



The Water Herald

Learn from your peers

Volume 3, Issue 2-3, April - September 2011



External Services (ES)
Pictorial [pp. 13]

**Did you
know?**

The facts about water [pp. 28]

Looking to the future:
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Challenges Facing the urban
water and sanitation sectors in
developing countries [pp. 9]

Water is Life
Sanitation is Health

'The Customer is the reason we exist'



Water is Life

Sanitation is Health

“The Customer is the reason we exist”

Managing Director's Message



Dr. William T. Muhairwe, MD-NWSC

Dear Readers,

I am quite contented that we have advanced thus far, and achieved a lot during the period April – September 2011. My appreciation goes to you all who continue to support us in many of the initiatives that we have undertaken.

Referring back to the theme of this issue of The Water Herald, we explore and try to understand what really works for developing countries in their quest to ensure adequate WATSAN services. In NWSC, a number of initiatives have been formulated that have worked for the period April–September. These among others are depicted below.

The launch and implementation of the New Economic Order (NEO). This concept is based on the economic principle of demand creating supply. The order seeks to move away from the adhoc and spontaneous way of supplying water to a more planned framework in which the basis or foundation for water supply (production) will be credible prediction of demand, from the commercial unit of analysis, which in this case is the territory. The underlying notion is to ensure optimisation of water and its accountability at all technical and operational levels.

The Corporation also launched and introduced the e-water payment solution whereby our cash offices were phased out to enable customers pay for water bills conveniently. Payments can be made through banks interfaced with NWSC, or use telecom companies services like mobile money and M-Sente. In addition, we launched the e-procurement system. Procurement processes are now easy and can be made online. This process reduces paperwork and bureaucratic procedures.

At management level, the Corporation has overseen the evolution of the Internally Delegated Area Management Contracts (IDAMCs) into the Performance, Autonomy and Creativity Enhancement (PACE) Contracts. Resounding achievements were registered under the IDAMC framework that have propelled the organisation to higher levels of service delivery in the region, and cannot be forgotten.

Last but not least, for any utility to have purpose in a community it must put its customers central to its business activities. In NWSC, this is a guiding principle in every venture we undertake hence the slogan "The customer is the reason we exist." I wish therefore to reiterate our commitment to serving our dear customers better, and urge you to support us in the forthcoming planned activities.

In conclusion, I wish to state that there are many other contributing factors to the success and good performance of utilities in developing countries as you will read in the contents of this issue.

I wish you all pleasant reading...

Editor's
Note

Dear Readers,

Worldwide, over a billion people lack access to safe drinking water and three billion lack basic sanitation. Managing and investing in water and sanitation infrastructure constitutes an urgent and major challenge. Just halving the proportion of people without access to drinking water (500 million) and sanitation by 2015 would require investments of about USD \$ 72 billion per year.

On the other hand, the good news is that investment in water and sanitation contributes to economic growth. For instance, each USD \$ 1 invested, the World Health Organization (WHO) estimates returns ranging from USD \$ 3 – USD \$ 34, depending on the region and technology. The overall economic loss in Africa alone, due to lack of proper water infrastructure planning is estimated at USD \$ 28.4 billion a year, or approximately 5 % of the average GDP. Global investments need to be at least doubled from the current level of USD \$ 80 billion a year, in order to strive towards meeting the water and sanitation Millennium Development Goals (MDGs). This calls for concerted efforts!

Given the un-equivocal supply and demand issues surrounding water in developing countries, it is imperative that we make some conscious decisions regarding the preservation of this indispensable resource. In doing so, it is important to be aware of some basic realities. Water is a precious resource in our environment. Growing populations and ongoing droughts are squeezing our water resources dry and the degradation of natural habitats. Individuals have no choice but to pay more attention to how we are using water, and how we may be wasting it.

We must bridge the gap between our understanding of how important water is to our survival and what we can do to ensure that we have an adequate supply of clean water for several years to come. Endeavour to do one simple thing each day to save water. There are many simple ways you can take action and conserve water.

Enjoy this issue...

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Looking to the Future – NWSC Rolls out PACE Contracts

by Seith Mugume

1 BACKGROUND

NWSC has successfully implemented various management reforms aimed at improving the operational and financial efficiency of the corporation. Management introduced the Internally Delegated Area Management Contract (IDAMC) in 2004 with the overall objective of clearly separating the asset management role from operations, strengthening private sector principles within NWSC, transferring substantial autonomy to the Areas and building managerial capacity in Areas by offering operating teams strong performance incentives to improve performance. The IDAMCs have since gone through three main phases i.e. IDAMC I, IDAMC II & IDAMC III. The IDAMCs that have been implemented in three phases with great success have led to

- Improvements in operational and financial performance of the Areas and the corporations as whole,
- Improved service delivery and corporate image,
- Strengthened accountability in NWSC operations especially at Area level
- More involvement of the customers and other stakeholders through the water councils

These improvements have been more explicitly, manifested in improved cash-flows, more investments and improved corporate image. Despite the success recorded, through a series of brainstorming sessions involving Head Office and Areas, a number of challenges/shortfalls, highlighted hereafter, were noted and needed to be redressed. These included;

- Repetitive nature of the IDAMCs phases,
- Inadequacies in the bidding process,
- Lack of innovation especially in preparations of the business plans, and
- Gaps in the incentive sharing mechanism and enforcement of penalties.

Therefore, in order to strengthen the IDAMC concept and in line with the observed challenges/shortfalls, and also in

line with the requirements under the NWSC-GOU Performance contract, NWSC management has proposed Performance, Autonomy and Creativity Enhancement (PACE) Contracts as a successor delegated Area Management Contracts to the IDAMC. The PACE contracts are geared towards enhancing creativity within the Corporation and keeping the performance impetus and improving further NWSC's performance.

2 MAIN OBJECTIVES OF THE PACE CONTRACTS

In general, the underlying objective of the PACE contracts is to improve the performance of the Corporation from the current level and more specifically to:

- ◇ Build on the achievements of the IDAMC I, II & III
- ◇ To improve the operational and financial performance of the corporation
- ◇ To improve cost-consciousness of Areas
- ◇ To enhance creativity and innovation in the Corporation

The table below contrasts the enhancements incorporated in the proposed PACE contracts from IDAMC III Contracts.

