

# NON-REVENUE WATER (NRW) JINJA AND IGANGA

## CASE STUDY

PLANNING FOR RESILIENCE IN EAST AFRICA THROUGH POLICY, ADAPTATION, RESEARCH AND ECONOMIC DEVELOPMENT (PREPARED) PROJECT

FEBRUARY 2018

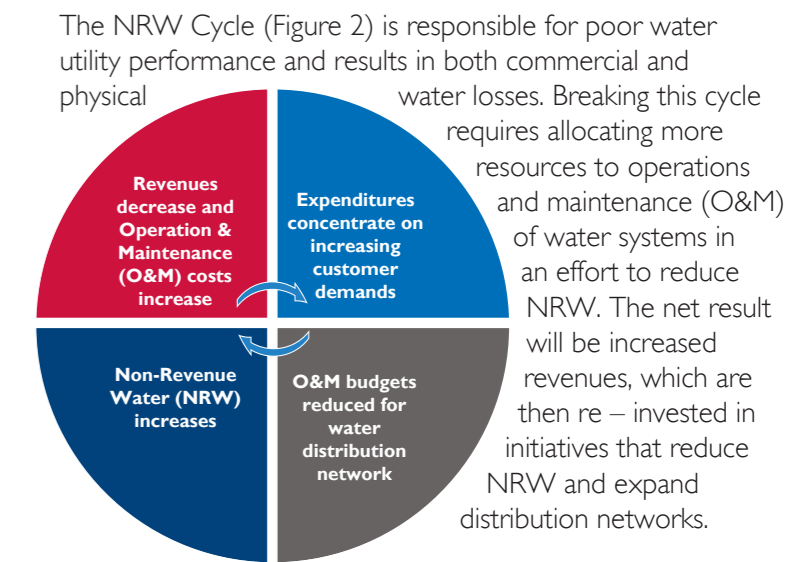
### NON – REVENUE WATER IS A REGIONAL ISSUE

Non – Revenue Water (NRW) is defined as water that is processed and supplied by a water utility, but cannot be accounted for physically or commercially within the network. Globally, according to a 2006 World Bank study, nearly 45 million m<sup>3</sup> of water is lost daily from leakage (enough to serve nearly 200 million people) and 30% of that is accounted for within developing countries.

According to the International Water Association (IWA) and the American Water Works Association (AWWA), and illustrated in Figure 1, seven factors contribute to NRW:

- ❖ Unbilled metered consumption;
- ❖ Unbilled unmetered consumption;
- ❖ Unauthorized consumption;
- ❖ Customer metering inaccuracies and data handling errors;
- ❖ Leakage on distribution mains;
- ❖ Losses at utility storage tanks; and
- ❖ Leakage from service connections up to the customer meter.

This is approximately a quarter of the total yearly investment in potable water infrastructure for the entire developing world. It is also more than the World Bank (the largest water financier among international financial institutions) lends every year in aggregate for water projects in developing countries.



According to the World Bank, globally these losses cost water utilities approximately US\$14 billion every year. It is particularly noteworthy that the estimate of what is lost every year in developing countries through commercial losses (that is, water that is actually delivered to a portion of the population, but not invoiced) is estimated at US\$2.6 billion.

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
		Unbilled Authorized Consumption	Billed Unmetered Consumption	
Water Losses	Real Losses	Apparent Loss	Unbilled Metered Consumption	Non Revenue Water
		Real Losses	Unbilled Unmetered Consumption	
			Unauthorized Consumption	
			Metering inaccuracies and Data Handling Errors	
Real Losses	Real Losses	Leakage on Transmission and Distribution Mains	Leakage and Overflows at Storage Tanks	
		Leakage on Service Connections up to point of Customer Meter		

Figure 1: NRW Contributing Factors

### BEST PRACTICES AND LESSONS LEARNED

NWSC has highlighted several lessons learned from this effort that include:

