



The Water Herald

Learn from your peers

Volume 4, Issue 2, July–September 2013

INSIDE

**How is NWSC Coping with
Water Resource Challenges?**

pg 10

**Potential for Energy
Production from BSTP Sludge**

pg 11

**Looming Global Hunger:
What are the Experts Saying?**

pg 41

and Much More...



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CONTENTS

Water Herald , Issue 2, July–September 2013

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Managing Director's Foreword

4

Editor's Note

5

Stakeholder Management in NWSC: The Pros and Cons

6

Water Supply and Sanitation Services for the Urban Poor: Kampala Water Experience

8

How is NWSC Coping with Water Resource Challenges?

10

11

Potential for Energy Production from Sludge

14

NWSC Areas Performance Score Card Jan–June 2013

18

Using Local Stakeholders' Knowledge to Assess Healthy Risks

22

Business Continuity Challenges: Experiences of Flooding in Kasese Area

25

Young Water Professionals Commitment to the Water Sector

26

YWPs Join the World to Celebrate Water Week

28

NWSC Gets New MD

29

NWSC Launches Gaba II Vocational Centre

30

Celebrating the Future and Community Participation

39

IT Jokes

38

How Iganga Area Manages Stakeholders

37

How Jinja Manages Stakeholders

32

External Services Benchmarking Visits



Mubende Area is Crowned Winner

MD's Foreword



Dr Eng Silver Mugisha
Managing Director–NWSC

First and foremost, it gives me great pleasure to congratulate all management and staff of National Water and Sewerage Corporation (NWSC) for having come to a successful end of the Financial Year (FY) 2012–2013. I specifically want to thank all NWSC staff for remaining focused on their mandate and key service delivery obligations, despite the prevailing challenges. To our esteemed readers and customers, we thank you for being our diligent supporters.

I wish to welcome you once again to our Water Herald (WH) magazine for the period, July–September 2013. As we start the new FY, I would wish to reflect upon our performance during the FY 2012–2013. Suffice it to say, the FY 2012–2013 was characterized by continued growth in service delivery and improvements. This is depicted by some increase in turnover, water sales, new connections and service coverage. Indeed, NWSC focused energies on ensuring continuity of adequate supply, coupled with the need to expeditiously respond to customer issues and complaints.

These achievements notwithstanding, NWSC still faces a number of serious challenges, namely: (i) non–revenue water, both technical and commercial losses, (ii) persistence of dry zones perpetuated by the exponential growth in demand for services resulting from increased urbanization, and (iii) population growth within the urban centres, among others. Fortunately, as the saying goes “adversity is the creator of success,” we do not construe these challenges as failures on our part, but they offer us a perfect spring–board from which we shall launch higher and embark on various mitigating activities – including the formulation of short term and long term interventions aimed at addressing these shortfalls.

Turning back to the WH, this edition is specifically dedicated to one of our corporate themes dubbed, “stakeholder management,” engrained within the NWSC Corporate Plan – for the period 2012–2015. The emphasis of this theme recognizes the fact that our efforts would be in vain, if we do not fulfill the aspirations and expectations of our key stakeholders. It should be noted that it is through proper stakeholder management that an organization like NWSC is able to balance its stakeholder needs, and achieve predictable value for money services.

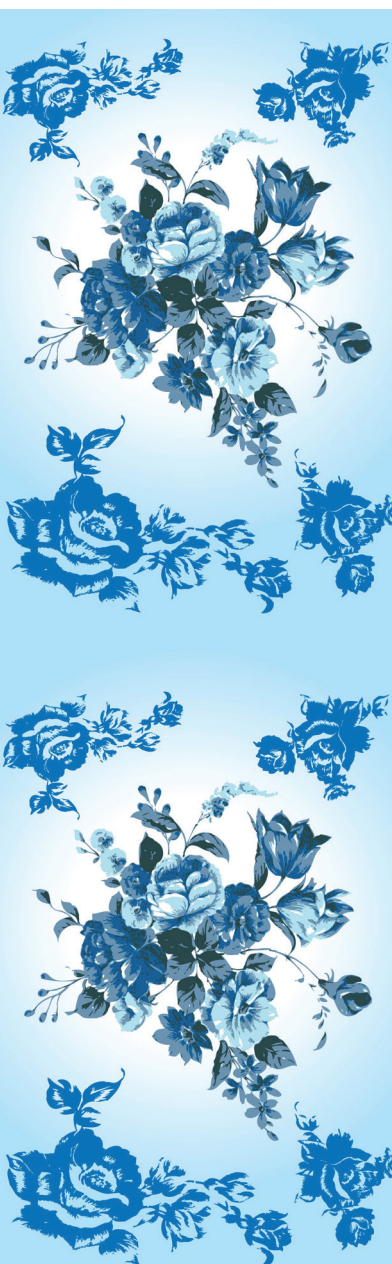
In broad terms, our key stakeholders may be grouped into two categories, namely: internal and external stakeholders. Our internal stakeholders represent NWSC staff and management, while the external stakeholders represent those on the outside of the Corporation, but whose role and influence is significant to our operations. These include: (i) the Government of Uganda, (ii) development partners, (iii) our esteemed customers, among others.

In this edition of the WH magazine, due recognition is given to our stakeholders who have played a significant role in moulding and ensuring that the Corporation continues unabated on the crucial path of sustained growth. Stakeholders have provided policy guidance, requisite financial needs, supported our market growth, and accessibility initiatives. Last but not least, they have also provided the indefatigable human resource that usually transforms our inputs into outputs.

In summary therefore, we as a Corporation do not take our stakeholders for granted, because we owe our very existence to them. As we make progress in the FY 2013–2014, I wish to mention that we have a number of activities and initiatives lined up to ensure that our services are propelled for the betterment of our stakeholders. We also pledge to continue promoting a cordial and harmonious relationship with all our stakeholders with a key emphasis on encouraging feedback and prompt responses to the issues that need urgent redress.

I therefore wish you all a pleasant reading of this edition. Additionally, I would like to end by reiterating our resolve and commitment to continually serve our customers better, with increased efficiency and tenacity. It is our sincere hope that we shall continue putting a smile on the faces of all our key stakeholders.

Thank you very much, For GOD and My Country■



Editor's Note



Dr Martin Kalibbala
Chief Editor

Dear readers
Two million dollar questions – (i) How can utility businesses safely juggle through some delicate maze of stakeholder blitzkriegs? and (ii) Is it really possible to manage all key utility stakeholders – by identifying, analysing, matrixing and engaging them – for better service delivery? No doubt, fostering stakeholder support is crucial for the survival of any business entity.

The fundamental legitimacy of any utility business – i.e. to ably and freely operate within their business niche – does not only depend on the success in wealth creation, but also on the ability to meet the expectations of the entire spectrum of stakeholders – who essentially contribute to the success. From stockholders to shareholders, the utility stakeholder spectrum might also include: resource providers, customers (internal and external), development partners, suppliers, alliance partners, and social actors and politicians, among others.

The bottom line – success or failure is usually measured through the lens of stakeholder perceptions. Thus, stakeholder challenges could definitely impact on service delivery, if not properly fostered and managed. When the utility managers work to improve on credibility, sanguinity, robustness and trustworthiness, the tangible payoff is usually realised in better relationships with their stakeholders.

Consequently, utility business managers must be seen to engage in mobilizing to create resources, ideas, wealth and benefits for all key stakeholders. In one of his famous quotes, George Bernard Shaw said, “The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress might depend on the unreasonable man (read stakeholder).”

Although the unreasonable stakeholders are often critical, nosy, irrational and irritable – which could create negative feelings for utility managers towards them – their inputs could be rendered reasonable and useful when they front scathingly critical ideas that might support management's ability to stick to the plan, scope, time, and costs in balance.

According to experts, there are generally three types of “dangerous” stakeholders who might rock the business boat or project – if not properly managed, namely: (i) unreasonable stakeholders – they do not embrace what some refer to as reason, (ii) unidentified stakeholders –

those who pop up during the life cycle of the project or business undertaking, and (iii) unclear stakeholders – they do not clearly articulate their ideas, interests and expectations, neither are they open and honest enough to table them.

Basically, there's a big difference between a stakeholder who does not clearly articulate their expectations, and the stakeholder who is not totally open about their expectations. Unfortunately, for both scenarios the resultant impact is the same, because either way, one remains unsure about their true expectations.

For this edition of the Water Herald – July–September 2013 – the Editorial Panel decided to focus on the theme dubbed, “stakeholder management in water utility businesses.” This decision is pivotal, considering the importance of stakeholders in utility business politics, coupled with a corporate theme entrenched within the NWSC Corporate Plan (2012–2015).

In a bid to reinforce the degree of seriousness pegged onto our stakeholders, NWSC has set up a number of actionable initiatives to focus on: (i) customer satisfaction surveys on quarterly basis, (ii) liaisons on efficient service delivery to customers through local water councils, (iii) initiatives to improve supply reliability, water quality and sewerage effluent, (iv) collaborations towards improved catchment management, and (v) business continuity planning, among others.

For NWSC, the most critical stakeholder of all is the esteemed customer! However, NWSC focuses beyond measuring corporate success based on one stakeholder group. It recognises the strategic value of the linkages between different stakeholders and their implications on our performance. Cognizant of the responsibilities towards the different stakeholders, NWSC has adopted linkages, methods and tools that have improved on stakeholder perception. How does NWSC do that? Through the pages of this issue, you might get some answers to this vital question.

We at NWSC, do not purport to have “done-it-all”, as far as effective stakeholder management is concerned. However, over the years, NWSC has accumulated and made some gains, and is willing to share useful experiences. Within the pages of this issue, the Editorial Panel shares with you some of these experiences; which we believe are richly benchmarkable, and worth reading.

Enjoy your reading!■

Stakeholder Management in NWSC: *The Pros and Cons*

by David K Isingoma

Introductory Remarks

The Corporate Plan 2012 – 2015 encompasses as one of its key strategic themes the concept of Stakeholder Management as a commitment of NWSC to meet the needs and surpass the expectations of its stakeholders. The Management of stakeholders refers to the ability to assess the needs, plan for and implement activities geared towards addressing the needs of the different partners in service. It should be noted that it is through proper stakeholder management that an organization is able to balance its stakeholder needs and achieve predictable and value for money services.

Stakeholder Management in a Historical Perspective

The mention of a public utility in the 1990's and before automatically switched peoples minds to inefficiency, and poor performance. True to this belief, most public companies at that time were beleaguered by gross inefficiencies, very low coverage, lack of cash to do anything and an unsupporting attitude towards customers. All these attributes culminated in a very low consideration by service providers for stakeholders (both internal and external). Indeed at that time, some of the revival therapies that were prevalent included the involvement of the private sector in service delivery, and the adoption of internal reforms by various utilities. Suffice it to mention that one of the cardinal principles underlying the internal reforms was the notion of addressing the needs of stakeholders. As already defined in the introduction, a balanced relationship between all stakeholders translates into efficient service delivery.

The first question that comes to hand is who are NWSC stakeholders? Our stakeholders include:

- Government
- Development Partners
- External Customers (People we serve and potential customers)
- Internal Customers (Management Teams and Staff)

The ensuing paragraphs give some detail on how the NWSC has addressed the issue of stakeholder in the past and currently.

Who are the NWSC Stakeholders?

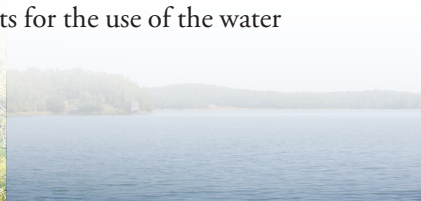
To begin with, NWSC is a parastatal which is 100 % owned by Government. This implies that Government is the major stakeholder in the affairs of the Corporation. It is for this reason that, the NWSC Corporate Plan, which guides the operations of the Corporation, is sanctioned by the Minister of Water and Environment. Secondly, in accordance with the NWSC Act, it is mandatory for the NWSC to submit quarterly performance reports to the Ministry of Water and Environment in conformity with the need for accountability, and the Corporations operational and financial performance is audited by the Auditor General's office every year. The Corporations annual plan and budget are also reviewed by Parliament through the Policy Statement submitted every financial year. The NWSC also operates within the framework of a Performance Contract with Government. The Performance Contract is a tri-partite arrangement between the Ministry of Water and Environment, and the Ministry of Finance representing Government, and the National Water and Sewerage Corporation.

Environmental Protection as a Stakeholder Process

Suffice it to say that the relationship between the NWSC and its major stakeholder Government has been very cordial with a number of benefits realized over the years. Government has enabled the Corporation access resources for investment, allowed for operational autonomy, assisted the Corporation clean up its balance sheet through the restructuring of the NWSC Long Term Debt into equity, and provided a good enabling policy environment. However, the only challenge to date is that as much as Government has enabled and provided a conducive environment, it remains one of the largest customers of the Corporation, and unfortunately one of the largest debtors to the Corporation. This therefore impairs the cash flow and stifles the operation and maintenance activities of the Corporation.

Government as a Stake holder

As part of fulfillment of Governments aspirations, the NWSC has incorporated the need for environmental protection in line with espousing integrated water resources management. Despite the fact that the Corporation pays for abstraction permits for the use of the water



resource, it was noted by the Water Policy Committee of the Ministry that users of the water resource should play a more overt role in the conservation of water resources and consequently the environment at large. This is premised on the fact that environmental degradation and its attendant effects on the quantity and quality of the water resource directly impact on the quality and cost of services delivered by utilities. To this effect, the Corporation has set aside funds that are to cater for the protection of its water sources. In addition, as a policy, all new projects being implemented by the Corporation are to have an element of environmental management embedded within them. However, the major challenge in regard to environmental protection is defining the extent of the source that is to be protected. This is because the water sources and catchment areas are not definite, and there are many other players whose activities also adversely affect the catchment areas and the water sources. This therefore calls for a holistic and integrated approach by various stakeholders in ensuring that the raw water sources are protected and preserved.