Description	IDAMCs	PACE Contracts
Management Contract Form	Internally Delegated Area Management Contract	Delegated Area Management Contract
Competition for Lead Partner Positions	Internal Competition	Competition open to general public
Selection Criteria	Based on evaluation of Enhanced Expressions of Interest (Bids) and Comprehensive Business Plans	Based on evaluation of Applications, 6 months PACE action plans and interviews by a select committee of Top Management
Contract Duration	2 years	3 years
Operationalisation of Contracts	1 year Action plans	6 months rolling Action Plans
Target Setting	Based on targets proposed by Bidders in the business plan	Based on Targets proposed by NWSC Head Office and negotiated with Area Management Teams

4 NEW REFORM ELEMENTS IN THE PACE CONTRACTS

The key new and innovative reform elements have been introduced in the PACE Contracts include;

- ◇ A simplified but effective bidding process (refer to box 1) for Lead Partners positions that entailed:
 - Advertising of Lead Partner positions in the print media to increase competition

- ◇ To shed off more operating risk to Areas
- ◇ To have better incentive sharing system and performance targets

3 RELATIONSHIP BETWEEN IDAMCs AND PACE CONTRACTS

The proposed PACE contracts are an enhanced form of Internally Delegated Area Management (IDAMC) Contracts. PACE contracts further seek to break the monotony of IDAMCs which had led to IDAMC "fatigue". The enhancements incorporated in the PACE contracts from the previous IDAMC III include:

- Opening up of the competition for lead partner positions to the general public
- Operationalisation of PACE contracts through 6 months rolling action plans
- Increasing Operational Autonomy to selected Areas to further enhance service delivery

- Interview of shortlisted candidates by a select panel of Top Management
- Provisional appointments of successful candidates subject to preparation of short term six months action plans by the partnerships.
- ◇ Increase of the PACE Contract duration from 2 years to 3 years.

- ◇ Introduction of rolling six month Area action plans in line with the NWSC corporate plan and corporate budget.
- ◇ Adoption of refined approach to performance target setting and negotiations that strived to optimize operating costs and maximize the operating margin
- ◇ Replacement of Tri-Annual evaluations with Bi-annual evaluations and performance review to allow Operational Areas adequate time to implement the agreed strategies and also optimize costs.
- ◇ Strengthened mandate of the local water councils as a tool of involving customers and key stakeholders in NWSC operations
- ◇ Refined incentive sharing policy that includes pre-distribution of incentives, and ring-fencing of penalties
- ◇ Strengthening of the Audit function and checkers system to enforce compliance to contract provision including penalties and ring-fencing of Area expenditures



Box 1: Steps in the bidding process under PACE

- ◇ **Advertisement and Application for Lead Partners' Position:** The selection of the Lead Partners for the Areas was through competitive bidding process that was opened-up to the general public. Leader Partners' Positions were advertised in the print media, NWSC Lotus Notes and website.
- ◇ **Shortlisting of applicants:** Preliminary and detailed evaluations were carried out a select committee of top management based on a criteria presented in the invitation documents. Based on the response and competence of the applicants, a maximum of three applicants were shortlisted for a given Areas.
- ◇ **Interview of shortlisted applicants:** Shortlisted applicants were interviewed by a select committee of top management.
- ◇ **Preparation and submission of six months actions plan:** Successful applicants for a given Area were appointed on a one-month probation basis and requested to prepare together with the Area Team a six-month action plan to achieve the performance targets set by Head Office. These action plans are updated on an bi-annual basis.
- ◇ **Negotiations of the Targets, Management Fee and action plan:** negotiations between Head Office and the Areas were carried out in July 2011 in Entebbe and also coincide with the final year II IDAMC III evaluation. The negotiations centered around the key performance targets, management fees and the proposed Area actions plans.
- ◇ **Contract Signing:** Following the successful negotiations between the Head Office and the Areas the PACE contracts shall be signed in September 2011 but effective July 2011.

COST BENEFIT ANALYSIS OF THE PACE CONTRACTS

A preliminary cost benefit analysis was carried to project the anticipated costs and benefits of implementing the outcomes of the negotiations under the proposed PACE contracts. The projected costs for operationalizing the PACE contracts are attributed to negotiated / budgeted Area Operation Expenditure and the planned capital investments in new connections, water and sewer mains extensions, and construction of reservoirs and installation of electromechanical equipment.

The projected benefits resulting from the implementation of PACE contracts were projected by contrasting a business as usual scenario¹ with sett PACE Targets arrived at after comprehensive negotiations between NWSC Head Office and the respective Area management teams. These benefits are outlined below;

- A double digit improvement in the monthly cash operating margin of 35.1 %
- Improvement in billings (net of VAT) by 23.8 %
- Improvement in revenue collections (net of VAT) of 8.7 %
- A 13 % improvement of 13 % in the Arrears performance
- Refined incentive and penalty framework that will further increase staff motivation
- Increased operational autonomy to selected Areas
- Increased flexibility and innovation in implementing six month rolling action plans

¹ Computed by forecasting the July 2011 – June 2012 performance based on the IDAMC III performance



Challenges Facing the Urban Water and Sanitation Sectors in Developing Countries

by Peluce K Egesa

Background

The management of Water and Sanitation Services in the urban areas of developing countries is beset with a variety of problems. These problems are largely due to lack of sound management. In urban areas there are two major systems, the water supply system and the waste water (or sewerage) system. Whereas the former has similarities with urban areas of developed countries, the latter does not. Compared to water provisions very few households in urban areas of developing countries are provided with water borne sanitation systems. The water systems of urban areas of developing countries often break down causing disruption of service to the Populace. When a water supply of a town breaks down, users will most likely fetch water from unimproved sources. The waste water from rainfall or urban runoff creates havoc in many towns and cities due to the absence of drainage systems, or due to their in-operation where they are present.

Scarcity of Water Sources

Under pressure from rising populations, extravagant lifestyles, intensive agriculture and industrialization, Water has become a scarce resource. Inevitably, it is the poor who tend to lose out in competition for resources, typically

through the pricing mechanism. The World Bank estimates that demand for water will exceed supply by 40 % by 2030. UN Water suggests that 1.8 billion people live in regions already classified as water scarce. Two thirds of the global population could experience water stress by 2025.

Contamination of the Water Sources

Water pollution is a major global problem which requires constant evaluation and mitigation measures at all levels (international down to individual aquifers and wells). It has been opined that it is the leading worldwide cause of deaths and diseases, and that it accounts for the deaths of more than 14,000 people daily. Disputes over clean water and sanitation are an issue in Johannesburg, South Africa. Many houses in the shanty towns have no water taps or toilets. People who live in these areas must share taps with dozens of others. Aida Matebone, who lives in one of the shantytowns in Johannesburg, revealed in a BBC interview in 2003, "It's difficult for me to come [to the taps] to wash, and come here to pour water for drinking, because it's very far." In Uganda a lot of money was spent on the Rehabilitation of Nakibubo Channel to curb the problem of contaminating Lake Victoria the main water source for Kampala City and the surrounding areas.