- ❖ Performance improvement programs formed from focused internal reflection were the key to improving staff and organizational performance;
- ❖ Increased awareness among customers provides transparency, improves infrastructure planning, and enriches service satisfaction;
- ❖ QSIP provided the framework for motivating staff and cultivating their commitment to enhanced service delivery and increased productivity;
- ❖ Staff became more attentive to customers and were more willing to address their complaints;
- ❖ The WACOCOs and the utility's outreach programs created enhanced awareness among customers for NWSC, its programs, and its NRW issues;
- ❖ More disciplined and committed customers became great allies in addressing water theft cases; and
- ❖ Although critical to identifying and addressing leaks and bursts in the water supply network, technological solutions must be combined with improved service delivery and increased customer satisfaction.

Between October 2014 and June 2017, NWSC Jinja and Iganga:

- ❖ Established QSIP within NWSC;
- ❖ Introduced and implemented SNARP and CRM programs;
- ❖ Launched 15 WACOCOs;
- ❖ Delineated seven District Metering Areas (DMAs) to better monitor flows and respond to problems;
- ❖ Installed water mind analysers (WMAs) and AMRs;
- ❖ Enhanced spot billing by use of hand – held devices (rugged phones);
- ❖ Reduced total arrears by US\$230,000;
- ❖ Increased billing from US\$285,000 to US\$493,000
- ❖ Increased water sales from 276,071 m<sup>3</sup> to 354,032 m<sup>3</sup>;
- ❖ Reduced suppressed accounts from 3,125 to 1,974;
- ❖ Decreased response time to repair leaks and bursts from 12 to 2 hours;
- ❖ Connected an additional 12,102 people to public stand pipes using the increased revenues from the NRW reduction program; and
- ❖ **Reduced NRW from 45% to 20%.**

NWSC's success at reducing NRW in a relatively short period of time demonstrates the power of an integrated approach that combines organizational culture change, outreach to and engagement of customers in solving problems and improving service quality, and the use of innovative and creative technological tools. NWSC Jinja and Iganga has become a model for Uganda, the region, and the rest of Africa and the utility has hosted numerous delegations in the last year. The use of QSIP, coordinated with a government – endorsed customer engagement approach, and the introduction of smart – metering by an innovative engineering company resulted in globally significant reductions in NRW levels in Jinja and Iganga.



The views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

### INTRODUCING INNOVATIVE ENGINEERING AND ICT SOLUTIONS

Itron, Inc., an international engineering company improving efficiency in the provision of water, energy and natural gas, became an early partner with NWSC on the development "smart metering". Itron introduced and sustained innovative water monitoring devices and software intended to improve real – time monitoring of water flows and system pressures.



Figure 7: Water Mind Analyzer on DMA bulk meter

To understand better the flows within their system, NWSC established 11 District Metering Areas (DMAs), separate units fed by bulk meters and completely distinct areas that could be monitored independently. In the seven DMAs with the highest NRW, NWSC installed Water Mind Analyzers (WMAs), or sensing units that send real – time flows and water pressures to a software monitoring program observed by head office engineers in order to detect irregularities that might indicate a leak, burst, or illegal use of water.

Using this system, NWSC has been able to respond rapidly; 24 hours, seven days a week, to correct problems and reduce water loss. The utility also created a Night Patrol team which responds and corrects problems as they happen, and if necessary, refers illegal water connections to the police.



Figure 8: Members of the Night Patrol

Itron's contributions, coupled with a new commitment to improved service delivery and a framework for engaging customers in dialogue and communication about the utility and its operations provides NWSC with the tools and approaches to sustainably reduce NRW and use the increased revenue to expand their infrastructure and service area.

NWSC created 15 WACOCOs to assist in all these efforts, each focusing on strengthening stakeholder participation in the provision of water and sewerage services through communication, planning and coordination as well as improving public awareness of NWSC services.



Figure 5: AMRs on domestic meters

NWSC's major departments implemented numerous recommended changes to improve services, motivate staff, augment internal operations, and build commitment. These changes cost little, but improved organization effectiveness and efficiency, while enriching professional and job satisfaction.

