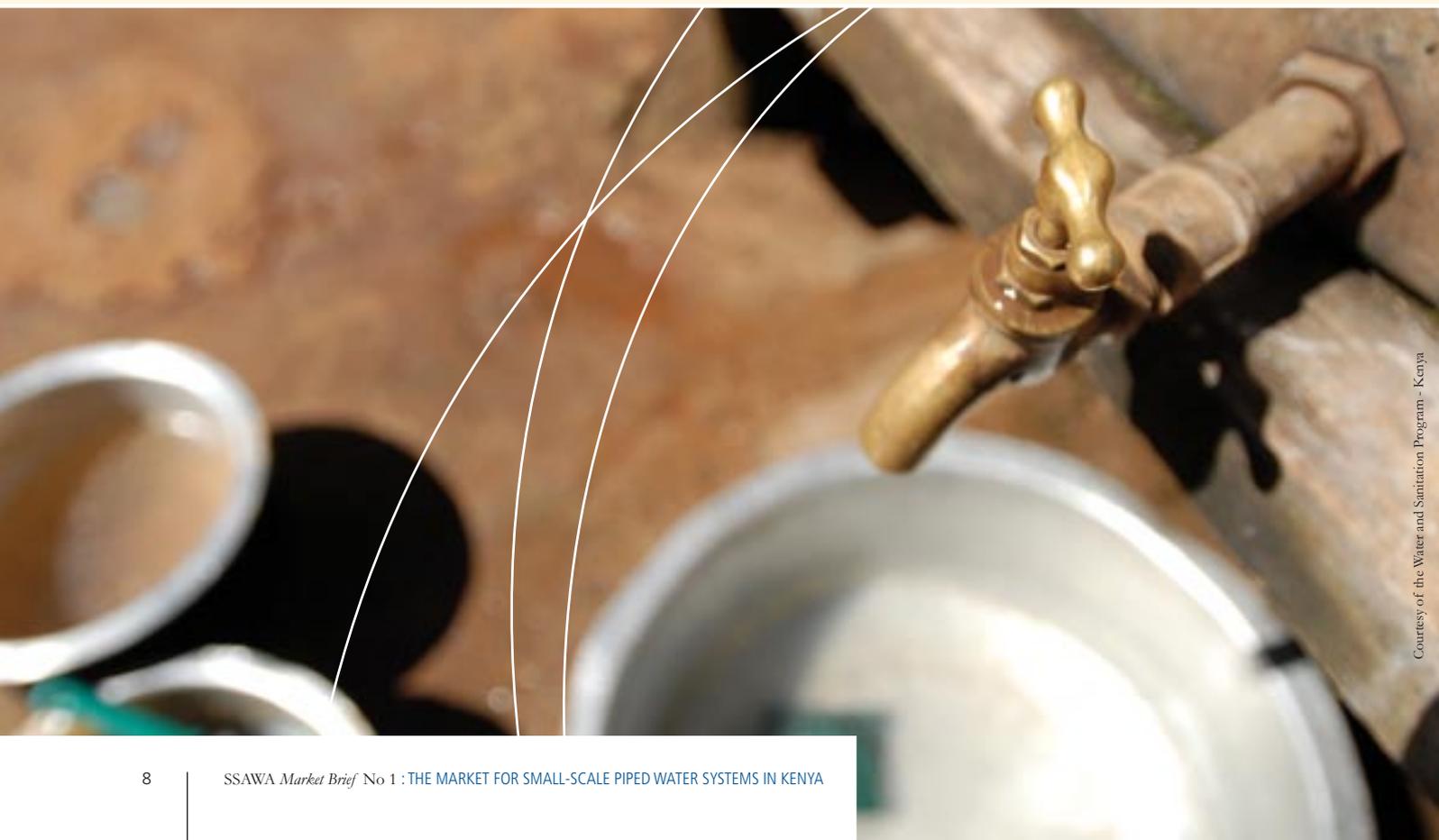
The mean water consumption is 16.16 liters/person/day. The mean monthly expenditure on water is 646 shillings (\$8) per month per household. The project would like to develop a borehole and extend distribution lines into some highly populated areas. The projected total cost of the improvements is 6.3 million shillings.

The project could finance the improvements through the increased number of new connections and higher water consumption. It is also likely that tariffs would need to be adjusted. A flat rate tariff of 100 shillings/m³ would be sufficient.

The main constraints to a commercial loan are:

- Lack of project registration with the government and regulatory agencies.
- Lack of an extraction permit.
- Absence of master meters, and therefore an inability to measure non-revenue water.
- The project is still paying off its original loan.