Water Losses/Wastage

Most Urban Centers in LDCs' frequently experience interruptions to its water supply for one reason or another. There is a lot of wastage of water in the city's distribution systems due to faulty valves, broken pipes, etc. Due to the lack of metering facilities in some cities it makes it difficult to give an exact estimate of the proportion of the water loss. The loss for most towns ranges between 30–50 % of the water delivered. To some extent the lack of water meters and the low tariffs have encouraged some people to consume (or waste?) excessive amounts of water. Before 1998, urban water losses in Uganda accounted for 50 % of the treated water sent in the distribution system to the customers. This was mainly due to management inefficiencies in form of delays in responding to leaks and bursts, commercial losses due to erroneous meter readings, lack of customer care services like use of call center and many illegal users.

Storm Water Challenges

During the rainy season in developing countries, parts of the cities get flooded to the point of impairing the efficiency of certain production activities and thereby causing a substantial loss of revenue to the service providers. Much of the sewer network and drainage channels are completely blocked by various materials. Maskel (1986) reported that 17 sewage pumping stations in the city of Dar es Salaam had stopped operating before 1979. Apparently before 1979 the routine maintenance of the sewerage system had virtually ceased. By the early eighties some 12 percent of the city's population had access to choked sewers, 8 percent used septic tanks and 80 percent had pit-latrines. These proportions are assumed to be the same today. In Uganda, especially in Kampala during the heavy rains, storm water fill the streets causing loss of lives e.g. In Bwaise one of city suburbs where a child lost her life. This is mainly caused by the poor drainage system in the city.

Inadequate Funding

Rehabilitation and improvement of water services in the most LDCs requires exorbitant funds. For instance, in Uganda, Entebbe Water Supply and Rehabilitation Project cost Euro 17.9 million (US\$ 48.3 billion) and the project was funded by the Government of Uganda, the Government of Germany through its agency (KfW) and National Water and Sewerage Corporation from its internally generated funds. The project which aimed at rehabilitating and expanding both Water and Sewerage systems in Entebbe was completed and it increased water production by 20,000 cubic meters per day. However, as NWSC without external funding and Government support this would have been difficult to achieve, given that the water and sewerage tariffs are not full cost recovery tariffs. Also for the Government of Uganda alone funding such a project the funds would be excessive for a developing country like Uganda, given

the other Government critical programs and projects that require funding.

Income Gaps

Disparities exist between the rich and poor and are much greater in sanitation than water. The poor are half as likely to have water access and one-fourth as likely to have sanitation access. More than half of the 41 percent of worldwide population are without improved sanitation live in India and China. Unmet needs are highest in sub-Saharan Africa (in Ethiopia, 94 percent of the country is without access to sanitation; in Chad, 92 percent; in Congo, 91 percent; in Eritrea, 91 percent; in Burkina Faso, 88 percent; in Guinea, 87 percent; in the Comoros, 77 percent) and Southeast Asia (in Cambodia, 84 percent) (UNICEF, 2004). In terms of access to improve water, coverage is lowest in Africa and Oceania (UNICEF, 2004). In Uganda Urban water service coverage is about 75 % and only 6.4 % of the people in urban areas have access to sewerage services. This due to high cost of sewerage services and as a result people have resorted to use of septic tanks which is considered cheaper.

Operational Inefficiencies

In many Developing Countries, drinking water supply services are intermittent, even in extensive areas of the main cities. This is mainly due to inadequate maintenance and poor commercial management; there are high levels of water losses in the drinking water supply systems of almost all the countries in LDCs. The proportion of the population covered by adequate systems of monitoring and control of drinking water quality is low in urban areas and insignificant in rural areas. The insufficient coverage and poor quality of services not only have negative impacts on the health of the population but also affect the environment, the economy, foreign trade, and the availability of water for various uses.

Inadequate Sewerage Treatment/ Systems

In developing countries, most cities and towns do not have sewage treatment plants, and the consequences of continued discharge of raw sewage into the environment are serious, irreversible damage to the aquatic environment as well as health risks from exposure to pathogens entering the environment. Finally, there needs to be investment in building human capacity in these countries in order to be able to construct, operate, manage and maintain water and sanitation services.

Measures taken to curb the challenges that are facing the Water and Sanitation Sector in LDC's (Case Study of NWSC-Uganda)

Prior to 1998, the Corporation faced a number of operational problems including; Low operational efficiency with high



NRW of 50–60 %, low collection efficiency of about 60 %, high arrears (accounts receivables) standing at about US\$ 30 billion equivalent to 14 months of debt age, over staffing levels of about 36 staff/1000 connections with alarming corruption tendencies, high number of unviable towns (only 3 out of 12 were financially sound) and poor customer care among others.

In order to improve performance, the NWSC adopted a two-tier process or business model. First, a set of long-term strategies was formulated through a Corporate Plan and later, the Performance Contract with Government, establishing a platform for subsequent tailor-made activities at a tactical level. Within the overall framework of the Corporate Plan and the Performance Contract with Government, a series of activities were implemented at operational level.

Secondly, the NWSC adopted several high impact short term performance improvement programmes based on home grown solutions/approaches meant to operationalize the long term plans. The programmes included the 100 Days programme, the Service and Revenue Enhancement Project (SEREP) I and II, the Area Performance Contracts I, II, and III, the Stretch-Out Programme, the One Minute Management Concept, and the Internally Delegated Area Management Contracts (IDAMC's). This was accompanied by financial/commercial reforms including a strengthened MIS and Tariff structure changes.