NWSC created 15 WACOCOs to assist in all these efforts, each focusing on strengthening stakeholder participation in the provision of water and sewerage services through communication, planning and coordination as well as improving public awareness of NWSC services. NWSC used WACOCOs, comprising elected officials and local community residents, to enhance public awareness about NWSC services, enrich public feedback, improve coordination of water and sewerage services in branches, synchronize planning of infrastructure development, increase the pool of resources, and boost safety and protection of NWSC installations.

*Whenever we wake up to come and work, we come to win. We learned that from QSIP, we have objectives to be achieved and we are prepared mentally. We do this so that our tomorrow is better than our yesterday. Our staff are now more trained and we have learned to engage stakeholders in our work."* Charles Okuonzi, NWSC Jinja and Iganga General Manager.

NWSC also interacted with the public through other communication channels. The utility introduced a local radio program, through a popular station, that informed customers about NWSC services, their customer obligations, and methods to improve health and sanitation, as well as how the community can reduce NRW by reporting leaks and bursts and assisting NWSC identify illegal connections. Twenty – five radio programs were aired and the feedback was overwhelmingly positive. NWSC complimented these engagement strategies with targeted visits and messaging to places of worship, spending the three days of each weekend addressing different faith denominations. More than 70 churches, synagogues, and mosques were addressed on NWSC's services and challenges, including their desire to improve customer interactions and relations and the need to conserve water by addressing NRW.



Figure 6: WACOCO meeting in Bugera

In the East African region, the average NRW figures by country in 2013 were: Uganda 33%<sup>1</sup>, Tanzania 36<sup>2</sup>, Burundi 41%<sup>3</sup>, Rwanda 42%<sup>4</sup>, and Kenya 44%<sup>5</sup>. Conservatively, the average NRW in the East Africa region therefore stands at 37%.

Water utilities within the region are striving for additional revenue to expand services. In some cases, water is rationed while much is being wasted. The NRW problem is likely to be compounded in the near future by declining available water resources, compromised water quality that will be expensive to treat to standards, increasing costs of energy to pump treated water, high rates of infrastructure deterioration, inadequate investment budgets, and increasing pressure from the effects of urbanization, climate change, and population growth.

More so, water utilities are under increasing scrutiny from citizens, government, and other stakeholders to use water resources more efficiently by reducing water losses in their distribution systems and ensuring sustainable service delivery.

## USAID EFFORTS TO BUILD RESILIENCE

The Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development (PREPARED) Project is a comprehensive program aimed at mainstreaming integrated, multi-sectoral, evidence – based, climate – resilient development planning and program implementation into the East African Community (EAC) and its Partner States’ development agendas.

Successful planning to address regional development challenges in the EAC points to the need for strong working partnerships, coordination, and capacity building among a broad range of institutions in the climate change, biodiversity, and water supply and sanitation communities to create and strengthen policy leadership and knowledge frameworks that support and integrate adaptive and strategic decision-making for more effective development.

The PREPARED Project coordinates with the East African Community (EAC) and Lake Victoria Basin Commission (LVBC) Secretariats through its technical working groups and task forces. A Regional WASH Task Force, under the guidance and coordination of the LVBC Secretariat, provided representatives from the five Partner States opportunities to identify key program activities that PREPARED could support. The Uganda National Water and Sewerage Corporation (NWSC) identified Non – Revenue Water (NRW) as a key constraint affecting the efficient provision of water to its customers. NWSC was looking for innovative and effective approaches to reducing NRW, and proposed a pilot activity for its utility serving Jinja and Iganga.