Development Partners Stakeholders

The Development partners commonly referred to as “Donors” are another important stakeholder to the Corporation. Why? Because, they bridge the financing gap faced by a number of service providers. The NWSC has been a beneficiary of copious amounts of investment finance from development partners over the years. These resources have helped the Corporation meet the exponential growth in demand for services as a result of the ever growing population within the urban centres. Development partners have not only provided finances, but have also helped shape the policy and strategic direction of the Corporation and the water sector at large. For example, through the Poverty Reduction Support Credit (PRSC) of the World Bank, strategic milestones such as the operational and financial reforms where stipulated which have helped the Corporation remain buoyant and operate on a viable basis. However, gone are the days where development partner assistance can be taken for granted. Financing today is linked to strong managerial and Governance factors. Furthermore, there is an increasing inclination towards loan financing as opposed to outward grants to the Government. This is especially true for the Urban Water Sector. Currently, the NWSC has funding (Euro 212) from 3 agencies (EIB, AFD, and KfW) under the Mutual Reliance Initiative (MRI) to finance the expansion and rehabilitation of water supply to the greater Kampala. Similarly, the Corporation has also secured funds from the World Bank (USD \$ 55 million) for

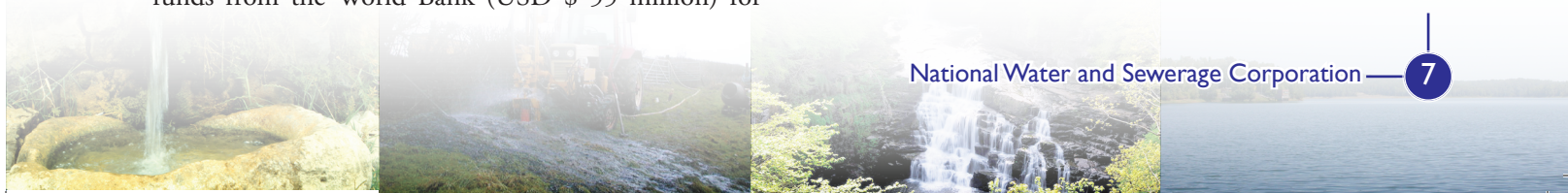
the expansion and rehabilitation of water and sewerage systems in Arua, Gulu, Mbale and Bushenyi towns.

Staff Stakeholders

Staff are, and remain one of the most essential internal stakeholders within an organization. Staff represent the human capital that an organization uses to transform the various other factors of production into outputs. To date, the Corporation has a total staff complement of 1,788 pax, translating into a productivity of 6 staff/ thousand connections. The management of this important resource is of paramount importance and means and ways have to be sought to ensure that staff are equipped and motivated to carry out their functions efficiently. As a means of ensuring accountability, currently all staff within the Corporation are under contract employment with specific key result areas for each of the staff. The contracts help in isolating the individual from the group. Activities that have gone on to strengthen staff performance include: the reward of performers and reprimand of non performers, instilling of competition among workers, improvement of awareness and ownership of business processes. Furthermore, several staff training programmes have been undertaken both locally and abroad. The workers union has also ensured that all staff grievances and issues are attended to by the Board and management.

NWSC Customer Stakeholders

Customers are the single most important stakeholder we as a service providers have. It is for this reason that we adopted the slogan, the Customer is King and the Reason We Exist. We revere our customer opinions. Customer opinions are carried out through regular customer surveys conducted through use of a questionnaire, customer Bazaars, Opinion boxes at all offices. Furthermore, the NWSC has improved customer services through; set up of a Call centre, simplification of payments through e-banking and use of mobile money, and provision of information to customers through SMS messages. In the past years, the NWSC implemented the Raving Fans Concept aimed at delivering plus one services. In the year 2012, in commemoration of its 40 years anniversary, customer weeks were held in all areas as a re-assurance and recommitment by the Corporation to serve its customers better, and to give back to the society for being diligent and cooperative customers.



Tariff Interface with Customers

In order to ensure customer satisfaction and willingness to pay for services, the NWSC has over the years carried out a number of reviews aimed at ensuring good customer relations. These have included the review of the connection and re-connection fees, elimination of minimum charges and the implementation of a new connection policy in 2004 in which the Corporation provided connection materials and labour for all customers within a distance of 50 metres from the NWSC service mains. This policy was enthusiastically welcomed by the customers, stakeholders and the general public. As a result, the NWSC experienced a great surge in customers' requests for new water connections. This has in turn increased our billing remarkably. The only challenge is that the marginal benefits from the new connections are decreasing due to the connection of smaller customers. However, this still meets the mandate of the Corporation of ensuring increased coverage. The NWSC Tariff also has an inbuilt cross subsidy with the poorer paying less, and the smaller areas benefitting subsidies from the larger towns.

Customer Stakeholder: Assessment through Surveys

Over the years, the NWSC services have greatly im-

proved which has been attested to by the number of accolades received. Much as complimentary testimonies of individual customers have been received, the NWSC continues gauging customer satisfaction through periodic customer surveys. This is mainly due to the changing dynamics of water supply. The main objectives of these surveys includes determining overall customer satisfaction with NWSC services and identifying customer-perceived areas of strength that needed to be enhanced and consolidated, as well as areas of weakness that need to be addressed to improve services on a continuous and sustainable basis.

Conclusion

In conclusion therefore, management of stakeholders is an important facet that can yield positive results. There is however need to balance stakeholder expectations in order to achieve a good outcome mix. From the NWSC perspective, a number of steps have been taken to ensure effective stakeholder satisfaction. However, we cannot bury our heads in the sand and assume all is well, because we still have a long way to go in achieving this end. It should however be noted that good stakeholder management is a necessary but not sufficient condition to ensure efficiency in service delivery as an organization or utility should ensure that other attendant conditions for efficiency are fulfilled ■

Water Supply and Sanitation Services for the Urban Poor: Kampala Water Experience

by Gerald Ahabwe



NWSC has been involved in the implementation of numerous initiatives targeting the urban poor and therefore possesses good institutional experience of successes and constraints within its ranks.

In 2006 the Corporation established a branch in Kampala Water dedicated to ensuring that pro-poor activities are planned for and implemented within the Kampala Water operational framework. However, of late there are increased cases of social dislocation resulting from the high rate of urbanization which has seen a boom in the number of urban poor in Kampala. Serving such a segment poses numerous challenges especially since their settlements are un planned and often lacking in legal recognition.

The mandate of the branch is to put in place infrastructure to provide services to the informal settlements. In doing this, emphasis is put on demand creation through community sensitization and stakeholder collaboration to ensure service ownership for sustainability. We also work with stakeholders to identify urban poor communities as well as put in place management frameworks suitable for the facilities therein.

The prepaid meters which the urban pro-poor branch has been installing have turned around the water supply situation in informal settlements. Before the branch was established, whereas NWSC already installed a social tariff for water at public water pipes (US\$ 1,236 per m³) in the tariff structure, the urban poor were unable to benefit from this special consideration due to the fact that these stand pipes are operated by private persons, who always apply an exorbitant fee for vending water.

The Corporation hitherto had no means to control the price for which operators were selling water to customers.



By installation of prepaid metered stand pipes, operator services are no longer necessary and the urban poor populace now enjoys the NWSC social tariff. The urban poor in Kampala are now able to consume five times more while maintaining the same amount of expenses they previously spent on clean and safe water (a 20 litre jerrican which a vendor sells at US\$ 200 now goes for US\$ 25 at prepaid meter points).

The reduced costs for water allow customers to consume more water reaching at least a consumption rate of 20 litres per capita per day. Whereas this is still below the internationally recommended standard of water user per capita, nonetheless, this is a big step in the right direction.

Along the provision of prepaid metering system, the urban poor branch has in the same regard promoted appropriate-technologies through the construction of demonstration low-cost sanitation facilities which have helped to improve the sanitation situation and on some

occasions initiated the construction of new facilities by the target group itself.

The success registered in urban poor has attracted many benchmarking visits from across the region and this has further enabled experience sharing and learning. Now, stakeholder collaboration has been greatly enhanced and more development partners are coming on board to support the initiatives. This is not to mention the reduction of incidence of water-borne diseases especially cholera which is longer a menace in the informal settlements because of the improved access to NWSC services.

Serving the urban poor is no longer a choice. For us at NWSC, who continue to aspire to be the leading water utility in the world, serving the poor - who constitute a substantial segment of our customers - is a must and I am highly privileged to be part of the team that ably is steering this initiative. ■

**WHAT
DO YOU
THINK**



To comment on this article, please email up to 500 words to the Editorial Panel at: editorial@nwsc.co.ug. A selection of comments received will be published in the next issue of the magazine. The Water Herald relies entirely on contributions sent in by NWSC staff, customers and other stakeholders. Articles should be 1000-2500 words long, with adequate illustrations and references. Please contact the chief editor for further information.



How is NWSC Coping with Water Resource Challenges?

by Allan Kaford

Since its establishment, NWSC has been in operation for over 40 years and during this time, it has continuously invested in water resources, treatment works, and reservoirs to meet the growing demands in urban centres across the country. More than half of the treatment plants in the urban centres in which NWSC operates were built in the early 1940s during the colonial period which means they have been operating for over 50 years.

With the increasing rate of urbanisation, housing growth, population growth and service coverage in these towns, the demand for water has grown, far outstripping water supply in most towns. This water supply – demand deficit coupled with the effects of climate change that manifest in the form of extreme weather conditions such as prolonged dry seasons, limited rainfall, floods and rise in temperature, are beginning to have an impact on the existing water resources and ageing infrastructure in terms of quality and quantity.

As a Company entrusted with the responsibility of ensuring water security in urban centres, NWSC has set up plans to cope with future challenges and continue to provide her customers with safe, secure and affordable water supply in the future. Innovations and improvements in system design, installation capacity upgrades and operational flexibility will be required as climate change brings volatility in both weather and demand for water.

With the support of Government and Development Partners, NWSC is undertaking feasibility studies in most urban centres across the country to develop new water infrastructure to provide sustainable water supply for the next 30 to 40 years horizon. In the short term, NWSC is looking to alternative water sources such as ground water exploration by drilling production wells to provide additional water supply in the affected towns and peri-urban environs.

NWSC is also undertaking strategies aimed at restoring the balance between demand and water supply to ensure affordable, secure and sustainable water supply in the future by taking measures to improve catchment management thereby preventing loss or damage to sources from pollution and improving urban water management with a focus on reduction in water losses through leakage control, improved pressure management and metering efficiency. Another threat to NWSC water installations that is worth noting is the occurrence of floods. A case in point is when floods washed away the intake works in Soroti in 2011.

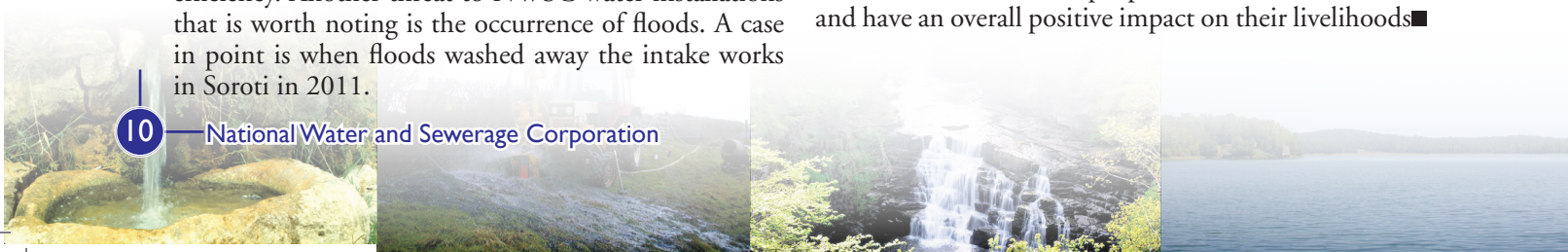
A similar incident occurred in Kasese recently when landslides washed away the intake works and the pipeline. The treatment works in Masindi usually get submerged when heavy rains occur. So NWSC has had to provide for flood protection at the water installations where the risk of floods is high. In order to better understand the catchments and develop better solutions to water resource challenges, NWSC will need to start monitoring trends, simulating and modelling of river flows, rainfall patterns, ground water levels and other relevant data to provide a solid basis for future interventions and preventive measures.

In the quest for more solutions to these water resource challenges and benchmark practises, the Internal Water Association (IWA) will this year bring together water

As a Company entrusted with the responsibility of ensuring water security in urban centres, NWSC has set up plans to cope with future challenges and continue to provide her customers with safe, secure and affordable water supply in the future.

professionals from across continents at its 3rd IWA Development Congress and Exhibition slated for 14th–17th October 2013 in Nairobi, as it seeks to “foster a broader understanding of urban water management that considers catchment wide interactions between stakeholders”. NWSC is participating in the event as it joins other utilities to identify, showcase and debate practical experiences that have been successful in developing countries.

One of the presentations by NWSC is on the development of floodplain maps for land-use management of Bwaise III. In this presentation the authors will discuss floodplain management and evaluate the alternative solutions to mitigate flood damages in lowland areas like Bwaise, in Kampala City with a focus on the use of non-structural measures as opposed to strictly structural approaches in controlling floods. These approaches if adopted would address problems of frequent flood damages to urban dwellers in flood prone areas, improve the health and sanitation of people in informal settlements and have an overall positive impact on their livelihoods■



Potential for Energy Production from BSTP Sludge

by Irene Nansubuga, Noble Banadda, Willy Verstraete, Korneel Rabaey and Mohammed Babu

Introduction

Energy production from wastewater is not common in most developing countries when compared to the developed world. More often, waste streams are considered a waste than a resource; and are usually improperly disposed. As such, many organic rich wastes like brewery sludge and cow dung find their way into the environment. To a small extent, cow dung has found application in agriculture but a considerable amount becomes a burden especially to the meat industry. In Uganda, there is no known reported use of brewery waste, instead it remains a challenge to the brewery industry. As a consequence of ignoring these valuable wastes, the water quality in particular has been compromised and this has led to high costs in water treatment. Furthermore, energy demand in developing countries is on increase and this has resulted into destruction of catchments exerting more pressure on water quality.

A study has been conducted at Bugolobi Sewage Treatment Plant (BSTP) with the aim of (i) determining the potential of energy production from the mentioned wastes when mixed with sewage sludge, and (ii) abating pollution. The Bugolobi sewage treatment plant (BSTP) located in Kampala is the largest conventional sewage treatment plant in Uganda. It was designed to treat 33,000 m³ per day but receives an average flow of 12,000 m³ per day. The resulting sludge from conventional treatment is left to stabilize in semi open anaerobic digesters and later on passed to drying beds, where it dries before being sold to farmers as manure. However, the public health implication of this activity is not fully known. Additionally, it is strongly believed that the semi open anaerobic digesters releases biogas (including methane) to the atmosphere which is known to be a greenhouse gas.

At a short distance away from the BSTP is located an abattoir owned by meat packers, which is known to produce vast amounts of animal dung. The solid matter from the abattoir is indiscriminately disposed on land and through run off, the matter finds its way into the lake. Additionally, most of the wastewater from the abattoir is released into the Nakivubo channel finding its way to Inner Murchison Bay (IMB) of Lake Victoria. The bay is heavily polluted and certainly the contribution of the abattoir cannot be underestimated.

East African Breweries (EABL) is located at Luzira a few hundred meters from the shores of Lake Victoria. Like the abattoir, it is located a few kilometres away from BSTP. The brewery is estimated to generate about 10 m³ of brewery sludge. Initially the brewery sludge was

disposed at the Bugolobi STP but has since 2010 been rejected, hence UEBL had to find alternative costly disposal methods.

Given the amount of wastes produced and close proximity of the brewery and the abattoir to BSTP, the potential of co-digestion of the three waste types to produce biogas for energy production makes much sense. It is upon this background that different proportions of the three wastes have been tested for biogas production. Also, NWSC is proposing to construct a new sewage treatment plant at Bugolobi but the potential biogas production using only sewage sludge is not known. These studies may provide an insight into biogas production potential for optimization and correct projections of energy production for the new plant.