The NWSC Response to the above Challenges;

- In response to Operational Inefficiencies, NWSC implemented short-term management programs like; the 100 days program which aimed at setting priorities, the SEREP (Service Revenue Enhancement

- Program), aimed at customer focus and stakeholder engagement, APC's and IDAMCs for autonomy of Areas and Empowerment and the "Checkers System" for increased accountability and monitoring systems among others.
- In order to curb the problem of Inadequate funding in the sector, NWSC carried out Tariff reforms, through tariff indexation, improved financial performance through improved operational efficiency and also got Government support by restructuring the NWSC Debt into Equity. This has enabled NWSC access market finance hedged upon the improved balance sheet. Other funding options that were used to correspond to the nature of investment included; use of internally generated resources for minor works and flagship investments, Loans for viable investments, Direct Grants for social mission and new large works and Output Based Aid to serve the poor.
 - Adopting to Climatic changes, NWSC implemented the Integrated Water Resources Management (WRM) with other stakeholders, implemented the Water Safety Plans, which are a holistic risk based water supply management approach and used cost-effective and efficient water treatment technologies like coagulation and polymers). The extension of raw water abstraction pipes in Kampala, Entebbe and Jinja was also done, planned construction of a new water works, for Greater Kampala, away from the Inner Murchison Bay towards Mukono in search of a cleaner source and protection of the quality of water in the inner Murchison Bay of Lake Victoria through improved Sanitation in Kampala.
 - Provision of Service to the poor was NWSC response to the challenge of Income Gap. This was done through establishment of a Pro-poor Unit to attend to the special needs of the poor, extending 1,370 kms of water mains extensions targeting mainly the peri-urban areas, construction of about 300PSPs/Kiosks per annum in the urban poor settlements, use of cross-subsidy tariff and introduction of pre-paid meters were the pro-poor strategies that NWSC implemented to overcome the challenge of income gap between the poor and rich in the urban areas.
 - In addressing the Sanitation challenge, NWSC has done the following;
 - NWSC has subsidised access to its sewerage services through a simplified sewerage connection policy

- Use of low cost sanitation technologies e.g. Eco-san, Vacutag etc for Urban Poor
- Working with local partners to define the urban poor initiatives
- Implementation of the Sanitation Master Plan in Kampala and other major towns and
- Use of the New state-of-art sewage treatment plant to be constructed soon in Kampala using innovative and appropriate technologies(this takes care of urban storm water as well)

Currently, the NWSC boasts of a customer base of 272,000 water subscribers from 50,000 in 1998, 100 % meter coverage of all active accounts as opposed to 73 % in 1998, NRW of 33 % from 50 % in 1998, Billing/collection efficiency ratio of 96 % compared to 60 % in 1998, Annual Turnover of about US\$ 130 billion from US\$ 21 billion in 1998 and staff productivity of 6 staff/1000 connections from 35 staff/1000 connections among others.

Way forward

An expansion of the capacity for an integrated water resources management is needed in order to; secure water for people and secure safe sanitation systems and hygiene, meet the challenges of an increasing urbanization, deal with variability of water in time and space including managing floods and mitigating their effects; and forging the political will to act; and ensuring collaboration across sectors and boundaries. –

However, a number of challenges remain, including important research needs for sanitation. In the past, many water and sanitation intervention programs took their own designs and implemented them in areas with need. This led to unsustainable, culturally inappropriate, or irrelevant installations which were not always effective.

New concepts focus on smaller, community-based projects that are chosen by the household and implemented through microcredit. The future of sanitation improvement lies in trying new approaches—creative approaches to technology and delivery, greater dissemination of information on what works and what does not, providing greater training and building capacity in human resources, and greater political and financial commitment

EXTERNAL SERVICES (ES) PICTORIAL

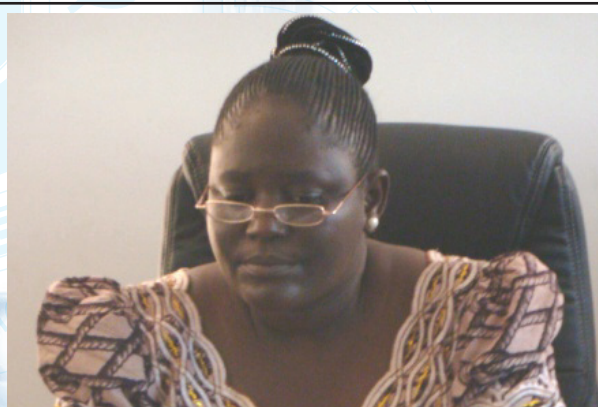
Lukanga Water and Sewerage Authority of Zambia

NWSC hosted a high power delegation from Lukanga Water and Sewerage Company of Zambia from Sunday 3rd to Friday 8th April 2011. The delegation was led by their Board Chairperson Ms. Ruth Mwanza Mvula. The team comprised of the Managing Director and his top managers. They were accompanied by the top civil servants from the mother Ministry of Local Government and Housing, Eng. Peter Lubambo – the Director of Infrastructure Development, and Mr. Sunday Lombe the Project Accountant. They were welcomed officially by NWSC top managers. They were here to benchmark and start a working partnership to collaborate and share information to improve performance in the sister organizations.

They want to introduce performance improvement programmes in all their Commercial Utilities (CUs) spread all over the country and managed by nine (9) regional water authorities.



Eng. Alex Gisagara welcoming the Lukanga delegation



LWSA Board Chairperson, Ms. Ruth Mwanza Mvula led the delegation



Lukanga delegation at the shores of Lake Victoria the source of water supply to Kampala, Jinja, Entebbe and other towns



The delegation at Gaba water treatment complex. Mr. Steven Tumwebaze took them around the plants.



Board Chairperson poses with the Trade Union Woman representative Ms. Agnes Kim as the GM Jinja Mr. Silver Emudong (right) looks on.



Lukanga delegation at Entebbe water intake works. The Area Engineer Paul Rachkara (left) guided the tour.



South Sudan Urban Water Corporation – Wau

Five staff members of Wau Urban Water Supply were on one-month training attachment from 23rd April to 22nd May 2011. They were one electrical engineer, a mechanical engineer, a maintenance superintendent, a cashier, a laboratory technician and commercial officer. They were first taken through all the operations of a water utility and later attached to particular offices of their specialties.



Wau staff at Salaama Branch being briefed by the Branch Manager on branch operations



Mr. Gilbert Akol the Senior GIS Officer (left) briefing Wau Water staff on mapping and imaging during the attachment training



The Wau staff at the closing of their training were briefed and they made activity plan for what they were going to do when they return home



Wau staff members were awarded certificates at the end of the one-month training. They were given by Dr. Rose C Kaggwa, Senior Manager-External Services

EU Water Fund



Participants in the first meeting on 16th April 2011



Participants in the 2nd meeting on 21st May 2011

South Sudan Urban Water Corporation

Malakal (22nd – 28th May 2011)



The Malakal delegation listening to a presentation by External Services staff



Dr. Rose C Kaggwa and Mr Nicholas Tayebwa meeting the delegation from Malakal Water Supply



The Malakal Area Manager, Eng Peter Nhial Gai (in black) and his staff were taken around Gaba Water treatment plant by workshop staff





Harar Water Supply and Sanitation Authority

(24th – 30th July 2011)



Dr William T Muhairwe (centre) welcomed the HWSSA delegation



The Harari delegation toured Kampala Water branches including Kansanga which serves the southern part of the city