A 6.3 million shilling (\$74,000) loan would require monthly repayments of about 170,000 shillings (\$2,000). Current project revenue is 185,000 shillings (\$2,175) per month.



OVERCOMING THE BARRIERS

The primary barriers to private sector support of small water service providers in Kenya are:

- Lack of awareness about commercial investment models and management services.
- Uncertainties in the regulatory environment, specifically in relation to small water service providers obtaining adequate service provision agreements.
- A legacy of unsustainable tariff levels and revenue collection, making the required level of increases difficult for consumers to accept.
- Risk assessment that relies largely on the character and capacity of existing management committees, and collateral consisting generally of cash flow from revenues.
- High transaction costs associated with the legal and professional requirements to bring small water service providers to the standards required for commercial loan financing.

These challenges can be effectively addressed by:

Clarifying the prevailing clustering policy. Kenya's de facto policy environment encourages the clustering of small water service providers with no reference to performance. It is based purely on size and the assumption that small projects will never

be commercially viable or provide reliable and efficient services. The clustering policy should be reviewed and clarified so that the conditions for clustering are based on performance. This would provide an incentive for small projects to either improve services or be absorbed with other systems that have better performance records.

Setting incentives for improving performance.

The Water Services Boards should engage with small projects to establish performance targets and timelines, and offer small systems support to help them realize those targets. Performance requirements play a crucial role in improving services. In combination with other opportunities like grant or commercial financing, the boards could offer a range of alternative models for improved management.

Creating incentives. Incentives are required to enhance interest among Water Services Boards to engage with small projects to help them meet service delivery targets. These can be created through a national performance monitoring system.

Creating a pool of reputable professional service providers.

A pool of firms offering professional management services that cover the requirements of the small projects should be developed.

Identifying and designing predefined packages of commercial investment and management services

A process of identification and design is required to bring interested parties together. This should include the Ministry of Water and Irrigation, the Water Services Regulatory Boards, Water Services Boards, banks, and water service providers.

The predefined packages may include the following options:

- Commercial loans. This package would include term similar or equivalent to those of Maji ni Maisha. However, such loans are likely to be hindered by the non-commercial approach that prevails in most small water projects.
- Outsourcing management and operations (including billing). This package offers the full range of management and operational services under a performance contract. Although this option appears feasible, it is relatively untested in Kenya and may initially be seen as costly.
- Outsourcing billing. This package offers "light" management support to small projects at an affordable price, with minimum intrusion into existing management and operations.
- Build-operate-transfer arrangements.

Build-operate-transfer: A way forward for the small-scale water sector

The build-operate-transfer model provides an opportunity to bring investment and improved management to small water systems. In such arrangements, private firms take responsibility to build or upgrade infrastructure, operate the infrastructure for a fee, and eventually transfer project ownership to the public sector.

This model has several benefits:

- A clear distinction is made between the ownership of a small system and operations and management, which are outsourced.
- Many management problems encountered by very small projects can be overcome through external management.
- Build-operate-transfer operators are likely to be more credible borrowers with secure collateral, established reputations, and professional staff.

This model seems to offer the best way to finance greenfield sites, and may also be the best way forward for other underperforming projects. It offers a low-risk, low-cost option for very small community projects that are coming to terms with the technical and business requirements of running water supply.

Each package needs to be carefully designed, with appropriate materials and examples to enable small-scale water service providers to understand the associated requirements and benefits.



WAY FORWARD

The report makes three sets of recommendations:

- 1.** Publicize successful experiences, including the Maji ni Maisha program, throughout the water sector. This will generate awareness of the opportunities and constraints associated with commercial financing and management arrangements.
- 2.** Engage the Water Services Regulatory Board and the Water Services Boards in a roundtable discussion on the small-scale water sector. Examine how best to set and enforce performance targets for small projects, and review regulatory arrangements to reduce uncertainty.

- 3.** Identify and pilot a selected number of build-operate-transfer plans for both greenfield and poorly performing water projects. This will provide an opportunity for the Water Services Boards to understand the constraints and benefits associated with commercial financing and management services. Build-operate-transfer models combine private investment and private management under a single contract, and appear to be the best way to sustainably expand the provision of small-scale water services throughout Kenya.

This report was commissioned by IFC under the auspices of the Sanitation and Safe Water for All (SSAWA) program. SSAWA is an advisory services program designed to support market-based approaches with the potential to expand access to safe water and sanitation products and services for underserved consumers. A two-year pilot phase of the program began in Kenya in November 2011. SSAWA is managed under the IFC Sustainable Business Advisory Department.

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