Methodology

The experiments were conducted at the BSTP laboratory under anaerobic conditions at mesophilic temperatures of 36±1°C (Figure 1) using glass bottles



Figure 1: Glass anaerobic digesters inside an incubator

Primary STP sludge, cow dung and brewery sludge collected from BSTP, meat packer's abattoir and EABL
National Water and Sewerage Corporation



Inverted Plastic cylinders in which biogas was collected.

respectively were mixed in different proportions as shown below and digested for over two months.

- S0: 100 % STP sludge,
- S1: 75 % STP sludge and 25 % cow dung,
- S2: 50 % STP sludge and 50 % cow dung,
- S3: 75 % STP sludge and 25 % brewery waste,
- S4: 50 % STP sludge and 50 % brewery waste,
- S5: 50 % STP sludge, 25 % cow dung and 25 % brewery waste and

The biogas produced in the anaerobic reactors was trapped in plastic transparent measuring cylinders and volumes produced daily were measured to determine production rates. Biogas composition was determined using a gas analyzer (Model GC 2000 PLUS) at the College of Engineering, Design, Art, and Technology Makerere University.

Key Results

Biogas Production Rate (biogas produced on a daily basis per L reactor) Table 1: shows the biogas production rate and the composition of the biogas for each combination. The results

Table 1. Mean biogas production rate and the methane content for the different waste combinations

Waste Combinations	Mean biogas production rate (L/L reactor. day)	Methane Content (%)
S0 (100 % STP sludge)	0.3	41
S1 (75 % STP sludge and 25 % CD)	0.4	45
S2 (50 % STP sludge and 50 % CD)	0.4	48
S3 (75 % STP sludge and 25 % BS)	1.2	64
S4 (50 % STP sludge and 50 % BS)	2.0	58
S5(50 % STP sludge, 25 % CD and 25 % BS)	1.3	52

show that when STP sludge was digested alone, low biogas production rate was observed, indicating that it is not easily biodegradable. The reason for the poor digestibility has not been established in this study, but it is highly suspected to be caused by heavy metal or other toxic element contamination, which may result from illegal industrial waste discharge into the sewer system. To confirm the suspicions, further investigations are required, in that respect, a suitable laboratory is being sought for further test.

Research to Practice

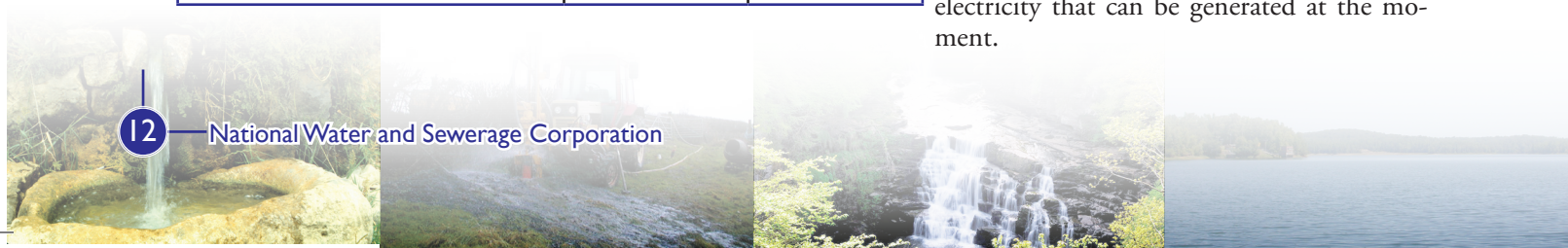
Co-digestion with brewery waste to increase energy generation

Table 2. Electricity and heat energy potetial of different options

Option	STP:BW: CW ratio	Digester Volume (m ³ /day)	Biogas production rate (m ³ /day)	Electricity (KWh)	Heat energy (KWh)
A	100:0:0	800	280	560	1680
B	75:25:0	1060	1272	2544	7620
C	50:50:0	1600	3200	6400	19,200
D	50:25:25	1600	2080	4160	12,480

Addition of cow dung alone to STP sludge did not yield better results. However, when it was mixed with brewery waste, the biogas production was improved by a factor ≥ 3 . The proportion of 50 % sludge: 50 % breweries waste (S4) had the highest biogas production rates of up 2.0 L/L reactor per day, this was followed by S5 and S3, respectively.

Other causes of methane inhibition like total ammonium nitrogen (TAN) and pH were not a problem in all digesters as they were within the levels required for a stable anaerobic digestion. TAN was much lower than 3000 – 4000 mg TAN/L which is known to cause inhibition (Chen et al., 2008) while pH ranged between 6.5 to 7.5 a range known to be optimal (Parkin and Owen, 1986). However, the reactor with S4 required occasional pH correction with use of a buffer solution. Co-digestion to increase biogas production has been applied and has been found to be feasible in a number of developed countries. Likewise, this can be done in Uganda and would benefit NWSC by meeting some of its energy demands. Table 2 shows the calculations for up scaling, the possible daily biogas production and an equivalent amount of electricity that can be generated at the moment.



The tank volume is calculated based on complete digestion of STP sludge produced at the plant at a SRT of 20 days.

Energy is calculated based on a rule of thumb of 0.5 m³ biogas 1 KWh electricity + 3 KWh heat energy, in a combined heat and power module.

Generally, the results show that NWSC can benefit from the increased energy generation. The annual electricity production estimated from option A (as is now) is 204,400 KWh per year, which meets 89 % of estimated annual electricity requirement of 230,000 kWh for the current plant of minimal mechanization. If option D is considered, the power productions would increase by a factor of about 7. Considering the new plant whose sludge volume is anticipated to be 10 times higher and energy requirement estimated at 4,599,000 KWh per year (Draft inception report 2010), option A would provide 2,044,000 KWh which would meet half of the requirement to run the plant. On the other hand, option D would increase the energy to 14,308,000 KWh per year. This is expected to fully cater for the energy needs of the more mechanized plant, as well as provide surplus electricity (over 9,000,000 KWh), which can be sold off to the national grid hence generating extra income for NWSC.

Option C would give the highest energy output with a factor of 11 more energy relative to the energy generated when using only STP sludge. However at the moment, at a daily of 10 m³/day, the brewery waste would not be sufficient. Possibly brewery waste can be transported from elsewhere to meet this demand but costs must be considered.

Pilot studies to enhance biogas and methane production

There is need to construct a pilot anaerobic digester for projecting laboratory results to reality. A

digester of smaller capacity should be constructed and operated to provide information on operational challenges and possibility of optimization. Additionally, the effects of the inhibition of co-digestion by toxic substances need to be studied further.

Conclusions

The studies have indicated that BSTP sludge is poorly degradable with low biogas production, but there is potential for increased energy production through co-digestion of wastes. Also, a proper management strategy to minimise industrial waste discharge into the sewer network, is important. All this would enable NWSC to meet the energy aspect of the operational costs of running the new plant. Additionally, treatment of the different waste streams is critical in protecting Lake Victoria which is the raw water source for Kampala City.

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Areas Performance SCORE CARD, JANUARY – JUNE 2013

WATER HERALD
Learn from your peers

Volume 4, Issue 2, July–September 2013

by Carolyne Nyangweso and Beat Nabacwa

AREA	Jan 2013 Performance				Feb 2013 Performance				March 2013 Performance			
	NRW	WR	COM	Incentive Earned ('000' US\$)	NRW	WR	COM	Incentive Earned ('000' US\$)	NRW	WR	COM	Incentive Earned ('000' US\$)
Kampala	Actual 39.2 %	56.7 %	4,094,177	196,937	36.1 %	49.9 %	4,419,756	189,423	38.6 %	56.4 %	3,977,744	232,156
	Target 36.0 %	56.8 %	4,501,579	984,375	36.0 %	56.8 %	4,501,579	984,375	36.0 %	56.8 %	4,501,579	984,375
Jinja	Actual 38.0 %	49.7 %	421,340	11,436	36.0 %	50.4 %	390,021	9,894	36.0 %	50.6 %	404,471	9,954
	Target 28.0 %	46.0 %	555,600	116,906	28.0 %	46.0 %	555,600	116,906	28.0 %	46.0 %	555,600	116,906
Entebbe	Actual 18.0 %	41.4 %	259,183	0	19.0 %	49.7 %	269,770	6,527	19.0 %	48.3 %	295,880	7,202
	Target 14.0 %	47.0 %	509,926	106,420	14.0 %	47.0 %	509,926	106,420	14.0 %	47.0 %	509,926	106,420
Mbale	Actual 11.0 %	76.7 %	67,838	0	11.0 %	76.1 %	71,130	0	11.0 %	75.6 %	76,605	0
	Target 9.0 %	65.0 %	134,693	89,758	9.0 %	65.0 %	134,693	89,758	9.0 %	65.0 %	134,693	89,758
Mbarara	Actual 15.2 %	53.4 %	196,626	7,672	12.8 %	54.0 %	185,704	8,279	14.8 %	54.0 %	182,355	8,423
	Target 9.6 %	49.9 %	366,722	44,926	9.6 %	49.9 %	366,722	44,926	9.6 %	49.9 %	366,722	44,926
Masaka	Actual 33.0 %	80.2 %	48,433	0	33.0 %	80.2 %	52,619	0	34.0 %	81.9 %	50,413	0
	Target 28.0 %	72.0 %	90,621	43,127	28.0 %	72.0 %	90,621	43,127	28.0 %	72.0 %	90,621	43,127
Tororo	Actual 10.4 %	113.1 %	-19,589	992	10.3 %	110.1 %	-15,439	1,028	10.0 %	110.2 %	-15,009	999
	Target 8.0 %	85.0 %	43,701	50,639	8.0 %	85.0 %	43,701	50,639	8.0 %	85.0 %	43,701	50,639
Soroti	Actual 16.7 %	70.3 %	39,723	4,937	16.5 %	72.1 %	39,586	6,383	15.9 %	76.8 %	33,170	6,125
	Target 10.0 %	76.0 %	57,768	42,634	10.0 %	76.0 %	57,768	42,634	10.0 %	76.0 %	57,768	42,634
Arua	Actual 17.9 %	90.3 %	3,944	1,108	17.6 %	87.8 %	7,614	1,376	19.1 %	86.4 %	13,349	1,627
	Target 13.0 %	77.0 %	22,302	21,731	13.0 %	77.0 %	22,302	21,731	13.0 %	77.0 %	31,863	21,823
Gulu	Actual 23.5 %	66.7 %	58,960	1,097	22.9 %	64.2 %	54,759	1,703	22.9 %	65.5 %	55,354	1,551
	Target 15.0 %	57.0 %	109,605	42,955	15.0 %	57.0 %	109,605	42,955	15.0 %	57.0 %	109,605	42,955
Bushenyi	Actual 15.0 %	96.0 %	6,198	3,307	15.0 %	114.1 %	-5,769	478	15.0 %	112.6 %	-5,025	929
	Target 15.0 %	91.0 %	10,774	17,826	15.0 %	91.0 %	10,774	17,826	15.0 %	91.0 %	10,774	17,826
Kabale	Actual 11.2 %	80.8 %	14,096	0	11.9 %	80.5 %	15,246	0	12.7 %	81.3 %	16,402	368
	Target 8.0 %	71.0 %	40,057	29,025	8.0 %	71.0 %	40,057	29,025	8.0 %	71.0 %	40,057	29,025
Lira	Actual 11.0 %	76.7 %	44,843	0	11.0 %	75.7 %	48,576	0	11.1 %	73.2 %	57,606	1,462
	Target 10.0 %	61.0 %	111,499	43,391	10.0 %	61.0 %	111,499	43,391	10.0 %	61.0 %	111,499	43,391
Fort Portal	Actual 29.0 %	80.1 %	39,006	1,156	15.0 %	77.7 %	33,221	1,312	18.0 %	77.2 %	36,898	1,582
	Target 15.0 %	64.0 %	65,864	30,415	15.0 %	64.0 %	65,864	30,415	15.0 %	64.0 %	65,864	30,415
Kasese	Actual 29.0 %	59.1 %	45,052	0	13.0 %	57.6 %	43,114	0	28.0 %	58.2 %	51,072	406
	Target 15.0 %	48.0 %	85,864	10,614	15.0 %	48.0 %	85,864	10,614	15.0 %	48.0 %	85,864	10,614
Hoima	Actual 23.1 %	140.5 %	-22,245	718	24.6 %	137.5 %	-20,500	931	25.3 %	137.8 %	-20,350	965
	Target 12.0 %	114.0 %	-6,545	37,480	12.0 %	114.0 %	-6,545	37,480	12.0 %	114.0 %	-6,545	37,480
Lugazi	Actual 24.7 %	135.9 %	-13,351	0	25.8 %	137.1 %	-13,601	0	26.6 %	142.5 %	-16,734	0
	Target 14.7 %	98.0 %	5,093	22,773	14.7 %	98.0 %	5,093	22,773	14.7 %	98.0 %	5,093	22,773
Masindi	Actual 13.6 %	97.6 %	-19,670	1,107	13.6 %	95.4 %	-18,923	1,342	13.3 %	97.0 %	-15,063	2,219
	Target 11.0 %	90.0 %	11,671	65,551	11.0 %	90.0 %	11,671	65,551	11.0 %	90.0 %	11,671	65,551
Mubende	Actual 8.9 %	114.6 %	-18,699	0	8.8 %	113.7 %	-18,763	0	8.7 %	111.2 %	-12,442	986
	Target 8.0 %	94.0 %	3,534	42,783	8.0 %	94.0 %	3,534	42,783	8.0 %	94.0 %	3,534	42,783
Iganga	Actual 24.9 %	59.3 %	30,638	0	23.8 %	57.8 %	31,607	0	24.0 %	56.8 %	34,001	705
	Target 19.0 %	46.0 %	53,786	15,380	19.0 %	46.0 %	53,786	15,380	19.0 %	46.0 %	53,786	15,380

NRW – Non-revenue water, WR – Working Ratio, COM – Cash Operating Margin, US\$ – Uganda Shillings

Performance in a particular month represents the cumulative average performance from July 2012 to that particular month.