*HWSSA delegation at Entebbe water intake works
HWSSA visitors joined tourists to see the Source of the Nile*



Ministry of Water Resources and Irrigation South Sudan

(1st – 4th August 2011)



*The delegation toured water and sewerage facilities.
Here they were at the sewage treatment plant Bugolobi.*



The South Sudan visitors at Kansanga Branch of Kampala



Dr. Martin Kalibbala making a presentation to South Sudan Delegation at NWSC-IREC



The South Sudan delegation visited small water schemes like Buwenge and Bugiri in Busoga region. They were accompanied by two water and sanitation specialists from the World Bank



WETwin Workshop

1. National (15th September 2011)



Dr. Eng. Charles Wana-Etyem (2nd right, NWSC board Member) was Chief Guest



NWSC Participants at the workshop



A section of participants



Mr. Najib Lukoya

*Ms. Susan Namaalwa
Presenters*

2. International (18th -21st October 2011)



MD, Hon Minister of Water and Environment and NWSC Board Chairperson



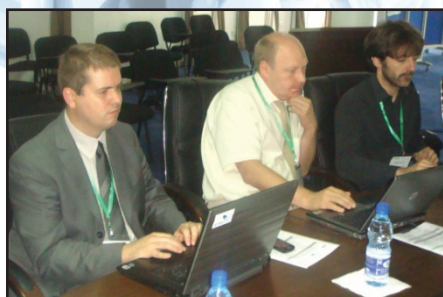
Dr. Charles Wana-Etyem (right) briefing the participants at the beginning of the workshop



Chief Managers, Eng. Alex Gisagara and Ms. Sarah Walusimbi



Project Coordinator, Dr. Rose Kaggwa at the opening session



Sections of Participants



The Executive Director of NEMA Dr. Tom Okurut making remarks on the issues of environment in wetlands



NWSC Board Chairperson, Ms. Christine Nandiyose Kasirye addressing the gathering



The Chief Guest, Hon Minister of Water and Environment, Hon. Maria Mutagamba

Keyboard Shortcuts You Probably Don't Know

Navigate your computer more easily with the push of a few buttons. Most expert computer users know the basic keyboard shortcuts, like pressing Control (Ctrl) + P on a PC to print a document. But did you know there are plenty of other very useful key combinations out there? From instantly zooming in to a larger view to quickly closing your browser window, these shortcuts will put the world wide web and more at your fingertips – because every second counts



1. Add a Bookmark

Tab your new favorite website for easy access by bookmarking the page with the following quick trick.

PC: Ctrl + D

Mac: Apple key + key (see right) + D

2. Delete Forever

When you know you want to delete a file forever – instead of sending it to clog up the recycling bin first – tap the keys below.

PC: Shift + Delete

3. Close Browser

Quickly close your browser windows, use this shortcut.

PC: Alt + F4

Mac: Apple key + Q

4. Show Desktop

If you have lots of windows open on your computer and you want quick access to your desktop – or a super-quick way to hide your work – hit the following keys.

PC: Window key (see right) + D

Mac: F11

5. Find Files or Folders

Forget painstakingly searching all of your folders to find one file. The shortcut below will do the searching for you.

PC: Window key + F

Mac: Apple key (see right) + F

6. Change Zoom Level

Whether you're working on the web or in a word processing program, zoom in or out with this command.

PC: Ctrl + scroll mouse wheel

Mac: Apple key + plus sign; Apple key + minus sign

7. Reopen Previous Tab in Browser

Have you ever accidentally closed the browser tab you were looking at and had to spend time backtracking to find it again? The shortcut below will restore that page to you almost instantly.

PC: Ctrl + Shift + T

Mac: Apple key + Z

8. Switch between Open Programs

Navigating between open screens can get confusing. Make it easy to move among all your programs with this quick trick.

PC: Alt + Tab

Mac: Apple key + Tab

9. Take a Screen Shot

Capture an image of what you're working on instantly with a screen grab – it's particularly useful for web pages you can't copy and paste.

PC: Print Screen (then paste [Ctrl + V] into a Word document)

Mac: Apple key + Shift + 3

10. Refresh a Web Page

Whether you're waiting for a new email to arrive or the latest news story to pop up, easily refresh your screen using the keys below.

PC: F5, or Ctrl + R

Mac: Apple key + R

11. Go to a Previous Location in Browser

Time travel with the neat shortcut below, which lets you quickly go back to the web page you were looking at before your current one.

PC: Alt + ←

Mac: Apple key + [

12. Spelling/Grammar Check

No more excuses: Perfect spelling and grammar is just one keystroke away.

PC or Mac: F7

13. Add "http://www" to Your Browser's Address Bar

The quickest route to your online destination? Just type in the name of the webpage you'd like to go to (for example, type "Google"), then press the following keys to add the "http://www." to the beginning and ".com" to the end.

PC: Ctrl + Enter

Mac: Apple key + Enter

14. Select the Address Bar

When you want to quickly type a new URL into your browser, the shortcut below will easily select the address bar for you, so you can start typing without moving your mouse.

PC: Ctrl + L, or F6

Mac: Apple key + L

15. Launch the Windows Start Menu

Just tap the keys below for an easy way to view your Start Menu options.

PC: Window key, or Ctrl + Esc



The Editorial Team of the WATER HERALD would like to congratulate Eng Sottie Bomukama (Director-DWD and NWSC Board Member) for receiving the DISTINGUISHED ALUMNI AWARD from Loughborough University, UK



LOUGHBOROUGH UNIVERSITY

DISTINGUISHED ALUMNI

AWARD



SOTTIE BOMUKAMA

MSc – Water and Waste Engineering, Class of 1983
Water, Engineering and Development Centre
School of Civil and Building Engineering

Sottie Bomukama has worked in Uganda's water sector for 35 years.

His passion for public health and commitment to improving Uganda's water supplies have been rewarded with swift promotion through the ranks of Executive Engineer, Senior Executive Engineer, Assistant Commissioner and Commissioner.

For more than two decades, his strategic input and policy guidance has helped to reform the sector. In recent years, new approaches to planning and management have led to vast improvements in water resources management, rural and urban water supplies, as well as water stocks for manufacture and production.

Sottie has made a significant contribution to this success. A member of the Board of Directors for the National Water and Sewerage Corporation of Uganda since 2004, Permanent Secretary (2006-07), and Director of Water Development for Uganda (2004-), he has played a major part in enhancing water supply, sanitation, and hygiene whilst meeting increased demand for services in a climate of government budget cuts.

