

# Uganda Water and Environment Week 2018

## Abstracts



**Water and Environment a catalyst for achieving middle income status**

Water Resources Institute Ministry of Water and Environment

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## 1.0 Introduction

The inaugural Uganda water and environment week 2018 provided an opportunity to various stakeholders to prepare and present papers on various aspects related to the environment. These papers form part of research and practice interventions that shape and inform policy. Abstracts of these papers are presented in this booklet.

### 1.1 Back ground and setting

The Ministry of Water and Environment in collaboration with key partners held the 1st ever Uganda Water and Environment Week (UWEWK-2018) that coincided with the annual commemoration of the World: Water Day; Forestry Day; and Meteorology Day. It took place from 17- 23 March 2018. The event was linked to the National Development Plan II (NDP II), which focuses on achieving structural transformation through increased industrial activity. Emphasizing the fact that meeting Uganda's Vision 2040 growth targets will require tripling of reliable water deliveries relative to today's levels and heavy investments in environmental management and water resources is needed to achieve this. It aimed at disseminating the essential need of proper water and environment management among other things. A wide range of water, sanitation and environment stakeholders attended the event, including policy makers, technocrats, academicians, public and private sector institutions, civil society organizations, non-governmental organizations and consumers.

One of the events to mark the UWEWK-2018 was a national conference which was held from 21st to 22nd March 2018. The conference provided an opportunity for water and environment academics, researchers, practitioners, businesses and innovators to share knowledge through presentation of papers in following sub-themes:

Integrated water resources management; coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

1. Water and sanitation development; Addressing water, sanitation and hygiene needs in Urban, semi-urban and rural areas of Uganda
2. Wastewater and pollution management; Managing wastewater and pollution through treatment, reuse, purification, reduction and restoration.
3. Environment and natural resources; Efficient and effective utilization of natural resources innovations, technologies, approaches and strategies leading to sustainable management
4. Water - energy - food - ecosystem nexus: Recognizing that water, food and energy sectors are inextricably linked, actions in one area commonly have impacts on the others, as well as on ecosystems
5. Stakeholder engagement and water sector financing. the economic case for water and environment, and effective communication of water and environment centrality to economic development
6. Weather and Climate change: Weather and Climate change implications on natural resources, productivity and current measures to address/cope with these impacts
7. Sustainable forest management: Conservation of forests in light of development and industrialization

## 2.0 Water Supply and Sanitation

Providing Inclusive and Equitable WASH services:

### Policy Perspectives

Atuhairwe Spera,  
WaterAid

*Uganda has a relatively robust national and water and sanitation policy framework which has led to tremendous improvement in access to water, sanitation and hygiene (WASH) services. However, issues of equity and inclusion have limited scope in terms of conceptualization and actual service provision particularly for the poor and vulnerable groups. Notwithstanding the fact that 30% to 35% of Ugandans remain without access to water and sanitation services. The current policy framework and delivery mechanisms do not adequately facilitate new initiatives as appropriate models for inclusive and equitable WASH service provision. This paper analyses the current policies and how they promote or inhibit the provision of equitable and inclusive WASH services to the vulnerable individuals and underserved populations. It also points out the policy and practice changes that can improve inclusive and equitable WASH service provision in the country.*

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### New generation of prepaid Water Meters: Revolutionise the Water Sector

Marcel Schreurs  
SUSTEQ

*Worldwide about 30% of all rural water points are out of order. Just for hand pumps alone this equals a disinvestment of approximately one billion USD. For small and medium piped water schemes the problems are similar: in Kenya for example only 58% of all rural piped schemes are functioning. In 2012 some Dutch people came up with the idea to address the lack of sustainability via prepaid water metering in order to improve and automate the revenue collection and to create transparency for the same. Susteq then developed the first prepaid water meter in the world, that could convert existing hand pumps in prepaid hand pumps. This was a big success which was the basis to set-up another new company, called Water Forever International, with a first subsidiary in Kenya, called Maji Milele Ltd. The latter company evolved very quickly and now offers a whole range of prepaid water meters (for communal use, for individual connections, for irrigation, for purified water ATMs, etc.) and they now have clients in 15 of the 47 counties in Kenya. In 2017 they also did a pilot with NWSC, who recently approved a second project for another 20 prepaid communal water meters. The advantages of the prepaid meters include: Revenue collection increases by 300-400%, it transparent no hidden charges, only digital money, no cash, no need for operator costs, ensures 24/7 access and for communal prepaid meters only: multiple taps per meter can be added.*

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### Prepaid water system and improved operation and maintenance of Kibasi Borehole