Area	April 2013 Performance					May 2013 Performance					June 2013 Performance				
	NRW	WR	COM ('000 US\$)	Incentive Earned ('000' US\$)		NRW	WR	COM ('000' US\$)	Incentive Earned ('000' US\$)		NRW	WR	COM ('000' US\$)	Incentive Earned ('000' US\$)	
Kampala	Actual	33.5 %	56.1 %	3,985,292	239,850	35 %	57 %	3,928,244	221,388		37.8 %	57.9 %	3,825,971	199,130	
	Target	36 %	56.8 %	4,501,579	984,375	36 %	56.8 %	4,501,579	984,375		36 %	56.8 %	4,501,579	984,375	
Jinja	Actual	36.3 %	50.7 %	411,734	9,991	36.5 %	51.1 %	400,862	10,826		36.6 %	52.5 %	414,385	10,748	
	Target	28 %	46 %	555,600	116,906	28 %	46 %	555,600	116,906		28 %	46 %	555,600	116,906	
Entebbe	Actual	22.2 %	48.3 %	312,959	7,853	22.6 %	48.8 %	318,017	8,687		22.5 %	48.2 %	377,142	11,626	
	Target	14.0 %	47 %	509,926	106,420	14.0 %	47 %	509,926	106,420		14.0 %	47 %	509,926	106,420	
Mbale	Actual	10.6 %	75.1 %	74,400	0	10.7 %	74.8 %	75,229	0		10.5 %	76.1 %	91,188	0	
	Target	9.0 %	65 %	134,693	89,758	9.0 %	65 %	134,693	89,758		9.0 %	65 %	134,693	89,758	
Mbarara	Actual	13 %	54 %	168,299	7,379	12.9 %	54.3 %	172,906	7,494		12.8 %	54.4 %	188,957	7,681	
	Target	9.6 %	49.9 %	366,722	44,926	9.6 %	49.9 %	366,722	44,926		9.6 %	49.9 %	366,722	44,926	
Masaka	Actual	34.1 %	81.5 %	49,911	0	34.3 %	82.6 %	47,652	0		34.2 %	81.5 %	51,736	0	
	Target	28.0 %	72 %	90,621	43,127	28.0 %	72 %	90,621	43,127		28.0 %	72 %	90,621	43,127	
Tororo	Actual	10.1 %	110.2 %	-16,752	987	10.1 %	111.3 %	-17,546	846		10 %	114.7 %	-20,465	829	
	Target	8.0 %	85 %	43,701	50,639	8.0 %	85 %	43,701	50,639		8.0 %	85 %	43,701	50,639	
Soroti	Actual	15.3 %	80 %	28,581	5,373	15.4 %	79.8 %	31,325	5,829		15.4 %	83.6 %	24,807	4,654	
	Target	10.0 %	76 %	57,768	42,634	10.0 %	76 %	57,768	42,634		10.0 %	76 %	57,768	42,634	
Arua	Actual	19.4 %	85.9 %	16,316	2,645	20 %	85.3 %	14,930	1,798		21.2 %	89.6 %	11,856	1,347	
	Target	13.0 %	77 %	22,302	21,731	13.0 %	77 %	22,302	21,731		13.0 %	77 %	31,863	21,823	
Gulu	Actual	23 %	65.3 %	52,542	1,468	23.4 %	64.8 %	50,769	1,473		23.5 %	66.8 %	50,251	1,482	
	Target	15.0 %	57 %	109,605	42,955	15.0 %	57 %	109,605	42,955		15.0 %	57 %	109,605	42,955	
Bushenyi	Actual	15 %	111 %	-3,813	814	15 %	111.6 %	-3,302	826		15 %	108.2 %	-736	1,364	
	Target	15.0 %	91 %	10,774	17,826	15.0 %	91 %	10,774	17,826		15.0 %	91 %	10,774	17,826	
Kabale	Actual	13 %	80.9 %	16,648	430	13.3 %	81.5 %	17,005	386		13.4 %	82.5 %	17,687	359	
	Target	8.0 %	71 %	40,057	29,025	8.0 %	71 %	40,057	29,025		8.0 %	71 %	40,057	29,025	
Lira	Actual	11 %	73.5 %	59,601	1,446	11 %	75 %	58,568	1,796		11.2 %	74.4 %	60,044	1,665	
	Target	10.0 %	61 %	111,499	43,391	10.0 %	61 %	111,499	43,391		10.0 %	61 %	111,499	43,391	
Fort Portal	Actual	27.2 %	78.4 %	33,653	1,459	26.8 %	78.9 %	33,388	1,208		26.1 %	79.7 %	54,523	5,324	
	Target	15.0 %	64 %	65,864	30,415	15.0 %	64 %	65,864	30,415		15.0 %	64 %	65,864	30,415	
Kasese	Actual	22.1 %	56.5 %	51,646	517	22.1 %	56.8 %	50,520	512		21.9 %	55.9 %	51,577	510	
	Target	15.0 %	48 %	85,864	10,614	15.0 %	48 %	85,864	10,614		15.0 %	48 %	85,864	10,614	
Hoima	Actual	27.2 %	137.1 %	-19,825	1,045	27.8 %	134.9 %	-18,267	1,219		28.8 %	135.8 %	-19,282	1,151	
	Target	12.0 %	114 %	-6,545	37,480	12.0 %	114 %	-6,545	37,480		12.0 %	114 %	-6,545	37,480	
Lugazi	Actual	26.5 %	140.1 %	-17,187	0	26.8 %	139.5 %	-16,601	0		26 %	136.4 %	-14,393	0	
	Target	14.7 %	98 %	5,093	22,773	14.7 %	98 %	5,093	22,773		14.7 %	98 %	5,093	22,773	
Masindi	Actual	13.1 %	96.4 %	-15,429	2,220	13.3 %	97.4 %	-14,796	2,236		13.4 %	96.9 %	-9,352	3,189	
	Target	11.0 %	90 %	11,671	65,551	11.0 %	90 %	11,671	65,551		11.0 %	90 %	11,671	65,551	
Mubende	Actual	8.6 %	111.7 %	-10,150	1,538	8.6 %	111.3 %	-10,018	1,116		8.6 %	109.8 %	-3,321	3,423	
	Target	8.0 %	94 %	3,534	42,783	8.0 %	94 %	3,534	42,783		8.0 %	94 %	3,534	42,783	
Iganga	Actual	23.1 %	57.4 %	33,221	599	22.8 %	57.3 %	33,720	696		22.5 %	62 %	30,251	0	
	Target	19.0 %	46 %	53,786	15,380	19.0 %	46 %	53,786	15,380		19.0 %	46 %	53,786	15,380	
NRW – Non-revenue water, WR – Working Ratio, COM – Cash Operating Margin, US\$ – Uganda Shillings															
Performance in a particular month represents the cumulative average performance from July 2012 to that particular month.															

JANUARY 2013 PERFORMANCE

Non–revenue Water (NRW):	The January 2013 performance indicates that the only Bushenyi Area achieved its NRW target. All other areas fell short of their targets.
Working Ratio (WR)	All areas were unable to achieve their Working ratio targets except for Kampala, Entebbe and Soroti.
Cash Operating Margin (COM):	With regard to cash operating margin, all areas were unable to achieve their cash operating margin targets.
Incentives Earned:	The Areas that earned incentives in the month of January 2013 are Kampala, Jinja, Mbarara, Tororo, Soroti, Arua, Gulu, Bushenyi, Fortportal, Hoima and Masindi. Kampala earned US\$ 197 million, Jinja earned US\$ 11 million and Mbarara earned US\$ 7 million. Other areas did not earn incentive because they failed to achieve their minimum standards for cash operating margin (COM).

FEBRUARY 2013 PERFORMANCE

Non–revenue Water (NRW):	During the month of February 2013, most of the Areas did not meet their NRW targets except Fort portal, Kasese and Bushenyi.
Cash Operating Margin (COM):	Kampala and Soroti were the only areas that managed to achieve their working ratio targets during the month of February 2013. All other Areas failed to achieve their targets during the month.
Incentives Earned	All Areas failed to achieve their COM target in the month of February 2013 and this was majorly due to increased Energy costs.

MARCH 2013 PERFORMANCE

Non–revenue Water (NRW):	The other areas that managed to earn incentives during the month of February 2013 except Mbale, Masaka, Kabale, Lira, Kasese, Lugazi, Mubende and Iganga.
Cash Operating Margin (COM):	The performance for March 2013 indicates that only Bushenyi achieved its NRW target. All other Areas fell short of their targets. All Areas fell short of their targets and this was mainly attributed to escalated input costs.
Incentives Earned:	All areas were unable to achieve their Working ratio targets except for Kampala, Entebbe and Soroti.

APRIL 2013 PERFORMANCE

Non–revenue Water (NRW):	The April 2013 performance indicates that only Two Areas achieved NRW targets. These were Kampala and Bushenyi. All of the other areas fell short of their targets.
Working Ratio (WR):	All areas were unable to achieve their working ratio targets, except for Kampala.
Cash Operating Margin (COM):	With regard to cash operating margin, all areas were unable to achieve their cash operating margin targets.
Incentives Earned	The Areas that didn't earned incentives in the month of April 2013 were Mbale, Masaka and Lugazi. This was because they failed to achieve their minimum standards for COM. Kampala earned US\$ 239 million, Jinja earned US\$ 9 million, Entebbe earned US\$ 8 million, while Mbarara earned US\$ 7 million.



Areas Performance Score Card, April 2013 – June 2013 – Continued

GENERAL COMMENTS

Non–revenue Water (NRW):	The other areas that managed to earn incentives during the month of February 2013 except Mbale, Masaka, Kabale, Lira, Kasese, Lugazi, Mubende and Iganga.
Working Ratio (WR):	The performance for March 2013 indicates that only Bushenyi achieved its NRW target. All other Areas fell short of their targets.
Cash Operating Margin (COM):	All Areas failed to achieve their COM target in the month of May 2013 and this was majorly due to increased Expenditure.
Incentives Earned:	The areas that did not earn incentives during the month of May 2013 were Mbale, Masaka and Lugazi.

MAY 2013 PERFORMANCE

Non–revenue Water (NRW):	During the month of May 2013, most of the Areas did not meet their NRW targets except Kampala and Bushenyi.
Working Ratio (WR):	All Areas failed to achieve their targets during the month.
Cash Operating Margin (COM):	All Areas failed to achieve their COM target in the month of May 2013 and this was majorly due to increased Expenditure.
Incentives Earned:	The areas that did not earn incentives during the month of May 2013 were Mbale, Masaka and Lugazi.

JUNE 2013 PERFORMANCE

Non–revenue Water (NRW):	The performance for June 2013 indicates that only Bushenyi achieved its NRW targets. All other Areas fell short of their targets.
Working Ratio (WR):	All Areas failed to achieve their targets during this month.
Cash Operating Margin (COM):	All Areas fell short of their targets and this was due to reconciliation of all the expenditures for FY 2012–2013 which tends to increase expenditure for Areas that don't post all the expenses in time into the iScala system.
Incentives Earned:	Mbale, Masaka, Lugazi and Iganga were the only areas that did not earn incentives for the month of June.

GENERAL COMMENTS

Non–revenue Water (NRW):	Only Bushenyi Area managed to achieve its NRW target throughout the period. Kampala only achieved its targets twice i.e. in April and May 2013.
Working Ratio (WR):	Most of the Areas recorded a decline in their working Ratio over the period due to increased operating costs. Only one Area was able to achieve its target for the four months i.e. January – April 2013 and this was Kampala.
Cash Operating Margin (COM):	Most of the Areas registered an improvement in COM over the period attributed to an increase in collections. However more effort should be put in reducing Arrears, improving collection efficiency and minimising expenditure.
Incentives Earned:	Areas have progressively earned incentives over the period except Lugazi, Masaka and Mbale which did not earn any incentive due to failure to achieve Minimum Standards for some performance indicators particularly COM. For the period January – June 2013, a total of US\$ 1.55 billion was transferred to Areas as incentives ■

Using Local Stateholder Knowledge to Assess Health Risks and Inform Sanitation Safety Planning

by Jonathan Parkinson, Philippa Ross and Luiza C Campos

This article describes a methodology that uses local stakeholder knowledge as part of a participatory and rapid risk assessment methodology that assesses the risks in the sanitation chain in order to prioritise interventions for local governments to reduce these risks. The Participatory Rapid Sanitation System Risk Assessment (PRSSRA) methodology has been developed by the International Water Association (IWA) and partners of a research project funded by the European Water Initiative ERA-NET (SPLASH) entitled “Sustainable and resilient sanitation service chains in Maputo province – action research and piloting for the benefit of the urban poor”. The project partners involved in the research in Maputo are Class-A, established as a platform for multi-stakeholder partnership and a learning alliance, University College London who are leading on the development of the risk assessment methodology and W-Smart who are focussing on wider application of the application of methodology.

Existing context

Sanitation related diseases are widely prevalent (endemic) in cities of sub-Saharan Africa particularly in poor communities and in informal settlements where infrastructure provision is poor. Sanitation provisions act as a primary barrier against diseases transmission. But, at the same time bad sanitation can increase even more the transmission routes. The interrelated physical, environmental and social factors mean that solving sanitation-related health problems remains challenging and sanitation interventions can be too much focussed on one particular dimension of the problem. This can lead to poorly designed programmatic interventions and decisions about investment that may not achieve the maximum health outcomes and overall benefit to society. (See Figures 1 and 2)

As in many cities in sub-Saharan Africa, there is limited information about the current sanitary situation in different areas. Information on type and quality of facilities and infrastructure can be collected by household surveys, questionnaires or a mixture of both, but these are time and resource consuming and are therefore not considered practical for application at a city scale. Consequently, this results in a situation where there is an abundance of data from those communities that are the focus of

detailed research projects, but there remains virtually no data from the other areas of the city.

The methodology is based on the premise that an improved understanding of risks associated with sanitation can help to target interventions and develop strategies to reduce risks where sanitation systems are most precarious and local residents are most at risk. A participatory approach towards situational analysis gives communities the opportunity to identify where community members are most at risk and to identify parts of the sanitation chain to which high risk can be attributed. The other benefit of the participatory approach towards data collection is that provides a direct feedback loop towards a diagnostic of the current situation and derivation of solutions to these problems. This approach can then be used as the basis for discussing risk reduction interventions with the responsible authorities and development organisations.

At the same time, staff working for municipalities, utilities and other providers of sanitation services hold a wealth of knowledge about the systems that they operate that can be used to help understand system performance and resultant hazardous events caused by system failure. Involving these experts in a systematic risk assessment process which is essentially based on their knowledge can be an effective means to avoid more detailed data collection.

Risk assessment framework and risk indicators

The purpose of a sanitation system is to contain excreta (the hazardous material) and to avoid exposure by local residents. However, sanitation systems are frequently inadequate in performing this function resulting in hazardous events which may result in exposure of the population to the hazard (faeces). Figure 3 illustrates how the disease exposure pathways are affected by the type of sanitation system and how the resultant morbidity is also dependent on the vulnerability of individuals to combat disease. The risk assessment is based on the assumption that in situations where excreta are not safely contained, local residents are at risk of exposure to faecal matter containing pathogens, which may lead to illness and further propagation of disease. (See Figure 3)

What is clear from an inspection of this diagram is that there are three main elements that manifest to result in



escalation of hazardous events related to the transmission of diarrheal disease:

- i) The coverage and quality of the sanitation systems,
- ii) The factors that exacerbate exposure through transmission routes for faecal contamination and,
- iii) The vulnerability of populations to disease.

These are discussed in more detail below.

Components of the risk framework

- 1) **Sanitation systems:** The primary element of risk is posed by the hazards related to excreta (mainly contained in faeces) that harbour different types of pathogen and resulting in disease in the local population. Although the most important sources of hazards are household facilities/communal latrines and infrastructure for excreta and wastewater management, solid waste is widely considered to be part of sanitation and is part of municipal environmental health services.
- 2) **Exacerbating factors:** The incidence of and exposure to hazardous events are often exacerbated by additional factors and circumstances that, although not directly related to sanitation systems, impact upon these systems resulting in an increased frequency, intensity, and/or duration of exposure to hazards. The

following risk indicators are considered to be of primary importance: i) availability of water for maintaining hygienic conditions ii) flooding which causes dispersion of hazards iii) hygiene behaviours (particularly hand washing) iv) flooring in housing which can increase disease transmission when not lined v) groundwater levels vi) domestic livestock and vii) wastewater reuse.