Today, Uganda's Directorate of Water Development is recognised as one of the most progressive and dynamic sector departments in the region. Since 1989, safe water coverage in Uganda has increased from 19% to 66%, providing services to a further 17.7 million people – a remarkable achievement recognised throughout the region.

Summer 2011

INSTRUMENTAL IN THE
REFORM AND SUBSEQUENT
TRANSFORMATION OF THE
WATER SECTOR OF UGANDA





SOTTIE BOMUKAMA RECEIVES DISTINGUISHED AWARD FROM LOUGHBOROUGH UNIVERSITY

Uganda's Director of Water Development Sottie Bomukama has been presented with a prestigious award from his former university.

Mr Bomukama received a Distinguished Alumni Award from England's Loughborough University in recognition of his instrumental work reforming and transforming the water sector in Uganda.

For more than two decades, his strategic input and policy guidance has helped reform Uganda's water sector. In recent years, new approaches to planning and management have led to vast improvements in water resources management, rural and urban water supplies, as well as water stocks for manufacture and production.

Since 1989, safe water coverage in Uganda has increased from 19% to 66%, providing services to a further 17.7 million people.

Andrew Cotton, Director of WEDC at Loughborough University explains '*we are proud to make this award to alumni recognised both for their remarkable contributions to the water, sanitation and hygiene sector, and also for their inspiration to future sector professionals*'.

The Distinguished Alumni Award was presented as part of the University's Water Engineering and Development Centre's (WEDC) 40th anniversary celebrations. He was one of just five alumni world-wide to receive the honour

Mr Bomukama graduated from Loughborough University with a Masters in Water and Waste Engineering in 1983.

1. In 2011 WEDC celebrates its 40th Anniversary as a world-leading education and research institute developing knowledge and capacity in the water and sanitation sectors for low and middle income countries. Its contribution is evidenced through alumni in key positions in various institutions around the world and was recognised by the award of Loughborough's first Queens Anniversary prize in 1995.
2. Loughborough is one of the country's leading universities, with an international reputation for research that matters, excellence in teaching, strong links with industry, and unrivalled achievement in sport and its underpinning academic disciplines.

It was awarded the coveted Sunday Times University of the Year 2008-09 title, and is consistently ranked in the top twenty of UK universities in national newspaper league tables. In the 2010 National Student Survey, Loughborough was voted one of the top universities in the UK, and has topped the Times Higher Education league for the UK's Best Student Experience every year since the poll's inception in 2006. In recognition of its contribution to the sector, the University has been awarded six Queen's Anniversary Prizes.

Loughborough is also the UK's premier university for sport. It has perhaps the best integrated sports development environment in the world and is home to some of the country's leading coaches, sports scientists and support staff. It also has the country's largest concentration of world-class training facilities across a wide range of sports.

Areas Performance Score Card, April 2011– June 2011

By Godfrey Sentume Arinaitwe & Beat Nabacwa

Area	April 2011 Performance				May 2011 Performance				June 2011 Performance				
	NRW	WR	COM (‘000 UShs)	Incentive Earned (‘000’ UShs)	NRW	WR	COM (‘000’ UShs)	Incentive Earned (‘000’ UShs)	NRW	WR	COM (‘000’ UShs)	Incentive Earned (‘000’UShs)	
Kampala	Actual	38.7%	58.3%	2,734,849	151,012	39.0%	57.7%	2,823,248	176,709	39.0%	59.3%	2,694,899	129,515
	Target	39.0%	54.9%	3,039,566	395,832	39.0%	54.9%	3,039,566	395,832	39.0%	54.9%	3,039,566	395,832
Jinja	Actual	23.0%	42.0%	360,918	11,917	25.0%	42.4%	349,439	10,773	25.9%	45.0%	359,977	10,465
	Target	18.0%	42.1%	473,637	94,891	18.0%	42.1%	473,637	94,891	18.0%	42.1%	473,637	94,891
Entebbe	Actual	10.4%	43.9%	282,409	14,211	11.2%	44.5%	302,282	19,302	10.6%	44.8%	323,844	23,641
	Target	13.5%	47.7%	320,965	79,482	13.5%	47.7%	320,965	79,482	13.5%	47.7%	320,965	79,482
Mbale	Actual	7.6%	68.9%	73,486	10,884	7.6%	70.0%	74,081	10,722	7.6%	66.9%	79,014	12,892
	Target	7.5%	68.7%	94,995	74,414	7.5%	68.7%	94,995	74,414	7.5%	68.7%	94,995	74,414
Mbarara	Actual	11.7%	51.3%	132,510	9,013	11.6%	50.8%	137,521	9,271	11.4%	51.7%	146,523	10,504
	Target	11.5%	53.8%	237,555	60,417	11.5%	53.8%	237,555	60,417	11.5%	53.8%	237,555	60,417
Masaka	Actual	33.9%	82.7%	43,500	7,662	33.7%	81.5%	44,782	8,408	33.3%	80.3%	47,094	9,564
	Target	18.0%	77.1%	50,888	26,937	18.0%	77.1%	50,888	26,937	18.0%	77.1%	50,888	26,937
Tororo	Actual	9.7%	98.2%	379	0	9.7%	96.2%	2,483	0	9.7%	93.3%	7,595	1,483
	Target	8.0%	86.4%	22,117	28,896	8.0%	86.4%	22,117	28,896	8.0%	86.4%	22,117	28,896
Soroti	Actual	14.3%	77.2%	24,345	2,989	15.0%	76.6%	26,074	3,169	14.5%	77.9%	25,399	2,953
	Target	14.0%	71.8%	39,420	30,218	14.0%	71.8%	39,420	30,218	14.0%	71.8%	39,420	30,218
Arua	Actual	9.2%	85.2%	11,891	3,753	9.2%	106.0%	-6,538	0	9.1%	105.5%	-7,010	0
	Target	9.0%	86.5%	18,410	26,708	9.0%	86.5%	18,410	26,708	9.0%	86.5%	18,410	26,708
Gulu	Actual	13.7%	76.3%	13,453	0	14.8%	76.5%	14,288	0	15.7%	78.9%	12,462	0
	Target	8.0%	66.9%	78,006	25,247	8.0%	66.9%	78,006	25,247	8.0%	66.9%	78,006	25,247
Bushenyi	Actual	19.6%	116.9%	-6,742	2,555	19.5%	118.9%	-7,156	2,393	18.8%	123.6%	-10,150	1,689
	Target	14.0%	117.6%	-6,306	13,967	14.0%	117.6%	-6,306	13,967	14.0%	117.6%	-6,306	13,967