Joint Effort to Save the Environment (JESE),  
Uganda WASH Alliance (UWA)

Community members of Kibasi village had not had water for one and half years because of non-functional water pumps. It failed to raise 500,000/= (USD 130) and repair rusted pipes and broken head pump. Residents of Kibasi village resorted to fetching water from unprotected water sources, spend to buy water (20 liters at 300/= Equivalent to USD 8 cents) from water vendors. Thus households spent substantial amounts to have water for domestic use. In 2016, JESE in collaboration with SIMAVI and Practica foundation piloted a prepaid water system on the broken down water pump of Kibasi after the borehole was rehabilitated. The community was trained on operation and maintenance using a prepaid water system, a water user committee to oversee general management and a shopkeeper to collect user fees paid per 20 liters of water collected was set up. For 20 liters of water households pay 100/= (USD 2 cents). 30% of collected water fees is paid to the shopkeeper and 5 members of the water user committee as wages, 50% is kept for operation and maintenance of borehole while 20% is given out as loans to the community at 2% interest. Ever since the prepaid water system was installed, the resident's home consumption has increased due to fare rates of water prices. The residents have access to clean safe water hence have stopped fetching water from unprotected sources.

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## The Worth of investing in WASH in rural Primary Schools: Case of Pallisa and Kibuku Districts

Solomon Kyeyune  
WaterAid

The triple bottom line provides a wider concept of determining the Value of investments based on their Economic, Social and Environmental worth. Often economic value is used in investment decisions at the expense of their social and environmental value. In social services like Water, Sanitation and Hygiene in schools there is growing need to relate investment to benefits or returns. At the end of a schools WASH project implemented by WaterAid in partnership with Build Africa in Kibuku and Pallisa Districts a Social Return of Investment (SROI) methodology was used to do this. The focus was to: provide insight into the socio-economic value created by the project investment in the target schools and communities; position and pitch WASH issues in the country's economic discourse and; generate evidence on how WASH interventions and investments can result into improved quality of life and incomes among the population

An evaluative approach consistent with both the principles and stages of undertaking an SROI analysis as set out by the SROI network and New economic foundation was used in data collection and analysis. It focused on four sets of stakeholders pupils, teachers, women in the community and targeted schools and seven outcomes for each of the selected stakeholders. Data was collected using four surveys [household, school, pupil and teacher] questionnaires designed using mWater software. A two-stage-stratified random sampling approach was adopted to select a total of 300 households, 300 pupils, 20 schools and 100 teachers as a sample size for the analysis. The data was analysed using the SROI Model. The overall SROI ratio for the project was estimated at 1:3.40 with a range of 1.17 to 4.61. This represented value in the form of improved school attendance, reduction in teacher absenteeism, improved productivity of women, improved dignity, and reduction in incidences of diarrheal diseases, improved safety and improved grade completion. The highest project value generated was for the pupils, especially for the girl child in relation to improved safety, followed by improved school attendance while least value was generated for teachers in terms of improved dignity and self-esteem. At community level the project led to reduction in time

spent by women and children collecting water, time spent looking after children with diarrhoea and reduction in the incidence of diarrhea cases and household medical expenditure on diarrheal related incidences across the communities surrounding the targeted schools. Therefore, in School WASH projects, highest value can be generated from less tangible aspects of the project, such as girls feeling safe when using the sanitation and hygiene facilities. Since this proved to have the most value, future projects should take steps to ensure this is addressed.

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## Integration of Market Approaches to Sanitation; A case of Slum Communities in Makidye and Lubaga divisions, Kampala District.

Kizito, C., Bugaari, A. and Zake, J.  
Environmental Alert

*This paper examines the potential of Water, Sanitation and Hygiene (WASH) based enterprises (such as briquette making, improved public toilet design with a business unit, crafts making from solid cloth waste) towards contribution to the triple benefits of improved livelihoods; a clean & healthy environment; and enhanced social organization and cohesion among slum dwellers in urban slums. This was largely realized through various intervention, which were implemented within the framework of the Descent Living Project in Makidindye and Lubaga Divisions by Environmental Alert in collaboration with Water Aid Uganda and Kampala City Council during the period 2014-2016. Interventions such as community mobilization, participation, sensitization, training, better access to appropriate technology & tools added value on existing knowledge, skills and social organization within the slum community. Furthermore, there was active involvement of key stakeholders (e.g. Village Health Teams/Community Based Health Workers; Community Based Organizations, Kampala Capital City Authority; Water Aid Uganda) within and outside the community based on their capacities and mandate. Overall the interventions are resulted in visible positive changes in the slum communities even after project end in 2016. Some of the visible changes in the communities include: Enhanced community empowerment; improved hygiene and sanitation at household and community levels; employment creation and increased incomes and well-being among community members who benefited directly from the project interventions; and enhanced social organization and cohesion among slum dwellers in urban slums. Despite, the demonstrated potential of WASH based enterprises in contributing towards the triple benefits there are several challenges and limitations which must be addressed by the duty bearers and development partners to tap into this potential at different scales.*