- 3) **Vulnerability:** The third element of the risk framework refers to vulnerability or susceptibility to disease. This takes into account aspects related to exposure (i.e. some social groups within communities are more prone to exposure to others due to their types of activity) and their physical resistance to disease. Taking into account both of these factors, it is clear that children are highly vulnerable. Other factors include nutrition, access to health care and weight for age, which can be attributed to socio-economic status or poverty level (Rheingans et al. 2012): “Estimating inequities in sanitation-related disease burden and estimating the potential impacts of pro-poor targeting.” The number of children per household and type of house are considered to be suitable risk indicators.



Figure 1. Poor sanitation facilities are a common cause of health risk due to proximity to communities



Figure 2. Contaminated drainage channels are widely used as a source of water



This risk framework is used as the basis for identification and quantification of sanitation risks in relation to:

- i) Community level hazard assessment in areas which are recognised to be poorly served; and
- ii) Municipal hazards which are defined as those that occur as a result of human waste once it has been removed from the immediate locality of deposition in the neighbourhood or treatment and disposal or reuse elsewhere.

In both situations, the principles of risk assessment methodology are described below :

- Participatory – to engage with stakeholders at different levels
- Simple – to ensure that stakeholders understand the process
- Holistic – to take into account the full sanitation service delivery chain
- Resource efficient - to be independent on expensive equipment or specialist expertise
- Rapid – to be applied at city-scale

Community level assessment

The community level assessment focuses on those areas where sanitation conditions are already recognised to be poor. The area is divided into smaller areas (neighbourhoods) and the risk in each of these areas is assessed separately. Workshops are conducted with 20–25 participants from different parts of the area with a mix of genders and age groups. Participants are asked to assess the level of risk in different parts of the area using the risk framework and a defined set of indicators. For example, for desludging services, households that manually empty latrines and waste are dumped in the area or latrines that are never emptied are considered to be high risk. Each group is given ten counters which they proportion to indicate which types of toilet are predominant in their area. Each indicator is scored based on a simple traffic light system:

- Score 1 Green indicating low level of risk
- Score 2 Orange indicating medium level of risk
- Score 3 Red indicating high level of risk

Municipal system assessment

Municipal hazards are related to the waste collection or treatment and disposal/reuse systems and risk is calculated according to the principal hazardous events that occur in each sanitation chain not according to geographical area. Risk is estimated using ranked responses of level of exposure, vulnerability and hazard intensity, summing the risk factors can allow the comparison of risks arising from different chains and different stages of the waste management process.

A sanitary survey is applied for each hazardous event to assess the condition of the sanitation system responsible for the event and the presence of exacerbating factors that could increase the likelihood of a system malfunction. The assessment involves engagement with technicians such as municipal engineers, private service providers who are responsible for operations and maintenance of sanitation infrastructure but also included less educated stakeholders such as local farmers. This serves as a diagnostic to clarify the causes of particular hazardous event and indicate appropriate interventions.

Sites of most severe sanitation risk are identified and visited, and indicators of system malfunction and lack of capacity (e.g. sewage overflow, polluted storm drains) are observed along with frequently observed health risks that can arise from these issues. The risks identified and the insufficiency of the sanitation infrastructure as a cause are then discussed, along with drivers in the community such as density of population and level of poverty, which can exacerbate the problems.

Application of the methodology

Figure 4 shows how sanitation system risk assessment is used to inform risk reduction strategies. Thus, the results from the risk assessment will be used as the basis for discussion about the roles and responsibilities between the community and different institutions for managing risk in different parts of the sanitation service delivery chain.

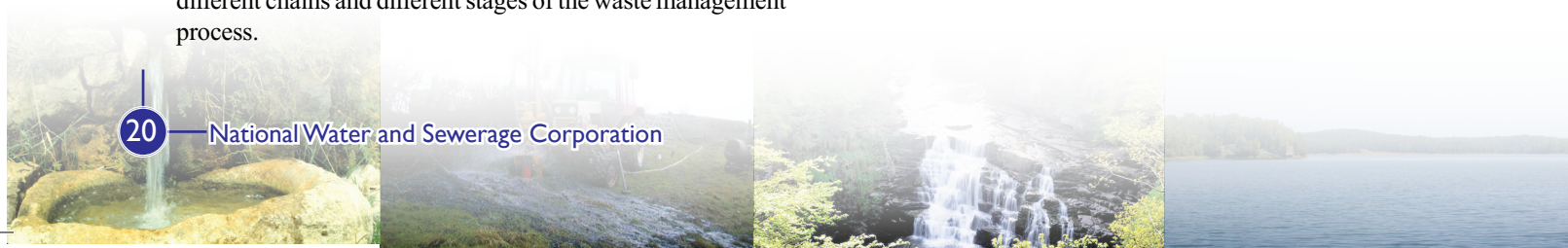
Who will use this knowledge?

- i) Local authorities – policy and planning/prioritization
- ii) Environmental health offices – regulatory function
- iii) Utilities/service providers – improved service provision

A mapping tool has been developed, based on the WaterAid's Sanitation Mapper tool, to map the spatial distribution of risks, which will be used to present the results from the research to institutional stakeholders at a municipal level workshop.

Application of risk assessment for Sanitation Safety Planning

- Emphasizes the public health dimension of sanitation
- Highlights vulnerable communities who are most at risk
- Provides a systematic and objective assessment of risk
- Builds on well-established and recognized risk assessment methodologies
- Can be applied as a means to improve existing systems as well as plan for new interventions



Benefits of risk assessment

The risk assessment described below provides an important contribution towards the development of a Sanitation Safety Planning methodology which being developed by the World Health Organization with support from various partner organisations including IWA. The three main processes: i) understanding the system, ii) identifying and prioritising risks and iii) ensuring appropriate control measures are in place to reduce risks to an acceptable level are integral to the approach similar to the more widely recognized Water Safety Planning (WSP) and the HACCP (Hazard Analysis and Critical Control Point) frameworks. Due to the multiple disease transmission routes that can be linked to sanitation and the greater variation in the types of systems that are employed, a more integrated approach is needed for a sanitation safety plan than for a water safety plan.

The case for integration is made stronger, as responsibility for sanitation is often unclear and split between multiple stakeholders. In fact, responsibility for different parts of the sanitation systems may lie with national or local government, the household, the municipality or the private sector and a sanitation safety assessment could provide a platform for integration across stakeholders and a tool to explicitly assign responsibility to different parties. The International Water Association is working with its members and partner organisations of the Urban Sanitation Initiative such as the WHO and the Water Supply and Sanitation Collaborative Council to further develop and apply the sanitation system risk assessment methodology as a means to support the development,

adoption and implementation of sanitation safety plans. In this regards, the IWA expressed its interest to work with the National Water and Sewerage Corporation to pilot the methodology in Uganda.

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For further information, contact Dr Jonathan Parkinson, Programme Manager of the Urban Sanitation Initiative based in IWA's London office (email: jonathan.parkinson@iwahq.org Telephone: + 44 20 300 48528) or visit the IWA internet site at <http://www.iwahq.org/3x/themes/urban-sanitation-initiative.html> ■

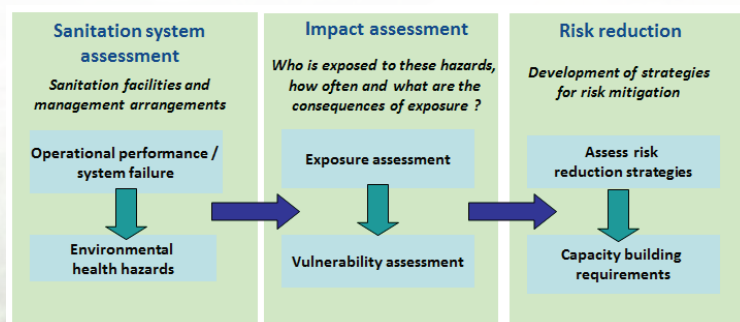


Figure 3. Disease transmission routes related to sanitation highlighting risk aspects related to i) hazardous events, ii) exacerbating factors and iii) vulnerability (adapted from Carr, 2001).

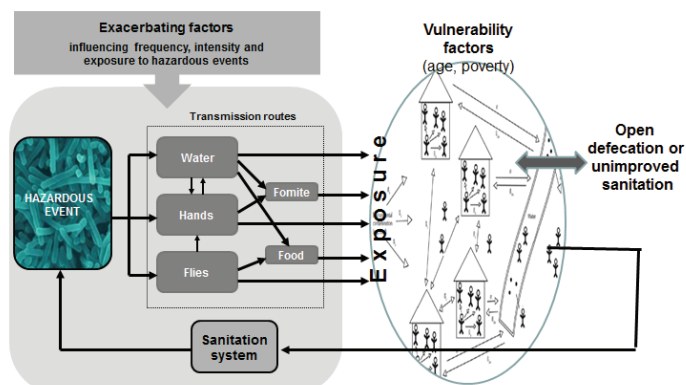


Figure 4. Sanitation system risk assessment as a means to inform risk reduction strategies.

Business Continuity Challenges: *Experiences of Flooding in Kasese Area*

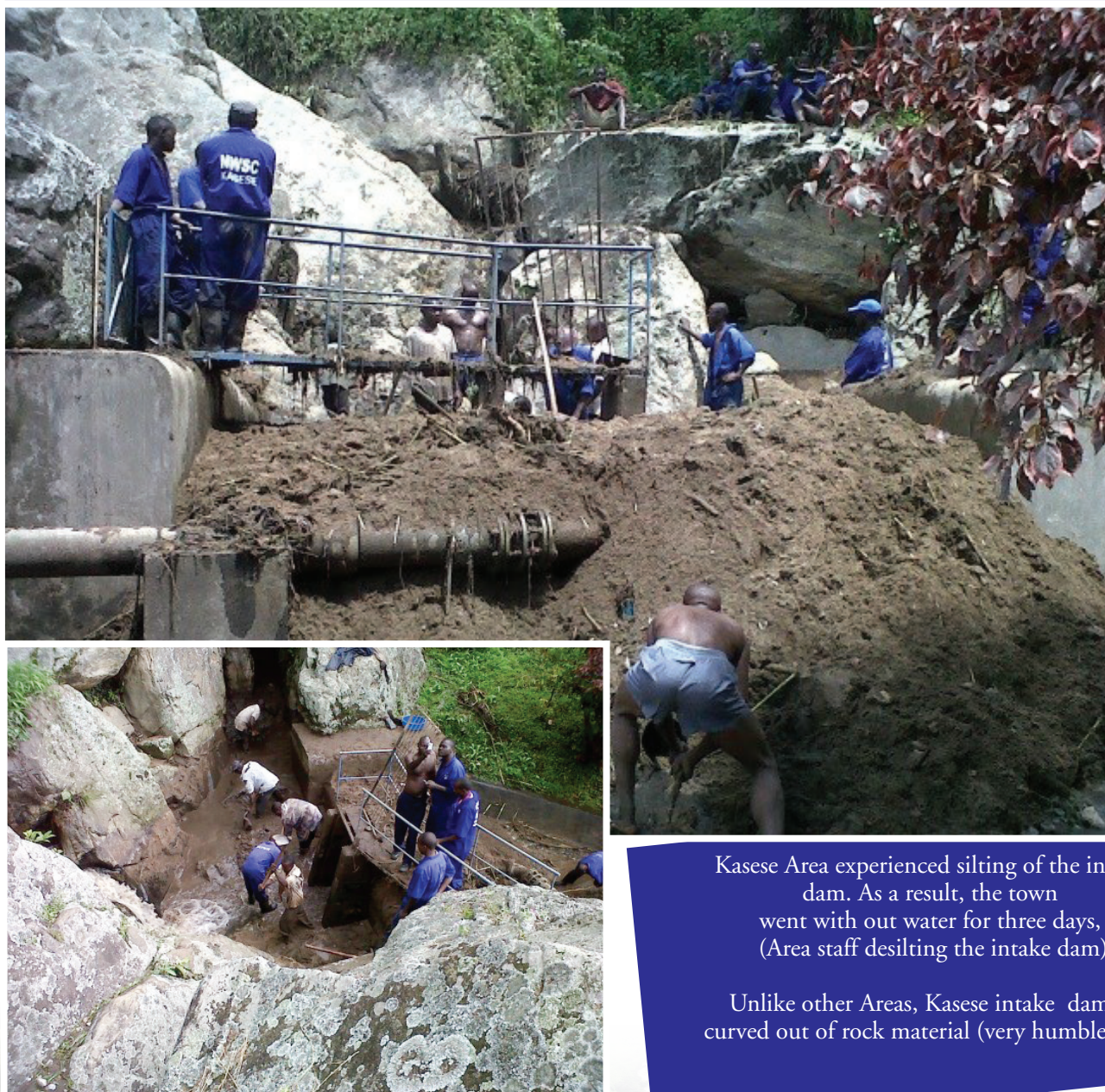
by Stanley Kamugisha

Kasese National water service area is found in Kasese Municipality. It has an area of about 78 km². It lies in the leeward side and at the foot hills of the Rwenzori Mountains. The town is very hot with average temperatures of over 30 degrees Centigrade for most parts of the year

Kasese Municipality has a population of about 74,300. The total number of water connections is about 5,022 with a water coverage of about 70 %. The Area treatment plant has a capacity of 72,000 m³ and current average water production per day is 2,100 m³

Kasese Area experienced one of the worst floods in history on 1st and 2nd May 2013. Rains started pouring on 1st May 2013 at around 10.00 am and continued for several days. Since then, things have never been the same for Kasese area and the neighbor hood.

As the saying goes, “when problems come, they come in battalions.” At the beginning of July 2013, unfounded rumors went throughout the country that NWSC Kasese water was “poisoned.” Customers shunned the service and went for several days without consuming water. This affected our revenue collections.



Kasese Area experienced silting of the intake dam. As a result, the town went without water for three days, (Area staff desilting the intake dam)

Unlike other Areas, Kasese intake dam is curved out of rock material (very humble one)



(Above) Kasese Area 6" transmission mains was exposed by flood waters. This made the pipeline a prey for scrap dealers. They descended on the line, cut three pieces of 22 meters and went away with them. Consequently, Kasese went for three days without water.

(Above Small) Vandalisation of power line supplying Kasese area water works. Kasese water works power transmission power line from Kilembe mines Ltd was also vandalized. Also, power transmission wires and transformers were stolen.

(Right) A Section of the vandalized transmission line, the only life line for Kasese area.



Kasese area has experienced many problems in the post-floods era. Declining billing and revenue collection have hit the area worst.