Kabale	Actual	8.9%	78.1%	19,834	4,784	8.8%	77.4%	20,319	4,974	9.0%	77.6%	20,147	4,692
	Target	8.0%	81.7%	21,243	22,545	8.0%	81.7%	21,243	22,545	8.0%	81.7%	21,243	22,545
Lira	Actual	13.0%	73.9%	46,467	4,261	13.2%	75.4%	44,254	3,489	13.0%	72.9%	46,029	3,932
	Target	10.0%	72.0%	57,855	32,189	10.0%	72.0%	57,855	32,189	10.0%	72.0%	57,855	32,189
Fort Portal	Actual	20.8%	73.6%	30,414	2,405	21.1%	81.4%	21,678	1,410	20.4%	77.6%	24,631	1,736
	Target	15.0%	66.1%	50,433	29,523	15.0%	66.1%	50,433	29,523	15.0%	66.1%	50,433	29,523
Kasese	Actual	17.4%	58.2%	37,487	4,693	17.2%	58.1%	38,884	4,927	17.3%	55.6%	41,067	5,138
	Target	16.0%	63.6%	35,816	20,358	16.0%	63.6%	35,816	20,358	16.0%	63.6%	35,816	20,358
Hoima	Actual	14.2%	111.6%	-1,496	0	14.2%	114.3%	-1,640	0	13.9%	117.9%	-4,300	0
	Target	13.0%	96.4%	11,329	20,903	13.0%	96.4%	11,329	20,903	13.0%	96.4%	11,329	20,903
Lugazi	Actual	22.9%	122.1%	-7,259	3,408	22.9%	126.4%	-7,915	3,266	22.6%	141.7%	-12,459	2,046
	Target	22.0%	138.3%	-7,907	15,983	22.0%	138.3%	-7,907	15,983	22.0%	138.3%	-7,907	15,983
Masindi	Actual	10.8%	87.4%	3,541	972	10.9%	87.7%	3,810	1,101	10.8%	87.6%	7,790	1,606
	Target	9.0%	78.0%	19,592	25,782	9.0%	78.0%	19,592	25,782	9.0%	78.0%	19,592	25,782
Mubende	Actual	13.2%	105.1%	-6,982	3,343	13.2%	112.4%	-10,527	2,406	12.9%	112.4%	-6,529	3,248
	Target	14.0%	110.6%	-302	16,562	14.0%	110.6%	-302	16,562	14.0%	110.6%	-302	16,562
Iganga	Actual	14.6%	53.6%	13,744	5,098	17.0%	53.6%	13,822	5,108	17.5%	53.6%	14,912	5,572
	Target	25.0%	87.6%	15,180	16,204	25.0%	87.6%	15,180	16,204	25.0%	87.6%	15,180	16,204
NRW – Non–revenue water, WR – Working ratio, COM – Cash operating margin, UShs – Uganda Shillings													
Performance in a Particular month represents the cumulative Average performance from July 2010 to that Particular Month.													

April 2011 Performance

Non–revenue Water (NRW):

The April 2011 performance indicates that only Two Areas achieved NRW targets. These were *Entebbe and Kampala*. Most of the other areas fell short of their targets by a small margin..

Working Ratio (WR):

Nine Areas were unable to achieve their Working ratio targets. These include: *Mbale, Masaka, Tororo, Gulu, Lira, Fortportal, Hoima and Masindi*. All other Areas achieved their targets.

Cash Operating Margin (COM):

With regard to cash operating margin, only *Lugazi* and *Kasese* were able to achieve their cash operating margin targets. All other Areas fell short of the expected target performance..

Incentives Earned:

All Areas earned incentives in the month of April 2011 Tororo with the exception of *Gulu* and *Hoima*. This was attributed to their failure to achieve the minimum COM standard In April, a total of UGX 242M was transferred to Areas as incentives.

May 2011 Performance

Non-revenue Water (NRW):

During the month of May 2011, most of the Areas did not meet their NRW targets except *Kampala, Entebbe, Mubende and Iganga*.

Working Ratio (WR):

Six Areas managed to achieve their working ratio targets during the month of May 2011. These include: *Entebbe, Mbarara, Kabale, Kasese, Lugazi and Iganga*. All other Areas failed to achieve their targets during the month.

Cash Operating Margin (COM):

Only *Kasese* Area achieved its COM target in the month of May 2011. All the other Areas fell short of their targets and this was majorly due to increased Expenditure.

Incentives Earned:

All Areas managed to receive substantial incentives during the month of May 2011 except *Gulu, Arua, Tororo and Hoima*. A total of UGX 267M was earned as incentives with *Kampala Water* earning UGX 176M.

June 2011 Performance

Non-revenue Water (NRW):

The performance for June 2011 indicates that only *Kampala, Entebbe, Mbarara, Mubende and Iganga* achieved their NRW targets. All other Areas fell short of their targets.

Working Ratio (WR):

Six Areas managed to achieve their working ratio targets during the month of June 2011 and these include *Entebbe, Mbale, Mbarara, Kabale, Kasese, and Iganga*. All other Areas failed to achieve their targets during the month.

Cash Operating Margin (COM):

Only *Kasese* and *Entebbe* achieved their cash operating margin target during this month. All other Areas fell short of their targets mainly attributed to escalated input costs.

Incentives Earned:

With the exception of *Arua, Gulu and Hoima*, the remaining Areas were able to earn an incentive in June 2011. A total of UGX 230M was earned as incentives.

Overall Performance.

Non-revenue Water (NRW):

Only Kampala and Entebbe Areas managed to achieve their NRW targets throughout the period. Factors contributing to this performance include: *various programmes in Kampala Water aiming at increasing water sales which include Wetstorm with focus on illegal use reduction and Every Drop Counts (EDC) with focus on improving metering efficiency and reducing water loss through leaks and bursts.*

Working Ratio (WR):


Most of the Areas recorded a decline in their working Ratio over the period due to increased operating costs. Only five Areas were able to achieve their targets throughout the period and these were *Entebbe, Mbarara, Kabale, Kasese and Iganga.*

Cash Operating Margin (COM):

Most of the Areas registered a slight improvement in COM over the period attributed to a marginal increase in collections with the exception of *Mbale, Masaka, Forportal, Arua, Lira and Hoima* which registered a slight decline. This calls for measures towards improved collection efficiency, arrears reduction let alone cost rationalisation and optimisation.

Incentives Earned:

Areas have progressively earned incentives over the period except *Hoima* and *Gulu* Areas which did not earn any incentive due to failure to achieve Minimum Standards for some performance indicators particularly COM. For the period April-June 2011, a total of *UGX 741 Million* was transferred to Areas as Incentives.



Did you know?