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## WASH situation of public schools in Gulu district

Partners for Community Health and Development Organisation  
Plot 7, Francis Egungu Road, Gulu Municipality

*Water and sanitation facilities and of the hygiene situation in 12 primary schools in Gulu District depicted that all schools had their own hand pump, access to safe drinking water was the challenge. In the area of sanitation substantial improvement was required: only two schools had sufficient toilet stances to comply with the Uganda standards (40:1), and the latrine superstructures in many schools were in a poor state. In addition, only 3 schools out of 12 had properly cleaned latrines*

and in 2/3 of the schools no soap was available for hand washing. In response to this, Partners for Community Health and Development Organisation (PACHEDO) is tackling these issues, by supporting schools with the refurbishment of their infrastructure and by training students. But achieving sustainable change seems challenging. One important reason is that operation and maintenance of WASH facilities is a blind spot in many schools. The responsibilities for these tasks are often not clearly assigned and the schools' budgets are limited. To improve the performance of schools with regard to WASH, further capacity building, as well as improved budget allocation, monitoring and supervision should be considered.

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## Umbrellas of Water and Sanitation Authorities – Genesis, transformation and management responsibility

Godfrey Hashakimana, Martin Wamalwa, Dominic Kavutse, Herbert Nuwamanya  
Ministry of Water and Environment

The Government of Uganda through the Ministry of Water and Environment (MWE) in collaboration with Development Partners have increasingly constructed piped water supply and sanitation facilities throughout the country with a view of increasing access to clean and safe water to the people of Uganda with the biggest challenge being the performance/functionality and sustainability of the facilities. Performance ensures that the beneficiary communities enjoy the benefits of the water systems all the time as needed while sustainability ensures that the services are available for as long as its design life time. In order for the Ministry to ensure that the objectives for which the water facilities are developed is felt in communities, several strategies have been put in place.

One of the successful strategies in this case include the creation of Umbrellas of Water and Sanitation Authorities (UAs). The UAs have been and will continue being key in supporting the operation and maintenance (O&M) and also direct management of the water supply and sanitation systems in Small Towns (STs) and Rural Growth Centres (RGCs) in the country. Currently, UAs are providing O&M support in 467 piped water supply and sanitation systems out of which 223 are under direct management by the UAs. In addition, the UAs have identified more than 1,200 piped water supply and sanitation systems that need O&M Support. Cognizant of this fact MWE through the four regionally based water and sanitation development facilities (WSDFs) are constructing about 30 schemes annually substantially increasing the number of schemes not adequately managed but attended to by the respective beneficiary communities whose capacities are often insufficient, the regionally based utility model being promoted through the umbrellas of water and sanitation authorities has been found relevant and effective. The gazetting of umbrellas of Water and Sanitation as Water Authorities is a vibrant idea intended to ensure that all the water supply systems in the country are managed effectively and efficiently hence ensuring improved functionality and sustainability for long term social-economical gains to the communities in the country.

The reform process is still ongoing but the Ministry has put in place a revolving fund that is intended to handle emergencies to ensure continued financial stability, a human resource capacity building system, a revenue and accountability system, communications strategy and more importantly a proactive approach. The performance of the systems has so far improved with reduction of non-revenue water (NRW) in some of the schemes including Katuna (reduced from 45% to 19%) and in Rwene, NRW has dropped to less than 5%. Little breakdowns and leakages have been reported since October 2017 this has been attributed to increased vigilance and



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proactive strategies that has ensured success of the utility model. UAs have put in place a stable and sustainable revenue and accountability system which ensures that capital investments in the schemes is guaranteed. There is massive metering of connections that are not metered, providing extensions and new connections to unserved areas. UAs have come up with mobile technical crews that rotate around the schemes to ensure functionality is up-to-date.