In spite of all these short comings the area has come up with plan B. Kasese has embarked on the regeneration and protection of River Ngangi Catchment wetland in the Rwenzori Mountains ranges to safeguard against future erosions and silting of the intake dam. Area team with Town Mayor and Local water committee members

recently visited the catchment area sensitized the natives and donated 500 tree seedlings to plant so as to protect the environment. (Area staff with Members of Local Water committee in River Ngangi Catchment Area)

When floods subsided in early June 2013, biting drought set in, which has led to dwindling of water flow thus greatly affecting our billing and revenue collection. Kasese Area now ranks the last in revenue collection evaluations, which has never happened■



Floods buried and carried away many water meters in Nyakasanga, Salute A and B, Nyamwamba and other parts along Fort Portal road. Consequently, water Meters thefts have also become rampant.



NWSC Kasese during the good days. Fulfilling one of the Areas' corporate responsibilities by painting Kasese town zebra crossings.



Area staff with Members of Local Water committee in River Ngangi catchment area



NWSC Kasese management team meeting Kangangeye team at the inauguration of Kanyangeya community water line before the floods washed away the place.

WHAT DO YOU THINK?

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Young Water Professionals (YWP) Commitment to the Water Sector

by Gilbert Akol and Betty Aliba

The Young Water Professionals (YWP) network is a regional network that was established to bring together young professionals engaged in the water sector, below the age of 35 years, with the aim of pooling youthful competencies so as to provide unified approaches towards addressing the challenges faced by the water sector in the region.

The idea of YWPs was borne in 2010, inspired by the 1st regional conference for the Southern Africa Young Water Professionals (SA-YWPs). During this conference, NWSC facilitated a small team of young professionals within its ranks, to benchmark what other youth in the continent are doing in to lend their relevance to the sector.

It is the output of this benchmarking visit to South Africa that led to the birth of the East Africa Young Water Professionals Association (EA-YWPA). The Association was registered in 2011, with NWSC as the host institution.

To date, it has spread in the region with national chapters for Uganda, Kenya, Tanzania and Rwanda already registered as part of the Eastern Africa Young Water professionals. At international level, the YWPs network operates under the auspices of the International Water Associa-

tion (IWA) and at continental level; it is under the Africa Water Association (AFWA).

The Uganda Chapter has established strong links with the Ministry of Water and Environment (MoWE), Kampala City Council (KCCA), NGOs working in the water sector like WaterAID, GIZ, Plan International, World Vision, and Association of Private Water Operators (APWO), among others.

Other participating institutions include: Makerere University, Uganda Industrial Research Institute, National Environment Management

During this conference, NWSC facilitated a small team of young professionals within its ranks, to benchmark what other youth in the continent are doing in to lend their relevance to the sector.

Authority, Kyambogo University and Ndejje University.

It is from these institutions and organisations that the network draws its membership and support from. Currently, NWSC hosts both the

EA-YWPA and the Uganda Chapter. It is this partnership that has seen NWSC implement a number of its programmes in collaboration with the YWPs, and other institutions.

Since January 2013, the EA-YWP has represented NWSC during the World Water Week activities that took place in Kampala and the World Environment Day celebrations in Fort Portal.

As part of its planned activities, the YWPs carried out a tree planting programme in Soroti and Mabarara in September 2013. This is in line with the NWSC objective of promoting integrated water resources management through protecting water catchment areas.

Additionally, the YWPs National Career Fair is slated for 4th October 2013, at the International Resource Center (NWSC-IREC) in Bugolobi.

As NWSC celebrates 40 years service delivery, the YWPs salute the board, management and staff for the cooperation and support rendered since its inception in 2011. We remain committed to driving the NWSC youth agenda, and propel the institution through dedicated and constructive engagement as YWPs. Alluta continua! ■

**WHAT
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YWPs Join the World to Celebrate: Water Week and Environment Day

by Gilbert Akol

Every year, during the period 18th–22nd March, the world draws her attention to the Water, Sanitation and Hygiene (WASH) sectors, as a means of focusing on the importance of fresh water, and advocating for the sustainable management of fresh water resources. An international day to celebrate fresh water was recommended at the 1992 United Nations Conference on Environment and Development (UNCED). The United Nations General Assembly responded by designating 22nd March 1993 as the first World Water Day.

In December 2010, the United Nations General Assembly declared 2013 as the United Nations International Year of water cooperation. In reflection of this declaration, the 2013 World Water Day, took place on 22nd March 2013 and was dedicated to water cooperation.

Water and sanitation go hand in hand in fighting against sanitation related diseases such as diarrhoea, dysentery, which are common challenges in developing cities such as Kampala. Poor sanitation is a growing source of public concern and cause of health problems in Kampala. Evidence of the impact of poor sanitation and hygiene on the population can be seen in the high incidence of sanitation related illnesses which are more prevalent in the urban poor communities. In Uganda, the national World Water Day celebrations were decentralised to the districts by the Ministry of Water and Environment. This meant that each and every district had its own celebrations.

In Kampala, NWSC joined KCCA and other development partners in week-long activities that were crowned with the World Water Day celebrations

at Mulago playground in Bwaise. The main objective was to raise awareness, both on the potential for increased cooperation in addressing water and sanitation challenges, and also highlight the challenges facing water management in light of the increased demand for water access, allocation and services.

Other participating organisations included those under the Uganda Water and Sanitation NGO Network (UWAS-NET), with specific involvement of Community Integrated Development Initiatives (CIDI), Water AID, AEE (Africa Evangelistic Enterprise), Association of Private Water Operators (APWO), UNICEF and World Vision.

NWSC was represented by the Uganda Chapter of the East African Young Water Professionals Network, which participated in the planning and implementation of the week long activities across the five divisions of Kampala (Central, Kawempe, Nakawa, Rubaga and Makindye).

Besides the active involvement of the YWP on behalf of NWSC, the organisation also sponsored and donated a number of items towards the world water week celebrations. These included cleaning materials (gloves, cleaning detergent, brushes and brooms) that were used throughout the week as well as publicity for the week long activities. The pictorials below tell a comprehensive story of the water and sanitation activities undertaken by YWPs during the week ■



Figure 1: Mr Gilbert Akol, the EA-YWPA Uganda Chapter Chairperson hands over cleaning materials to Mr Jude Byansi Zziwa the KCCA sanitation official at the launch of the World Water Week activities in Kansanga, while other NWSC YWPs look on.

Figure 2: The YWP take a photo with a group of pupils from Nateete Primary School who joined them in the clean-up exercise



Figure 3: The then Kitintale Branch Manager hands over cleaning materials from NWSC to the KCCA staff who joined the clean-up exercise in Nakawa division at the KCCA division offices in Nakawa, as other YWPs and NWSC staff look on.



Figure 4: Cesspool emptiers were also deployed by KCCA to empty the pit latrines at no cost during the week



Figure 5: The YWPs and KCCA staff clean up a solid waste dump in one of the divisions



Figure 6: A band leads NWSC staff and students march to the main celebrations at Mulago

NWSC Gets New Managing Director

On 27th August 2013, The NWSC Board of Directors nominated Dr Eng Silver Mugisha as the new NWSC MD. The function was officiated by Mrs Ruth Asiimwe Kanyaruru (Board Member). The Ag MD, Eng Alex Gisagara official handed over the instruments of duty in the NWSC-IREC Pacific Hall (see Pictorial).



NWSC Officially Launches the Gaba II Vocational Skills Development Facility (VSDF)

Date: Saturday, 1st June 2013,

Guest of Honour: Hon Dirk Niebel, Germany Minister for Economic Cooperation and Development



The Future – Fort Portal Area

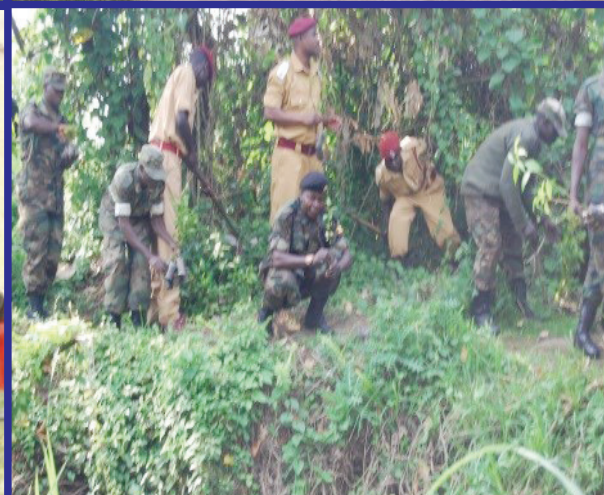
by Fort Portal Team

As a corporation, our future is dependent on the existence of the water sources and resources. This is the reason we should also direct our efforts on protecting such naturally occurring features – the water sources.

Celebrating the future is the most interesting activity everyone would like to be part. On 5th June 2013, we (FortPortal Area) were joined by other stakeholders like Uganda Peoples Defence Forces (UPDF), Uganda Prison Services, Fort Portal municipal council, Kabarole

district officials, local councils (1 and 3,)Schools, institutions of higher learning, the media and general public as we celebrated the future while planting trees on the World Environmental Day. The Senior Manager Operations, Mr Sonko Kiwanuka, who represented the Ag Manging Director, was the Chief Guest of Honour alongside Mr Akol Gilbert who represented the Young Water Professionals (YWPs).

Below is the event in pictures.



**WHAT
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OUT TO COMMUNITIES



Following a successful tree planting activity on June 5th 2013, the Area decided to go out into communities (area of our operations) to continue sensitising people about National Water, sanitation and environment.

On Friday 2nd August 2013, we went to Kahungabunyonyi Primary School in Fort Portal municipality after seeking permission from the school administrators to allow us talk to their pupils about NWSC, sanitation and environment.

We received a very warm welcome by the school in general and pupils were so excited to listen to us. They could not hide their excitement as they kept asking many questions with a lot of excitement. When we asked them if they would love to work with NWSC, almost all of them raised their hands. The pupils and

When we asked them about environmental management practices, we found almost all of them had a good knowledge about them and even some wanted us to visit their homes to see the trees they have planted which NWSC gave them.

the entire school received substantial information about NWSC and its products.

The pupils asked lots of questions ranging from water treatment process, how one can be connected, why

they should use water from NWSC, why does water sometimes appear dirty and what causes that?

When we asked them about environmental management practices, we found almost all of them had a good knowledge about them and even some wanted us to visit their homes to see the trees they have planted which NWSC gave them. They (pupils) promised to continue talking to their parents and guardians about good environmental practices and encourage them to join NWSC services since they had discovered it was easy and cheap to join.

We visited some of the trees that were planted near the school since its located near the water catchment area and we saw how pupils were maintaining these trees – what a wonderful work they are doing.

We closed by giving them an official invitation to tour our area so that they can learn more.

The Area is again going to Kahinju Secondary School in Fort Portal municipality on 16th August 2013 for similar talks ■



EXTERNAL SERVICES – BENCHMARKING VISITS

by Joseph Ndegeya

The External Services (ES) Department hosted many guests from different utilities in different countries. Their objectives varied from benchmarking and training, to research and field audits. In recent months the following delegations were hosted.

1. Sierra Leone Water Company (SALWACO): Five top managers benchmarking.
2. Liberia Water and Sewer Company: An engineer benchmarking on operational best practices.
3. Asmara University (Eritrea): A research student
4. Lodwar Water and Sanitation Company (Kenya)
5. Dhaka Water and Sewerage Authority (Bangladesh) Trade Union Leaders
6. Uttarakhand State Officials (India)
7. PROBE Workshop was organized by UNES-
CO–IHE was on Process Benchmarking. Participants were from different countries.

8. Makerere University Masters Students in Public Infrastructure Management.
9. Ministry of Local Government and Housing (Zambia) sent in three principal officers to benchmark in utility management.
10. Dutch Government Evaluators (The Netherlands)
11. Addis Ababa Water and Sewerage Authority members of the Board and Top Management came in to benchmark
12. South Sudan Urban Water Corporation sent in the Board and Top Managers. The delegation was led by the Minister of Water Resources and Irrigation
13. Nairobi City Water and Sewerage Co Limited (Kenya)
14. UN-Habitat Consultant Addis Ababa Water and Sewerage Authority



(Above left) The Addis Ababa Water and Sewerage Authority (AAWSA) delegation led by the City Manager at NWSC International Resource Centre (NWSC-IREC).

(Above right) Gilbert Akol (GIS Officer) making a presentation to the AAWSA delegation at the GIS, Survey and Mapping Offices of Kampala water.

(Below left) The AAWSA delegation at the Billing and ICT Offices of Kampala Water

(Below right) Dhaka Water and Sewerage Authority Union Leaders pose for photo with NWSC staff and UPEU representative (R) at IREC.



1) (Left Photo) Dhaka Water and Sewerage Authority (D-WASA, Bangladesh) Union Leaders. The Union Leader (Left) and Vice President led the delegation.

2) Eng Charles Odonga (Right Photo) was one of the key facilitators.

3) D-WASA Union Leaders attending a benchmarking session at the IREC

4) Eng James Kendor of Liberia Water and Sewer Company (L) and Kahsay Negusse of Aritrea University (C) toured the Gaba Water Treatment complex and workshops

5) James Kendor of Liberia Water and Sewer Company (L) and Kahsay Negusse of Aritrea University were shown the operations of Gaba water treatment plants

6) The NWSC Ag MD, Eng Alex Gisagara welcomed the Board and Management of LOWASCO

7) LOWASCO Board Chair Prof Thomas Ekuja (3rd Left) pose for photo with his team and Mr Joseph Ndegeya at IREC. The delegation included the Mayor, Managing Director, Technical Manager and Commercial Manager

8 & 9) The students of Masters in Public Infrastructure Management (Makerere University) at NWSC–IREC





1



2

1) The panel of NWSC facilitators welcomed the delegation.

[From 2] Nairobi City Water and Sewerage Company Ltd (NCWSC) started zoning the water supply system and sent two teams on 4th–5th and 8th–9th July 2013 to NWSC to benchmark on branches and decentralization.



3



4

3) NCWSC Managers led the teams

4) NCWSC Regional and Zonal Officers



5



6

5) NCWSC Officers who came during the 2nd benchmarking visit

6) NCWSC Managers at Entebbe Area Office



7



8

The PROBE Workshop
7 and 8) The Pro-poor Benchmarking (PROBE) workshop was facilitated by UNESCO-IHE of Netherlands and hosted by NWSC between 11th and 15th February 2013. The facilitator was training water utility managers from different parts of the world in services to the urban poor. PROBE workshop participants



9



10

9) PROBE participants at Jinja Area. They had presentations and toured slums in the town.

10) PROBE participants at one of the slums in Jinja town (Kikalamoja)

South Sudan (SS) Urban Water Corporation



10th–15th June 2013 South Sudan Urban Water Corporation was in Kampala from 10th–15th June 2013 on a benchmarking tour. The delegation was led by the Minister of Water Resources and Irrigation, who also doubles as the Board Chairman, Hon Paul Mayon Akec. The delegation first visited the Ministry of Water and Environment (MoWE) at Luzira, Kampala. They were received by Uganda's Minister of Water and Environment Prof Ephraim Ka-

muntu. The Ministers held bilateral talks centred on the trans-boundary natural resources that need to be jealously protected and equitably shared through regional organizations like Nile Basin Initiative, IGAD, among other issues. They also had presentations and open discussions on the management of the water sector in Uganda. The rest of the week, they spent in NWSC to study best practices in urban water management.