## STRATEGY AND APPROACH TO REDUCE NRW IN JINJA AND IGANGA

The National Water and Sewerage Corporation (NWSC) is a public utility owned by the government of the Republic of Uganda and was established by decree No. 34 of 1972. In 1995, the National Water and Sewerage Cooperation Act empowered NWSC to provide water and sewerage services in urban centers across Uganda. Currently there are more than 220 NWSC branches in Uganda, which supply over 120 billion cubic meters of water annually. NWSC functions under a Board of Directors and the Managing Director oversees the corporation’s national – level operations with individual utilities supervised by respective general managers. NWSC’s Five – Year Strategy (2013 – 2018) aims to achieve the goal of 100% water coverage in all its service areas. The NSWC Corporate Plan, aligned with the Five – Year Strategy, requires performance management plans for each NWSC branch and its staff, a key element for improving customer services.



Key objectives of the Five – Year Strategy are to increase coverage and supply reliability; improve asset management by reducing NRW; improve customer interface and satisfaction coupled with enhanced collaboration with stakeholders; increase revenue growth and mobilization of resources for investment, enhance staff capacity and welfare, and increase research and innovation. NWSC has addressed NRW since 1998, and has seen its national average drop from over 60% to less than 35% today.

The goal of the USAID – supported NRW Reduction Strategy and Approach in Jinja and Iganga was “..to improve the quality of water supply services of National Water and Sewerage Corporation (NWSC) – Jinja through sound management of appropriate ICT tools, performance improvement programs and customer engagement”.

To achieve this goal, a partnership comprising NWSC; Itron, Inc.; an international engineering company; and the PREPARED Project identified three objectives:

- ❖ Build a NWSC service delivery improvement program;
- ❖ Develop and test an interactive customer engagement framework and approach; and
- ❖ Implement innovative engineering and ICT solutions.

Figure 3 illustrates this approach to reducing NRW. Performance improvement is measuring the output of a particular business process or procedure, then modifying the process or procedure to increase outputs, improve efficiency, or enhance the effectiveness of an organization. Performance improvement represents change in which managers and a governing body of an organization establish and manage a program which assesses the current operational level of the organization and then generates ideas for modifying operational behavior to achieve improved performance and results. The primary