The approach towards the utility model takes the support of the beneficiary communities as a priority. The approach is to ensure that the communities remain part of the management structure especially through the Water Supply and Sanitation Committees (WSSCs) that have been into existence. The integration of WSSCs into the water management committees makes it possible for them to remain part and parcel of the reform process. The principle of operation ensures that, the existing water tariff is maintained as much as possible considering that some of the schemes are gravity flow schemes and have minimum O&M costs and cannot pay a similar tariff like pumping schemes. The tariff is being kept as low as possible and use of more qualified and experienced scheme operators is taken into consideration, especially who are based in the communities and have a direct understanding of the local conditions of the schemes. UAs have planned to maintain great focus to the attributes of effective utility management including though not limited to customer satisfaction, community and stakeholder engagement, financial viability, operational resiliency, product quality, infrastructure stability, water resource adequacy and human resource development.

### 3.0 Integrated Water Resources Management

#### Accelerating WASH using the Diamond approach

John Walugembe and Kulanyi Rashidah;  
WASH SDG programme-Uganda

In four towns in Rwenzori, Western Uganda, only 65% of 116,000 people living in these towns have access to safe sanitation. A quarter of the population defecates in the open. In these towns sewerage systems are rare and most people in use latrines. Having one truck to empty pits, most of the time pits are not emptied at all. Even when emptied, the sludge is dumped illegally, posing major health risks. In the region re-use of faecal sludge has not yet been set up. In support of these towns a Diamond Business Approach was adopted to institutionalize the sanitation business. It is a system-oriented and driven by demand and supply mechanisms. This model promotes the use of 'local finance (private sector as well as government)' as opposed to 'donor finance' to improve sanitation services in these towns.

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#### Establishment of Flood Early Warning Systems for Uganda

Tom Kanyike,  
Ministry of Water and Environment.

Over the last few decades, Uganda has recorded an increase in frequency of extreme events such as floods and droughts partly due to climate change aspects. Although the future climate cannot be predicted very accurately due to uncertainties about future Green House Gas (GHG) emissions, imperfection of climate models and imperfection of downscaling methods, it is important to note that various scenarios can still be given based on some tendencies such as global warming and acceleration of the water cycle. Therefore, all water resources projects



ought to factor-in climate change aspects in the designs. A wide-range of consequences for human societies and ecosystems are likely to happen as result of the expected impact of climate change on freshwater resources. These include increased frequency of extreme weather events and temperature increases of 20oC to 40oC, decrease the chance of maintaining the status quo in water supply and sanitation.

To prepare and cope with these expected impacts a paradigm shift in management of the water resources from manual monitoring of water resources to real-time monitoring of water resources. Upgrade of more than 50 telemetry hydrological monitoring stations that are now used to automatically capture data and transmit it in real time to a central server for processing and analysis has been completed. This has not only led to significant improvements in the quality of data but also placed a firm foundation to implementation of Flood Early Warning Systems across the country.

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### Development of activated carbon from rice husks for water purification

E. Menya a, b\*, P. W. Olupota, H. Storz c, M. Lubwamaa, Y. Kiros d

a Makerere University, Uganda

b Gulu University, Uganda

c Thuenen Institute of Agricultural Technology, Germany

d TH Royal Institute of Technology, Stockholm, Sweden

The useful application of rice husks in Uganda and many other developing countries is still very limited despite their abundant availability. Instead, a huge surplus of rice husks is usually stacked at the back of rice mills, openly dumped or merely burnt in open space, leading to environmental pollution. However, with the increasing awareness about the need for environmental protection, more research efforts have been focused on finding sustainable ways of disposing of rice husks, including production of activated carbon (AC) for various applications. In drinking water treatment, AC may be employed for natural organic matter (NOM) removal, which otherwise induces many adverse effects on the potability of water. The suitability of rice husk as a precursor is due to its physico- and bio-chemical properties, which may vary with rice variety and/or geographical location. This implies that even under similar preparation conditions, the quality of AC may still differ with rice variety and/or geographical location. Despite this possibility, there is still no information available regarding the quality of AC resulting from local rice husk varieties in Uganda, and their effectiveness to remove NOM in drinking water treatment. This study therefore seeks to develop an optimum process for production of AC from rice husk varieties in Uganda, and also demonstrate their potential application for NOM removal in drinking water treatment. This shall be done through characterization of rice husk varieties in Uganda, as well as optimization of both the activation process and conditions for NOM removal in drinking water treatment. Utilization of rice husks to produce ACs serves to support environmental protection, enhance sustainable value-added material production, as well as provide an alternative approach to management of agricultural waste to provide a useful commodity to society. More specifically, application of the developed rice husk ACs will provide a sustainable solution for providing safe drinking water to local communities in Uganda.