(1 and 2) Prof Ephraim Kamuntu (L) welcoming the South Sudan Minister Hon Paul Mayon Akec (R) to Uganda. The South Sudan Ambassador to Uganda HE Samuel Luat Lominsuk (L) was present. (Right) SSUWC delegation at the Ministry board room.

(3) Hon Prof Kamuntu (R) seeing off his guest at the Ministry headquarters, Luzira

(4) Prof Dr William Mu-hairwe (former MD, now consultant to SSUWC) also facilitated and attended the meeting. Looking on are the GM-Juba and MD SSUWC

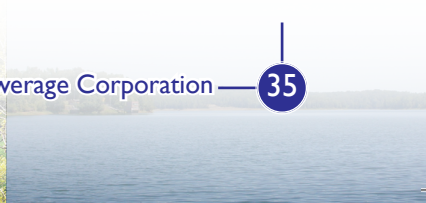
(5) The Ag Board Chair of NWSC Eng Chris Ebal (3rd L) Welcoming South Sudan delegation to NWSC. Present were NWSC MD's representative Alfred Okidi (L), SSUWC MD Joseph Chamjok (2nd L) and Ms Ziria NWSC Board member (R)

(6) The SS urban water corporation delegation listens to a series of presentations made by NWSC facilitators at IREC.

(7) Eng Mahmood Lutaaya (left, Manager, PM&E) makes a presentations to the delegation.

WHAT DO YOU THINK?

To comment on this article, please email up to 500 words to the Editorial Panel at: editorial@nWSC.co.ug. A selection of comments received will be published in the next issue of the magazine. The Water Herald relies entirely on contributions sent in by NWSC staff, customers and other stakeholders. Articles should be 1000-2500 words long, with adequate illustrations and references. Please contact the chief editor for further information.





(1) Hon Prof Ephraim Kamuntu (standing) addressing the gathering at Serena Hotel Kampala during a luncheon he hosted in honour of the South Sudan delegation led by his counterpart. Uganda's State Minister for Environment Hon Flavia Nabugere Munaaba (2nd R) attended

2) SS visitors made field trips to different NWSC business units including Gaba water treatment plants, workshops, stores and laboratories. Sonko SM-OPS (2nd L) guided them.



(3) Hon Akec (standing) addressing the people at the luncheon. He thanked his counrepart for the warm welcome and wonderful hospitality accorded to him and the delegation. He reiterated gratitude to the Uganda Government and Ugandans at large for the support given to South Sudan even during the hard times.

(4) US nationals from USAID visited NWSC to benchmark on water and sanitation services in informal settlements. L-R Dr. Rochelle Rainey (USAID), Tamika Allen (USAID), Mr John Baptist Otema (NWSC) and Dr Katy Beggs (USAID).



(5) Dutch Government evaluators came to NWSC to inspect the projects funded by their government through different agencies like DANIDA and UNESCO-IHE. They visited several places including the Pro-poor Branch in Kisenyi (Kampala). In the photo, J B Otema demonstrating the operations of the pre-paid meter

(6, 7 and 8) The three principal officers from Zambia listening to Mr. G Katongole (NWSC Principal Economist). They visited Kampala Capital City Authority to benchmark on Solid Waste Management



(9 and 10) Mr. Digby Davies was at NWSC from 29th to 31st July 2013 to check on activities of Global Water Operators Partnership (GWO-PA) undertaken by NWSC■



Management of Internal Stakeholders – Jinja Area

by Jinja Team

Jinja Area has over 100 staff (both contract and support). Managing such a big number of people comes with its own challenges but management of the Area has overcome any such challenges by ensuring involvement in a number of activities to ensure all staff are engaged and committed to performance.

The Area holds regular general staff meetings with staff i.e. at least once every month to ensure there is constant dialogue and communication with all staff. These meetings are used to update staff on performance and to address any challenges that the staff might be having in the execution of their work. Every staff is given a chance to communicate and this also boosts their confidence.

In addition, the Area management is in constant dialogue with the Union. This ensures there is constant harmony and it has helped the Area avoid any industrial unrest. All major decisions concerning staff are done with consultation with the Union. This ensures that all workers' interests are taken into consideration before implementation. In order to avoid unrest also, all staff claims are paid in time. Staff are given priority especially in matters where their monies are already with the Area e.g. if staff gratuity has been transferred to the Area, payment is done immediately.

The Area supports staff sports activities since they are viewed as part of team building. For example the Area participates in the Jinja Corporate league, every evening, staff are involved in aerobics as a form of physical fitness and the Area also holds inter Branch sports activities. Such sports activities bring the staff together and this boosts performance since staff look at each other as being one and aiming at a common cause. Jinja Area practises what is termed as 'open door policy'.

All offices especially the General Manager's office is accessible to everyone. Staff are free to access any of the Heads of section offices to express their requirements and needs. Protective wear like overalls, gumboots, gloves, masks is provided to staff timely and management ensures it is put to use especially by the Sewerage staff who sometimes want to do without any protective wear.

Jinja Area also engages on team building with other Areas for example of recent we have been having

team building and benchmarking with the Mbale Area. We also agreed with the Mbale team that it will be important for the Eastern Areas of Jinja, Iganga, Tororo, Mbale and Soroti to have one day of team building at the Jinja Area and this day will be characterised by sports activities and benchmarking.

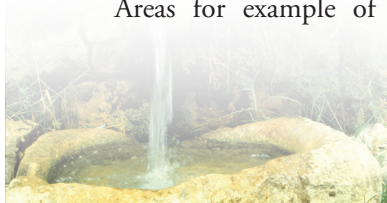
The Area also draws its strength on the Territorial management concept. Since 2009, we have consistently evaluated and awarded cash prizes on a monthly basis to the best three territories in the month and overall performing three territories for the year. The Area has three branches and each branch has four territories.

Where the territorial team performance is wanting, the team is summoned to meet the Partners and improvement performance strategies are charted out to improve the performance.

The Local Water User Committee is the other stakeholder we interface with on a quarterly basis. This committee has narrowed the gap between us and our customers. We have also been involved with the joint inspection of the industries discharging waste within the catchment. This team has registered a lot of successes. The Area has the Water Safety Plan Team and Non-Revenue Water teams. The Water Safety Plan team makes sure that the water delivered to the customers is safe and the Non-revenue Water team has the war on Non-Revenue Water activities.

The customers are very important stake holders we have as they always make us smile when they pay their bills in time. We have moved to having adequate water supply in the Area even to parts which were perceived as dry zones. Customer complaints are responded to in time, supply interruptions are communicated to the customers and revenue activities are carried out while having good customer care. This has made us to win our customers' will to pay their bills in time.

With all the above activities, Jinja Area has managed to excel since the stakeholders are given first priority. The staff do perform when they are managed well and they are regarded as the top resource and it is through them, that the other stakeholders are also managed and this has led to improvement in performance for Jinja Area ■



CHALLENGES OF STAKEHOLDER MANAGEMENT – IGANGA AREA

by Paul Isagara

A stakeholder can be described as a person, group or organization that has interest or concern in an organization. They can affect or be affected by the organization's actions, objectives and policies. Some examples of key stakeholders for NWSC are the employees, our customers, government (and its agencies) suppliers, creditors and the community from which the business draws its resources.

Stakeholder management therefore can be described as the process of forming, monitoring and maintaining constructive relationships with all stakeholders. This process is a delicate balancing act that often requires one to be patient, understanding, a good listener, sincere, friendly and supportive, a salesman, a counselor, and a motivator.

Internal Customers

While NWSC's customers are entitled to good quality service and the best customer care possible, I believe the company's employees should be given even more consideration as they are the grease that keep the wheels of our operations moving smoothly.

As Iganga area is still a relatively small area with only 16 staff, we are more or less like a family unit. The area management including the union has always emphasized the spirit of team work amongst staff and this has fostered a good working relationship with the staff in Iganga. For smooth operations, the area adopted the territorial management concept which was discussed thoroughly with all the staff prior to its implementation in order to ensure their buy in of the concept.

This has led to increased friendly competition between the staff, as they try to outdo each other for the monthly token prize given to the best two territories based on some key performance indicators like reduced suppressed accounts and collections achieved each month. All incentives earned by the area are shared equally amongst all the staff in order to promote fairness in all area operations and improve staff motivation.

In addition, Iganga area management has always held regular meetings with all staff to discuss any issues that maybe affecting their performance as well as update them on any new developments that may have come up in the organization.

Area management also encourages our staff to apply for and recommend them for higher, more challenging positions that become available in NWSC, if they have attained the necessary qualifications and have the skills. We are proud to have many NWSC Iganga area "alumni" working well in other areas having honed their skills right here.

External Customers

This has enabled us enhance the staff satisfaction as they know that if an opportunity arises anywhere in the organization which they are qualified for and interested in, area management will readily recommend them for it based on an honest appraisal of their abilities.

However, one of the main challenges facing our staff is the lack of trainings at area level and at IREC for the Marketing assistants and plumbers so as to improve their vocational skills. Training needs assessments are carried out but still no NWSC organized trainings for this category of staff have been undertaken as yet mainly due to inadequate budget allocations for this item. Any organization whose human resource doesn't keep learning and improving its skills will eventually collapse.

As the common slogan in NWSC goes "The customer is the reason we exist" and this is emphasized in all our area operations. Customers have been enlightened about the services we provide and our commitment to good service delivery to them. Based on the various customer satisfaction surveys that have been carried out recently, most of our customers are delighted with the quality of service that they receive from NWSC Iganga area (over 90% satisfaction level).

However, the area management can't rest on its laurels and is always trying to ensure that our service delivery improves. Through the operationalization of the NWSC Local Water Committees, we have been able to get direct feedback from a section of our external stakeholders about the quality of our services, what we are doing right or wrong, improved working relations with the municipal and district authorities but above all else free ambassadors for NWSC services to the rest of the community. The implementation of the customer appreciation week activities by NWSC in Iganga during the financial year 2012/13 was a resounding success with most of our esteemed customers highly appreciative



of the idea of the organization giving back to them based on the token gifts given to them as well as the corporate social responsibility activities undertaken in that week. The introduction of e-water payment system in Iganga area was readily embraced and appreciated by the customers and wider community. Its launch went off smoothly with the full support of the municipal authorities and area politicians.

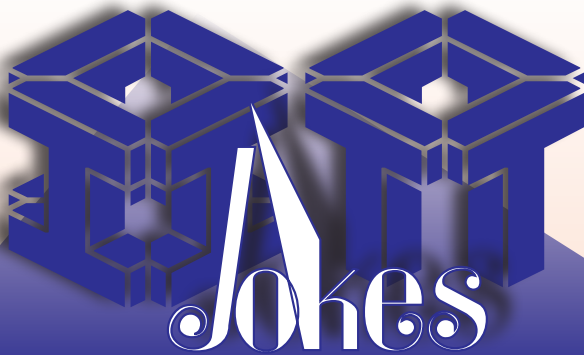
However, the area still faces a challenge of getting the customers to pay for all the water consumed within a given month. With the existence of several alternative water sources in the area like boreholes and shallow wells, many of our customers in Iganga area particularly within the town center, have yet to develop the habit of clearing all their current billing however small it is.

There are also the cases of water theft and illegal connections made by some of our customers which we have to deal with swiftly and fine them appropriately to deter others from developing similar habits.

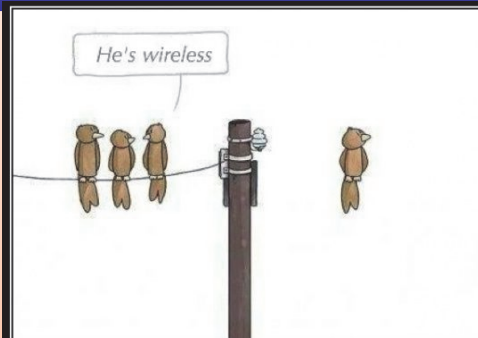
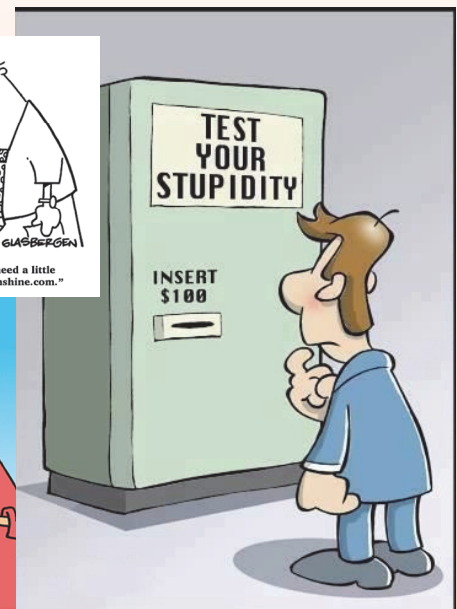
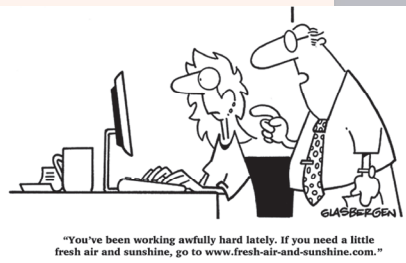
In addition, there is still a challenge of convincing the municipal and district authorities to adequately budget for provision of piped water extensions each year rather than the sinking of boreholes in communities as they have been used to, as this would complement the NWSC budgeted for extensions and increase water supply coverage in Iganga area faster.

Another challenge is that of managing expectations of both politicians and the general community who all expect water to be extended to their areas, wards or constituencies as quickly as possible, budgetary constraints notwithstanding.

In conclusion, NWSC Iganga area customers and stakeholders continue to support the Corporation relentlessly as it strives to fulfill its mandate of provision of customer centered water and sewerage service delivery in Iganga ■



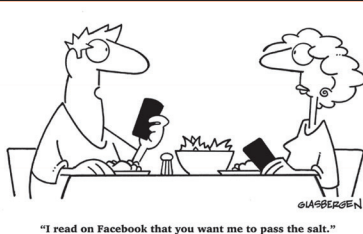
by Ronald Azairwe



Wireless



"The computer says I need to upgrade my brain to be compatible with the new software."



"Okay your father managed to get a mouse. Now how do we use it?"



LIFE BEFORE THE COMPUTER

- * Memory was something that you lost with age
- * An application was for employment
- * A program was a TV show
- * A cursor used profanity
- * A keyboard was a piano
- * A web was a spider's home
- * A virus was the flu
- * A CD was a bank account
- * A hard drive was a long trip on the road
- * A mouse pad was where a mouse lived
- * And if you had a 3 1/2 inch floppy ...you just hoped nobody found out

The Crowning of a Small King

by Mubende Team

The joy that came along with the news of Mubende Area being announced as the overall winner in just concluded evaluation, took the staff by surprise as their expectations was too minimal. They thought in a kraal where big bulls are, smaller ones always have to fold their tails and walk with their heads down as a gesture of respect.