### NWSC-JINJA NON-REVENUE WATER REDUCTION STRATEGY FOR 2014-2015

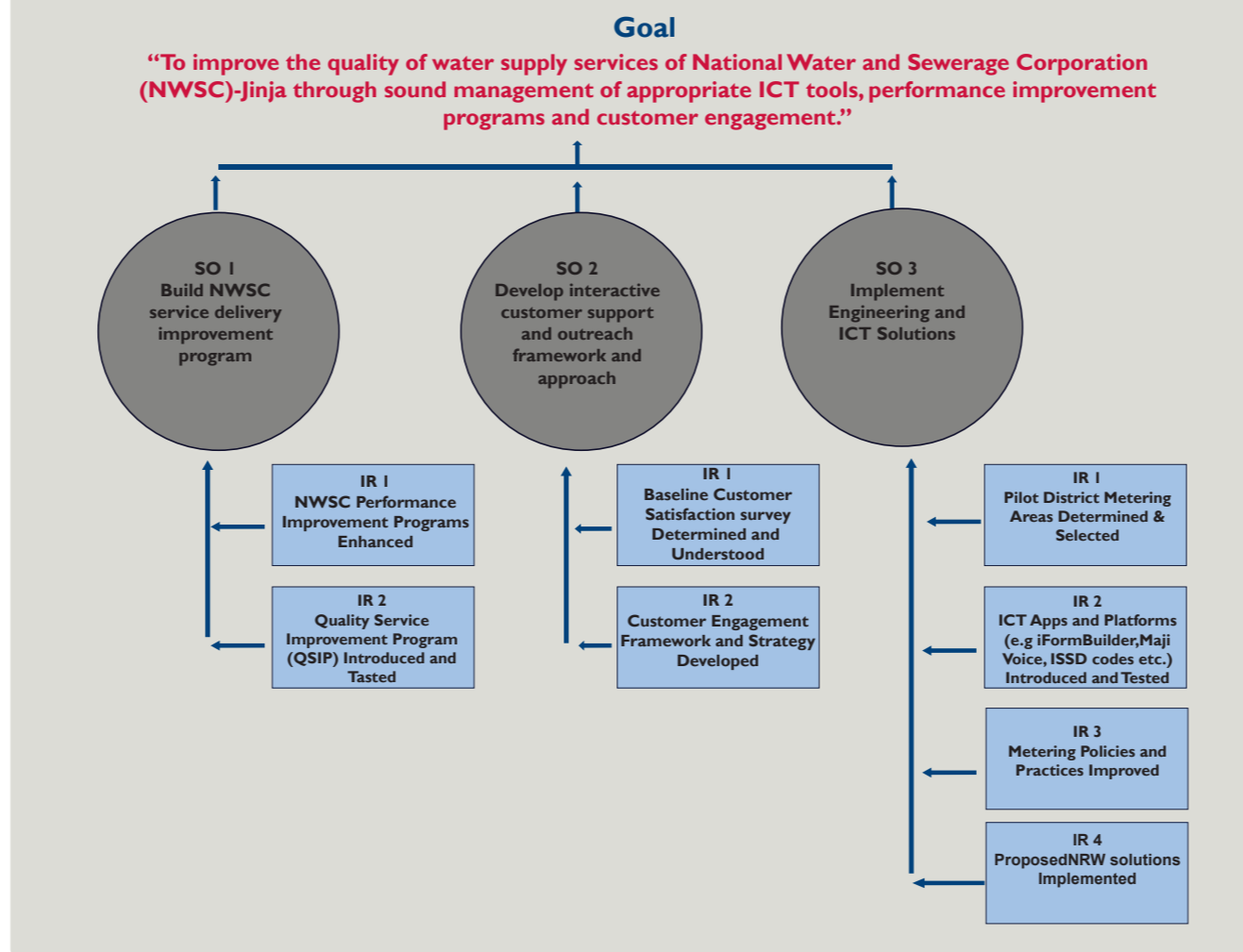


Figure 3: Strategy to Reduce NRW in Jinja and Iganga

goal is to better deliver goods and services to customers while improving internal operations.

NWSC has over the years adopted several high impact short – term performance improvement programs. These include the 100 Days Program; the Service and Revenue Enhancement Project (SEREP) I and II; the Area Performance Contracts I, II and III; the Stretch Out Program; the One Minute Management Concept; and the Internally Delegated Area Management Contracts (IDAMC’s). Financial and commercial reforms included strengthening Management Information Systems (MIS) and adjusting tariff structures.

All of these improvement programs are geared towards achieving:

- ❖ Financial sustainability;
- ❖ Infrastructure growth;
- ❖ Increased coverage for water and sewerage services;
- ❖ Learning and growth;
- ❖ Improved customer care; and
- ❖ Enhanced stakeholder expectations.

Key among the strategic focus areas are increased coverage and supply reliability, improved asset management aimed at tackling

the current water losses from NRW, improved customer interface and satisfaction resulting from enhanced collaboration with stakeholders, increased revenue growth and mobilization of resources for investment, improved staff capacity development and welfare, and enhanced research and innovation.

## ENHANCING NWSC PERFORMANCE AND EFFECTIVELY ENGAGING CUSTOMERS IN SOLUTIONS

Building on these previous NWSC initiatives, PREPARED introduced a Quality Service Improvement Program (QSIP) approach to the corporation. QSIP is a five – phase program aimed at improving service delivery and customer interaction and is based upon an internal organizational assessment of its current efforts.

QSIP starts with a Visions and Values workshop, a day dedicated to dialogue about customer service and quality among senior managers of the organization, and creating concrete products to launch QSIP. The objectives of this workshop are to create an understanding and commitment to the concepts of excellent service, identify key roles played by senior managers in creating

Figure 4: QSIP Phases to Improved Service Delivery



and sustaining a high level of service, introduce ideas and skills in the management role of building a service culture, and emphasize management behavior as models for others. During its Vision and Values workshop, NWSC senior managers developed a Service

Strategy that guides the organization, created a “Service Credo”, prepared its 10 Commandments for Quality Service, and developed a list of expected customer obligations.

