

MAXIMIZING THE BENEFITS FROM WATER AND ENVIRONMENTAL SANITATION

**Challenges of managing non revenue water:
Experience from a water utility in Uganda**

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Reduction of Non Revenue Water, NRW remains one of the major challenges facing many utilities in most developing countries. High NRW means that in order to sustain the operations of the utility, the consumers have to pay high tariffs for the inefficiency which makes the service unaffordable to the majority of the consumers in low-income countries. Overcoming the challenges of NRW calls for joint efforts from all stakeholders and experience sharing from other parts of the world. This paper presents a step by step approach used by National Water and Sewerage Corporation- Entebbe to address the challenges of NRW with support from the Water Utility Partnership (WUP) and experts from other parts of the world. We discuss the approach that was used and how critical stakeholder mapping especially the cadre staff and top management of the Area was to creating ownership of the project and its successful implementation.

Introduction

Reduction of Non Revenue Water, NRW remains one of the major challenges facing many water utilities in most developing countries with some recording as high percentage as 60%. There are all the reasons as to why utilities need to be concerned with high NRW. Safe Water is costly to produce and a number of costs are incurred to produce it such as; chemicals, energy costs, staff salaries, cost of the plant and equipment, maintenance costs etc. These costs must be recovered through water sales if the operations are to be sustained and for utilities that have high figures of NRW, the consumers end up paying for the inefficiency through increased water tariffs. This is a big burden especially in developing countries where the majority of the consumers are poor and as a result the service becomes unaffordable forcing them to resort to other poor/contaminated sources.

To a large extent, the level of NRW is an indicator of how well a utility is managed and the reduction of NRW is a crucial step to improve the financial health of water utilities and to save scarce water resources.

Entebbe Area is one of the Towns operated by National Water and Sewerage Corporation NWSC in Uganda. NRW for Entebbe varied from 30% to 28% in 2003 This represented one of the highest NRW figures in all the NWSC towns. With almost maximum plant capacity utilisation (over 98%), NRW reduction was the only medium term solution to securing safe water for the ever increasing demand.

Given its situation, NWSC-Entebbe Area was one of the five selected pilot areas in Africa for the Sida supported Water Utility Partnership, WUP project on improvement of Water utility Management and Unaccounted-for Water reduction.

The Area team in partnership with a team of experts from

the project have under taken a number of initiatives geared towards NRW reduction. This involved among others, carrying out a situational analysis of the system and identifying the practical interventions for implementation. This paper highlights these initiatives and the impact they have had on the reduction of NRW in the Entebbe Area.

Situational analysis

Managing NRW calls for effective institutional management systems that are comprehensive and operational. Day to day operations and future planning should have this important factor in their perspective. This implies that human beings and machinery should be planned and managed in such away that they will timely and effectively react and prevent any water losses.

In order to adopt effective measures to reduce NRW in Entebbe Area, the first phase of the project focused on carrying out a comprehensive situational analysis of the entire system in order to determine its current status. The focus was put on both management issues and water treatment plant and the distribution network status. Some of the weaknesses that were identified as far as NRW was concerned included among others;

Lack of systems to measure bulk water supply to large areas. To effectively manage NRW, it is important that a utility's service area is broken down into smaller manageable water loss areas, geographically and a measurement system put in place to determine losses that occur in these areas i.e. bulk meters to measure supply into these areas and consumer meters to measure water sales.

Old and non-functioning bulk meters at the inlet and outlet of some of the reservoirs, and old and faulty consumer meters. Controlling means measuring. It is extremely difficult

to Control what you cannot measure. The system used in accounting for water produced must therefore be reliable. It is common that meters are put in place to measure water produced and sold. It is however, more important that the meters are measuring accurately. This calls for calibrations where necessary and meter replacement policy in line with life spans of the meters as determined by the manufactures or by the utility in accordance with conditions in which they operate. The meters used should be of good quality with all the necessary accessories e.g. non- return valves. Right seizing and positioning of the meters is also an important factor. It is now known that for proper measurement, meters should be of smaller size than the pipe size for accurate measurement of the flow. Very low flow tends to leave some water unrecorded and this contributes to NRW.

Lack of minimum leak detection equipments. As far as NRW is concerned it is important that a utility is equipped with at least minimum equipment to enable it detect and fix leakages. Examples of minimum leak detection equipment include listening sticks, flow data loggers etc. With the use of such equipment there should be a deliberate effort taken by the organisation to research and fix invisible leaks. It is known that invisible leaks exist and contribute greatly to water losses. They are as bad as, if not worse than, visible ones. They should thus be managed together with the visible ones and leak detection equipments are therefore key for any utility if NRW is to be controlled.

Inadequate controls and poor documentation of the interconnections in the network. Practising network management plays a big role in reducing NRW. This process calls for pressure measurement and installing of pressure reducing valves in areas of excessive pressures. It is common knowledge today that pressure is directly proportional to leakages and bursts. This therefore makes pressure management key as far as reduction of NRW is concerned. It calls for determining ideal flows. Important also is to be able to maintain a network in a good condition. To be able to do this there should be a deliberate effort to monitor and know the pipe

network condition, performance and have replacement plans in place. All these need to be properly documented.

Old network which was prone to leaks and bursts. The assets that are used to produce and distribute water must be well managed and their lives determined for replacement. There needs to be proper documentation related to their use, maintenance and disposal for proper management.

Goals, objectives and standards for NRW reduction

After assessing the current status of the system, a set of objectives and standards were established to guide the Area in planning for what it intends to achieve i.e. the improvements to be made and the time frame as far as NRW was concerned. These goals were made clear to all staff in the Area for ownership of the process.