Little did they know at one point, even big bulls become tired and hand over the baton. On the final day of evaluation, the good news was met with ululation in a small town, west of Kampala, being the overall best, the self-esteem in the Area has now changed, the urge for more success is the tune and language spoken around. The mood in the Area is as good as the spirit of winners.

Mubende Area staff cut the cake (pictured right). This is part of the team that managed to come as winners in the last evaluation.

The road to this is not what one might think Huddles had to be overcome: from persistent plant breakdowns, long spells of drought, that was threatening to dry up the dams. Despite all these challenges, Area staff exhibited tenacious team spirit that ensured efficient service delivery to our customers.

The staff had all it takes to be winners, having ranked 1st Runners Up during the July–December 2012

evaluation. They tasted the fruits in the last evaluation. One of the local leaders who addressed staff at the party held to celebrate Area good performance in last evaluation. Prior, the Area was second best overall in the previous evaluation, before triumphing as overall winners.

The good performance has been greatly attributed to good networking with local leaders, and the community at large. The Area has a good representation of the major stakeholders in the Local Water Committee a factor which has created a sense of belonging to the community.

The performance has also been attributed to the support rendered to area by Top Management and our colleagues from other areas. Most of the issues that require political will have been handled with easy as customers representatives are regularly updated on benefits of any development prior to implementation.

The Area is also enjoying a good working relationship with the politicians who are appreciating our services and have turned out to be our ambassadors whenever they meet their electorate.

In addition to this, Area Water Council is so responsive to any community issues that are brought to its attention the reason we have management to respond to customers queries promptly. Mubende area is blessed to

share the same compound with Town Council and as such most of the issues that require attention of Council are handled immediately. On this note we thank Council authorities for the support they have extended to the Area especially with issues to deal with encroachment on our premises.

The Area recognizes the enormous support from the Call Centre management which has always relayed issues raised by customers for immediate action. Despite the contributions and the relationship with the Stakeholders in the area, there are some challenges that still need to be addressed such as pri-

oritizing service location.

Whereas as NWSC, we could prefer demand driven service locations, most of these stake holders, especially politicians, push for isolated areas where affordability is questionable.

Other challenges include: (i) unreliable water sources affecting quality, (ii) increased human activity which is threatening catchment areas, and (iii) unreliable power supply.

All in all, there is great hope that some of these challenges will be sorted out in the near future as plans have been drawn to address them ■



Looming Global Hunger: *The Causal Factors and a Biblical Perspective*

by Dr Martin Kalibbala

It is now official. The global agricultural production cannot feed the seven billion people on our planet. According to a new report – disseminated on the BBC website and published by UN experts in the Food and Agriculture Organization (FAO) – global hunger is hitting epidemic levels and requires urgent redress.

The report proposes some bizarre remedial measures like the need to encourage people worldwide to start feeding on insects –

e.g. grasshoppers, caterpillars, dung beetles, wasps, among others – due to:

- (i) Their high nutritional value in protein, calcium, iron, etc; and
- (ii) Their quick reproductive rates, high growth rates, and low carbon footprints.

This they say, makes insects economically viable and easy to farm.

These experts further argue that since over two billion people are already adding insects to their diet, they could be a food supplement to malnourished children, and a positive step towards expeditiously tackling global hunger.

But what exactly are the causal factors that have fuelled global hunger, so as to force experts into proposing outrageous solutions? Is there any hope that this hunger crisis could be averted?

According to research, there are two causal factors, namely: (i) the looming global water shortage due to increasing demands, and (ii) the dramatic and mysterious die-off of honey bees which are responsible for cross pollinating 40 % of our food crops. What are the intricate details of how these factors are

fanning global hunger? Keep reading!

Firstly, the world is running out of clean portable water. Our global demand is doubling every 20 years. This is more than twice the rate of our population growth. Some 3.5 billion m³ of freshwater is available and accessible world over. This also includes a big chunk stored in groundwater aquifers and clouds. Today, humans are already using 54 % of the accessible freshwater. By 2035, the human share has been predicted to rise to 90 %. In 2009 alone, there was approximately 6,400 cubic metres of fresh water available per capita. Remember, water is a non-renewable resource. Is there any hope that the coming global water crisis can be averted?

At this point, approximately 40 % of the global populace has little or no access to clean water, with further projections that by 2025, 66 % of humanity will live in water-stressed areas. Also, the erratic and ever-dwindling rainfall patterns in these areas are not helping to avert the situation.

Many Ugandans are unaware of this looming global danger, because they assume that the Lake Victoria basin has more fresh water than anyone else does. Our region – the Congo basin inclusive – churns out about 5,000 million m³ of fresh water per year, yet other regions like North and Southern Africa are really water stressed.

As an expert with a PhD in water and environmental issues, I can categorically state that Ugandans are partly right, but not for very long. Because this un-concerned attitude and lack of long-term national

strategies towards our water resources might be recipe for disaster. Thank GOD ALMIGHTY for this seemingly “huge reservoir” of water at our disposal.


What strategies and laws are we planning as a country to jealously safe guard, and sustainable manage all our vast GOD-given water resources – which might become a future gold mine in the wake of the escalating global hunger crisis?

Without water, you cannot grow crops, raise livestock, neither can you support modern cities. As this global water crisis gets worse, it is going to affect every individual on the planet. Experts insinuate that some future national wars might spark off due to this looming global water crisis and hunger.

For instance, in Cape Town SA, washing your car with horse pipes – in your back yard – is a criminal offence, prosecutable in the courts of law. Infact, due to this water crisis in SA, they had hatched plans to purchase and/or import bulk water supply from one of the East African countries.

Are we ready as a country, to command this discourse, so that we benefit ahead of all the other EA riparian countries – but without violating existing international laws? Do we have trans-boundary laws in place to favour such export trade? These are some of the strategic debates which our MPs ought to command.

May GOD grant us HIS wisdom as a country, so that we strategically invest (or attract investors) in modern agricultural methods and agro-processing industry. In view of this looming global hunger crisis, there is great need to ensure that



every harvested agricultural product across the country is not wasted but cleverly processed. As a country, we need to plan and lay the solid foundation of being a formidable regional food basket. GOD ALMIGHTY has gifted Uganda with adequate natural water resources and fertile soils.

More on the looming global water crisis:

(i) The Aral Sea in Central Asia used to be the fourth largest freshwater lake on earth. At this point, it's less than 10 % the original size, and scientific models predict that by 2020, it will totally dry up, (ii) Water flow rates along the famous River Jordan are down to only 2 % of its historic rate, (iii) by the year 2030, projections depict that water demand for China will exceed supply by 25 %,

Also, (iv) Every 8 seconds, somewhere in the world a child dies from drinking dirty water, (v) the US uses 148 trillion gallons of fresh water per year, and this is not sustainable, (vi) According to a US government report, 36 states will be facing water shortages within the next few years, and (vii) It has been estimated that the state of California only has a 20 year supply of fresh water left.

Secondly, let's get to the second causal factor which is also a great contributor to the looming global hunger crisis. Lately, there has been massive mysterious die-off of honey bees on a global scale. Bees are responsible for cross pollinating 40 % of our food crops. The absence of bees implies that we shall have less food on our plates, thus sparking off rises in food prices.

Besides making honey, they pollinate more than 100 crops, namely: fruits and vegetables like apples, nuts, avocados, soybeans, asparagus, broccoli, citrus fruit, cranberries, among others. About one-third of our diet comes from bee-pollinated plants.

This disappearance is called colony collapse disorder (CCD). In the US

alone, researchers have identified some intertwined factors namely: pesticides, mobile phones, parasitic mite, viruses, bacteria, poor nutrition, genetics, and habitat loss. CCD has caused 34 % of America's bees to just disappear since 2006. As a consequence, the number of US bee colonies has decreased from 6 million in 1947 to just 2.5 million in this present day. About USD \$ 30 billion a year depends on their health.

CCD has also hit bee colonies in Europe, where regulators are considering a ban on some pesticides like neonicotinoids that environmentalists blame for the bee collapse. "Some of these chemicals harm the immune systems of bees or amplify viruses," said Penn State University bee expert, Diana Cox-Foster.

Additionally, our cell phones may be partly to blame for the decline of bee colonies worldwide. Researchers conducted experiments and inferred that tele-signals from phones and masts interfered with honey bee navigation systems, making them disoriented and failing to return to their hives. If this is true, then our handsets are adding more insult to injury.

In order to mitigate the honeybee crisis which is negatively affecting global agricultural production, scientists are now scrambling for a solution. As a result, for the last 12 years, researchers have worked like mad to develop new robotic bees, which could be used to pollinate crops – instead of honey bees.

The million dollar question – what does the bible say about this looming global hunger crisis? Will things get any better according to scripture? To try and summarily answer these two questions, I am tempted to invoke Revelation 6:5–6, "When HE [LORD JESUS CHRIST] opened the third seal; I heard the third living creature say, "Come and see." So I looked, and

behold, the apocalyptic black horse, and he who sat on it had a pair of scales in his hand. And I heard a voice in the midst of the four living creatures saying, "A quart of wheat for a denarius, and three quarts of barley for a denarius; and do not harm the oil and the wine."

Allow me to try and decode for you the meaning of this text. Basically it depicts what will happen in the end-time dispensation, prior to the return of our LORD JESUS. For those who know biblical apocalyptic vulgate and Jewish history, the phrase, "a quart of wheat for a denarius and three quarts of barley for a denarius" means that buying food will become so expensive that people will live from hand to mouth, with barely enough to put on the table for their loved ones, even after a hard day's labour.

Also, Matthew 24:7 declares, "In the last days (which we are living in now)...for nation will rise against

&The report proposes some bizarre remedial measures like the need to encourage people worldwide to start feeding on insects&

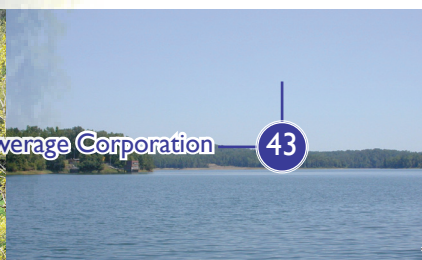
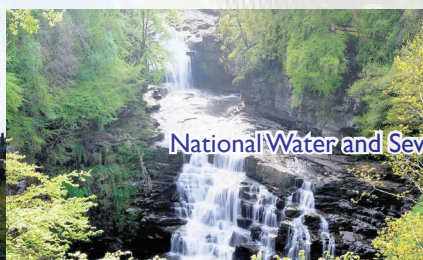
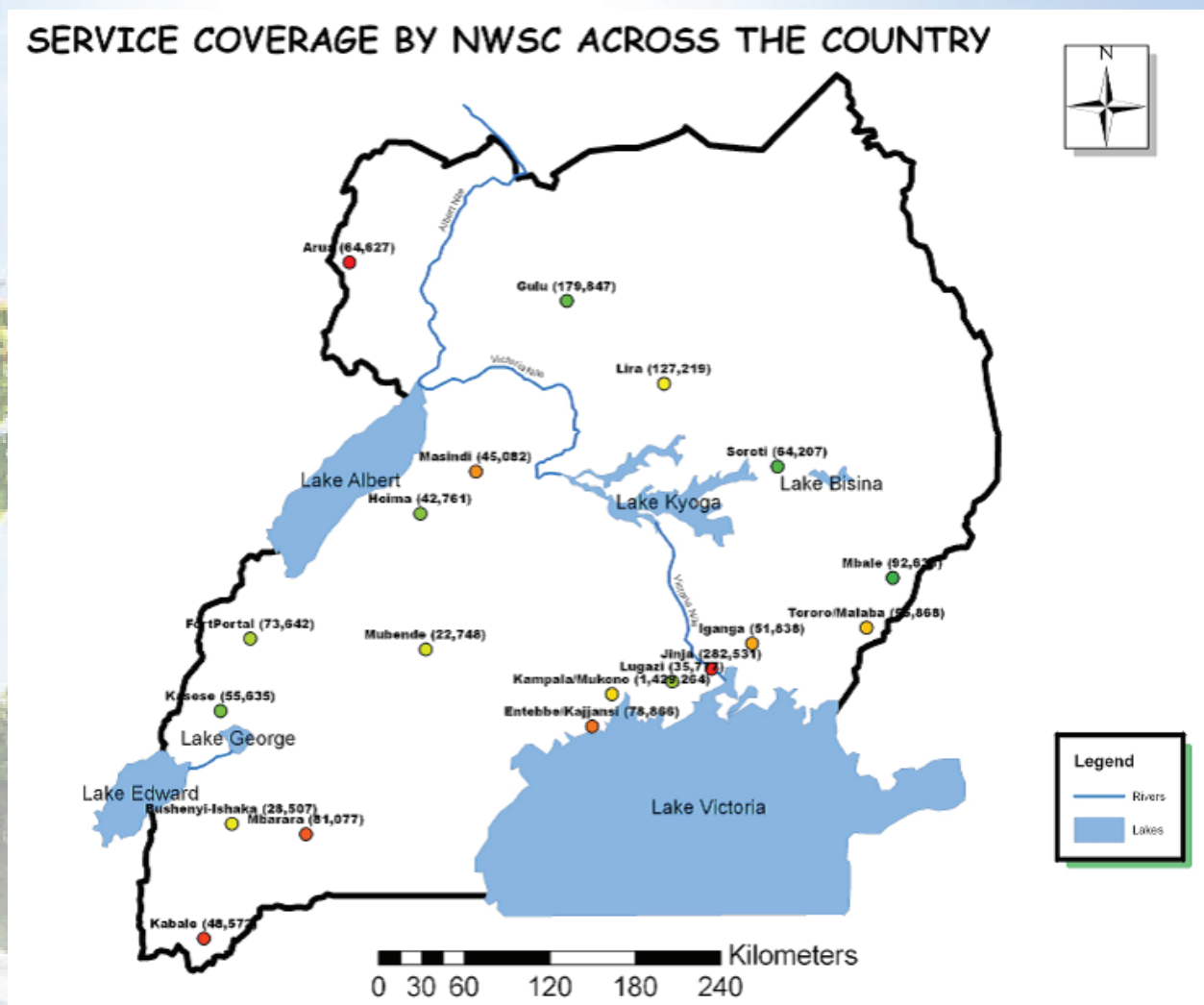
nation, and kingdom against kingdom. And there will be famines, pestilences, and earthquakes in various places." From a biblical point of view, this points to the fact that the global hunger crisis will grow from bad to worse. Why is this crisis envisaged to worsen, and is there no remedy?

In my humble view, there is no remedy if this impunitive, sinful, remorseless and un-repentant behaviour of men and women on earth does not change. Without genuine repentance (Acts 17:30–31, Isaiah 45:18, 22) – which begins with every individual – GOD will not relent, but stay the crisis (read judgement).

The LORD JESUS said, "he who has ears, let him hear (Matthew 11:15, Mark 4:9) ■"



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