The Facts About Water

by Martin Kalibbala

1

- Water dissolves more substances than any other liquid. Wherever it travels, water carries chemicals, minerals, and nutrients with it.
- Somewhere between 70 and 75 % of the earth's surface is covered with water. Much more fresh water is stored under the ground in aquifers than on the earth's surface. The total amount of water on the earth is about 326 million cubic miles of water.
- The earth is a closed system, similar to a terrarium, meaning that it rarely loses or gains extra matter. The same water that existed on the earth millions of years ago is still present today.
- Of all the water on the earth, humans can use only about three tenths of this water. Such usable water is found in groundwater aquifers, rivers, and freshwater lakes.
- A human being is about 67 % water. A chicken is about 75 % water. A pineapple is about 80 % water. The human brain is about 85 % water. Human blood is about 79 % water. Human teeth contain about 10 % water. Every cell needs water.
- Adults need 8–12 glasses of drinking water daily. A 2 % drop in body water can cause fuzzy short-term memory, trouble with basic math, and trouble focusing on your computer screen or a printed page.
- Losing 4–5 % of your body's water makes your work performance drop by 20–30 %. Drinking 5 glasses of water daily decreases the risk of colon cancer by 45 %. It can also slash the risk of breast cancer by 79 %, and one is 50 % less likely to develop bladder cancer.
- Lack of water is the number one cause of daytime tiredness. Dehydration can occur in any season. Older bodies have proportionately less water than younger bodies. Children lose proportionately more water sweating than do adults. Athletes can lose 4–5 quarts of water in one practice session.
- Drinking water is non-fattening. Small sips of water over your day are better than drinking down a whole glass or two at one time. Water absorbs shock to vital organs in the human body.
- Water protects human eyes. Travel increases your need for drinking water. Exercise increases your need for drinking water. Your food can provide about three cups of water daily.
- Over an average lifespan, a human takes in more than 16,000 gallons of water. If you are dieting, you can stop midnight hunger pangs with one glass of water instead of food.



2

Water alone is still the number one thirst quencher. Most people need to drink more water not more soft drinks or more tea, it is much better to have too much water in the body than not enough.

- The biggest problem with water today is that the public does not really believe there is anything wrong with it. People think water problems begin when the water starts to develop bad smell, taste or look dirty. However, harmful pollutants and contaminants usually don't make water smell or taste bad.
- Chemicals and viruses are actually passed into households for everyday use and can cause cancer, Birth defects and genetic damage.
- According to the World Health Organization (WHO) 80 % of all diseases and sicknesses are water borne. Next to air, water is the element most necessary for survival. A normal adult is 60–70 % water. We can go without food for almost two months, but without water only a few days. Yet most people have no idea how much water they should drink. Infact, many live in a dehydrated state. So if you don't drink sufficient potable water, you can impair every aspect of your physiology.

3

An expert says, "By not drinking enough water, many people incur excess body fat, poor muscle

tone and size, decreased digestive efficiency and organ function, increased toxicity in the body, joint and muscle soreness and water retention. If you are not drinking enough, your body may retain water to compensate.

- Paradoxically, fluid retention can sometimes be eliminated by drinking more pure water, not less. Proper water intake is a key to weight loss. If people who are trying to loose weight don't drink enough water, the body can't metabolize the fat adequately. Retaining fluid also keeps weight up.
- The minimum for a healthier person is 8–10 eight-ounce glasses a day. You need more if you exercise a lot or live in a hot climate. An overweight individual should drink an extra glass of pure water for every 25 pounds they exceed their ideal weight.
- Water is essential to every bodily function. It is also inexpensive and calorie-free, making it the perfect drink for dieting. And by consuming those 8–10 glasses of pure water throughout the day, you could be on your way to a healthier, leaner body. You think you are drinking enough water? If you are not, you could end up with excess body fat, poor muscle tone, digestive complications, muscle soreness and water retention problems.

**WHAT
DO YOU
THINK?**



To comment on this article, please email up to 500 words to the editor at watereditorial@nwsc.co.ug or martin.kalibbala@nwsc.co.ug. A selection of significant 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, guest writers and other stakeholders. Articles should be 1000 – 2500 words long, with adequate illustrations and references. Please contact the editor for further information



4 Everyday, humans lose water through breathing, perspiration, urine and bowel movements. For a human body to function properly, we must replenish our water supply by consuming beverages and foods that contain water.

- The average urine output for adults is about 1.5 liters a day. You lose close to an additional liter of water a day through breathing, sweating and bowel movements.
- Food usually accounts for 20 % of your total fluid intake, so if you consume 2 liters of water or other beverages a day along with your normal diet, you will typically replace the lost fluids.
- Practicing good oral hygiene is a very good way to help prevent tooth ache and tooth decay. Drinking purified water rather than polluted tap water can also help reduce the weakening of the tooth's enamel that leads to fracture and decay.
- Brushing after every meal to remove food particles stuck in the teeth and gums, rinsing with purified water after eating, and flossing at least once daily and getting regular dental check-ups and cleanings can all go a long way toward preventing tooth ache.

5 Workouts

- If humans exercise or engage in any activity that makes them sweat, they need to drink extra water to compensate for the fluid loss. An extra 400–600 milliliters (about 1.5–2.5 cups) of water should suffice for short bouts of exercise,

but intense exercise lasting more than an hour – for example, running a marathon – requires more fluid intake.

- How much additional fluid humans need depends on how much they sweat during exercise, how long they exercise and the type of activity they are engaged in.
- During long bouts of intense exercise, it's best to use a sports drink that contains sodium, as this will help replace sodium lost in sweat and reduce the chances of developing hyponatremia (loss of Sodium), which can be life-threatening. Additionally, humans need to continue to replace fluids after they have finished exercising.

Weather Changes

- Hot or humid weather can make humans sweat and require additional intake of fluid. Heated indoor air also can cause human skin to lose moisture during winter time. Furthermore, altitudes greater than 2,500 meters may trigger increased urination and more rapid breathing, which use up more of human fluid reserves.

6 Pregnancy or breast-feeding

- Women who are expecting or breast-feeding need additional fluids to stay hydrated. Large amounts of fluid are used especially when nursing. Pregnant women should drink 2/3 gallon of fluids daily, while women who are breast-feeding ought to consume 3/4 gallon of fluids a day.

**WHAT
DO YOU
THINK**



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Kansanga Branch Sanitation Drive 17.09.2011





Eastern Region Trade Fair, Mbale



Cont'd - Eastern Region Trade Fair, Mbale





Cont'd - Eastern Region Trade Fair, Mbale





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The Water Herald

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