The main objectives that were set included;

- Increasing the ability to measure UFW/NRW for smaller geographical areas and know exactly the problematic areas and find solutions for them so as to reduce the overall area UFW from 28% (2003) to 15% by 2009.
- Making staff more accountable for their actions by making it very possible and easy to apportion blame and success.
- Increasing depth of performance monitoring and being able to fairly reward extra individual and group efforts.

Strategies Implemented.

After going through the above process the Area implemented the NRW/Revenue zones.

The exercise took two months to accomplish (Oct. – Nov. 2004) and involved the following:

- Replacing old and faulty bulk meters at the treatment plant and reservoirs to have reliable measurement.
- Studying the distribution network to be able to technically insolate geographical zones network wise, taking into

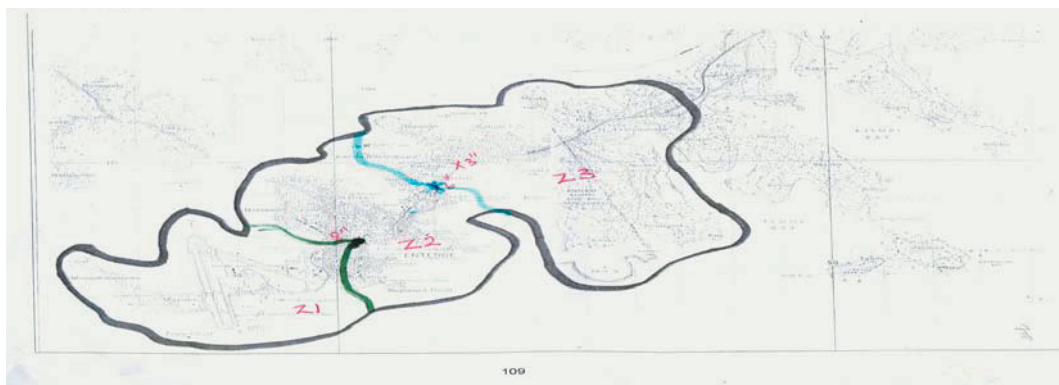


Figure 1. Map of the established Zones

- account any inter-connecting mains between zones.
- Drawing zonal maps and establishing zonal composition in terms of individual accounts, staff and other resources to create self - accounting NRW/Revenue zones.
 - Installing bulk meters and building chambers around them. One bulk meter was installed at the 8 inch main to the airport to measure water-going Airport, Kigungu and surrounding areas (named Zone I). Two bulk meters were installed at Katabi Sub County on the 6 and 3-inch parallel mains, to measure water supply to Baita and surrounding areas (named Zone II). By elimination therefore, a third zone (Zone III) consisting of Town Centre and surrounding areas was formed.
 - For each Zone, a monthly report is prepared on the operational data including full record of all leakage detection activities carried out. Zonal codes have been established in CUSTIMA (billing software) for easy monitoring of accounts and reports per zone for purposes of establishing zone by zone; monthly billing (shillings and cubic meters), revenue collected, No. of suppressed accounts, new connection and balance outstanding etc
 - Appointing zonal leaders (who are accountable for the zones' performance) and thereafter attaching staff and resources to each zone according to size, as well as defining the tasks. It was agreed that the zonal leaders should be technical persons and deputised by a commercial people since the major problem to be addressed is UFW. Apart from the Lead Partner (Area Manager) who oversees all zones each Partner was assigned a particular zone to oversee. The staff were also screened and distributed to zones according to their capabilities and mobility. Each zone has its own Meter Reader(s), Plumbers and Plumber mates and Revenue Staff. Distributed also were tools and equipment and transport allowing for sharing of resources, including staff, especially in cases of emergencies.
 - Agreeing on performance measurement indicators, reporting format and frequency. The agreed upon performance indicators include: - billing, UFW, collection, arrears reduction, new connections, suppressed accounts, response time to customer complaints, etc. In essence the zones operate as mini areas and there is a reward mechanism for each zones that achieves its set target.
 - A database has been established for bursts and leaks main cluster recording where all essential incidents of bursts and leaks on the mains are recorded and monitored accordingly.
- During initiation and implementation stages, a number of workshops were organised for all parties involved to make contributions. This was aimed at making sure that all ideas are captured and that everybody buys in, in the new system for easy implementation

Other achievements:-

Staffs are now more focused and motivated to work for better

Table 1. Entebbe Area NRW as per District Meter Area for the period December'2004 to March 2005

Months	Dece,04	Jan.05	Feb. ,05	Mar,05	Remarks
Zone 1					
Number of Accounts	131	140	147	151	
Billing Efficiency %	72	86	95	45	
UFW%	28	14	5	55	Big burst occurred on 2" mains over the weekend in March'05
Zone 2					
Number of Accounts	3401	3784	3827	3896	
Billing Efficiency %	61	63	80	89	
UFW%	39	37	20	11	Leak expert involved to identify invisible leaks in March'05
Zone 3					
Number of Accounts	1608	1717	1844	1919	
Billing Efficiency %	73	80	86	71	
UFW%	27	20	14	29	Grading of roads exercise cut many pipes, mains and service line in March,05

performance of their zones and since there is competition among the zones and the winning zone will be rewarded, this adds to their motivation and team spirit.

Increased knowledge and skill through training and exposure

More organised workplace and better systems in place (MIS)

Better planning process for people and other assets

Fine-tuning of the system continues as we go along but so far so good.

Conclusion

NRW is expensive for both the utility and the consumers especially in low income countries. Exchange of world experience on NRW provides means for more effective and economical measures of reducing NRW. As demonstrated above, Entebbe Area has used this experience in overcoming the challenges of NRW and though it's too early to celebrate the results are encouraging.

References

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Performance Improvement Plan

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