During the Service Audit phase, NWSC assessed “moments of truth” in its delivery cycle to determine initial obstacles and roadblocks customers face in accessing services. For example, although convinced that an application for a new water connection takes about 2 days, an internal staff reflection of the process determined that most customers had to wait about one month before being connected and that an individual applicant might have to visit the office numerous times during that period. Also in this QSIP phase, each NWSC department developed and disseminated Customer Feedback Instruments (CFIs), simple questionnaires requesting feedback from customers on NWSC performance and the human resources department administered a staff satisfaction survey of its employees.

QSIP’s phase three requires organizational departments to address the CFI results and consider its service credo, service strategy and in this case, its 10 Commandments for Quality Service in making recommendations for improving its operations towards improved customer service delivery. Additionally, a Customer Satisfaction Survey, the first step in developing a Customer Engagement Framework, was completed by the Uganda Coalition for Sustainable Development (UCSD), and the results were integrated with the results of the first two QSIP phases.

At a facilitated QSIP Action Planning workshop, held in April 2015, with participation of NWSC staff and targeted Jinja and Iganga customers, stakeholders recommended key actions for improving service delivery. Subsequently, the utility revised and developed new programs to address suppressed accounts, illegal connections, delays in new connections, inadequate billing procedures, high levels of arrears, and under – motivated staff.

NWSC introduced three major efforts to improve services and decrease the high NRW level, approximately 45% at the time of the workshop. These new efforts included these initiatives:

- ❖ Suppressed accounts, Non – Revenue Water, and Arrears Reduction Program (SNARP);
- ❖ Customer Relations Model (CRM); and
- ❖ A Water Community Communication Clubs (WACOCOs) approach previously piloted in Kampala by NWSC.

SNARP, a short – term program, emphasized an integrated, concentrated effort to address all suppressed accounts, and monitor and tackle illegal connections that contribute to NRW. NWSC, in partnership with the police, and with help from the WACOCO members and a whistle – blowers reward program, identified and charged domestic, commercial and industrial water users with fines for any discovered illegal connections and negotiated the settlement of arrears in order to reconnect suppressed accounts. During 2015, the SNARP team investigated and confirmed 428 illegal water use cases of which 47% were meter bypasses and 53% involved meter tampering. Out of the confirmed cases, 80.5% were domestic connections, 10.1% commercial, 3.9% public stand pipes, and 5.5% public institutions. NWSC collected approximately US\$43,000 in fines and reconnected these suppressed accounts through its newly developed Arrears Payment Agreement (APA) program.

The CRM focused attention on improved commercial operations, mostly through enhanced on – the – spot billing procedures. NWSC integrated improved engineering and ICT innovations with expanded billing software in order to effectively conduct immediate, field – based customer billing. Automatic Meter Readers (AMRs) provided meter readings from multiple meters over a 500 meter range, and this information was automatically uploaded into the main office billing system. Additionally, NWSC field staff, using cell phones and mobile printers, were able to provide immediate bills to customers.

*We started by identifying the challenges and weakness internally. Then, we all set our targets and understood our mandate and committed to offer better water and sewerage services and informing customers they also had to know their obligations. This has helped us work hand – in – hand with our customers.” Titus Niwamanya, Senior Commercial and Billing officer, NWSC Jinja and Iganga.*

<sup>1</sup> The Water Herald, Volume 4, Issue 3, October-December, 2013, NWSC, Kampala, Uganda.  
<sup>2</sup> PREPARED Project Baseline Report 2014  
<sup>3</sup> PREPARED Project Baseline Report 2014  
<sup>4</sup> PREPARED Project Baseline Report 2014  
<sup>5</sup> Impact 2013, A Performance Review of Kenya’s Water Services Sector 2011-2012, WASREB, Nairobi, Kenya