## Grass root Stakeholder mapping, Mobilization, concerns and levels of Participation in Catchment Based Integrated Water Resources Management Mpologoma Catchment Kyoga Water Management Zone Uganda

*Pamela Nyamutoka, Robert Kaliisa, Rose Nanyondo, Jimmy Asiku*

*International Institute of Rural Reconstruction (IIRR)*

*Stakeholder participation in Catchment Based Integrated Water Resources Management has shown to be an effective approach in increasing sustainable management of Water and related resources globally. Uganda adopted the use of IWRM framework 25 years ago and so far the experience in implementing the Catchment Based Integrated Water Resources Management tool in Uganda reveals that water and environment related problems can be addressed holistically if all stakeholders participate. However there are still gaps in the conceptualization of IWRM as a tool within communities and partner organizations. This study investigated stakeholder concerns and levels of participation in management of catchment based water resources in Mpologoma catchments of Kyoga Water Management Zone; The catchment has 13 districts Sironko, Bududa, Manafwa, Mbale, Butalejja, Budaka, Kibuku, Pallisa, Namutumba, Tororo, Buisa, Bugiri, Namayingo and Iganga.*

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## Utilising permits system self-monitoring data to support catchment based Integrated Water Resources Management in Uganda: Case study from Kampala Industrial and Business Park-Namanve

*Aheebwa Julius*

*Water supply plays a significant role in Uganda's social and economic developments but its development and management has been done with very little information which has sometimes resulted into unfeasible water development and management campaigns. In order to increase sources of data for feasible water development and management projects, there is need to motivate active participation of various stake holders involved in water resources data collection as per the present laws and policy frame works. This paper therefore presents a case study on how self-monitoring data in the permit system framework within the Water Resources Regulation and Planning Department may be utilized in catchment management and IWRM implementation. Self-monitoring pumping test data, borehole survey and completion reports collected by drilling permit holders; daily water abstraction volumes and water levels; collected by water permit holders together with other relevant climatic data have been analyzed to give useful information for conceptualization a ground system at Kampala Industrial and Business Park -Namanve area. This has in turn provided a frame work for predicting changes for various groundwater abstraction scenarios at three boreholes within the area. The results indicate that the rainfall recharge in the area is sufficient to balance the current groundwater abstraction rates with minimal water level variations  $\sim \pm 0.3m$  at all the three boreholes. Increasing the current borehole abstraction rates up to 100%, however, presented substantial water level declines of  $\sim 3.8m$  at borehole DWD 1746. This is important to note in comparison with the area's mean aquifer thickness of 24m and the extremely very slow movement of groundwater. In conclusion, improving the collection and*

utilization of quality self-monitoring data by DWRM will greatly complement the National water resources monitoring networks in providing data relevant for water resources development and management at both catchment and national level.

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### Besides physical scarcity: A social analysis of water scarcity in rural Rakai, Uganda.

*Innocent R Kamya, Narathius Asingwire and Dauda B Waiswa*

*Water scarcity is in most research a geophysical explanation. In this article, using extensive literature review and key informant interviews, we make the argument that people in some rural areas of Rakai District, Uganda, do not have access to safe water not because of the physical lack of the water but due to the way decisions are made about infrastructural allocation and facility maintenance attitudes. In Uganda, the Local governments at various levels play a key role in the decision making and management of water related services and activities. The water user communities also have a role they must play to ensure continuous supply of water from water sources. The findings from this study indicate that socio-political factors were critical in determining 1) new areas of service location largely based of political expediency; 2) the type of water supply technology used is more informed by economies of scale rather than sustainability and robustness of the technology; 3) water source maintenance votes and 4) the effective functionality of community management of water systems. Community contribution and equitable distribution are imperative in dealing with water scarcity.*

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## 4.0 Stakeholder engagement and water & environment sector financing

### Triggering Stakeholder Water Funding Interests

*Linda Lilian and Sandra van Soelen*  
*SIMAVI*

*While the 2017 Joint Sector Review Report for Uganda points out that the functionality for rural water supplies had reduced to 85%, from the 86%, Simavi partnering with 6 rural based organisations (3 of which are in Uganda 2 in Tanzania and 1 in Kenya), in the WASH & Learn Programme; makes effort to ensure WASH investments are financed, owned and sustained by the communities. This is being achieved through combining three working processes. The FIETS (Financial Institutional Environmental Technological and Social Sustainability), sustainability approach, risk assessment/mitigation as well as cost recovery planning. In this paper operational field experiences integrating the three processes to water as a business community models in communities in the Rwenzori Region in Uganda, Kakamega in Kenya and Dodoma in Tanzania are discussed and the effort to attain sustainability in the provision of safe water.*

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## Enhancing Incomes through Innovative Integrated Natural Resources Management Approaches, A Case of Manual Drilling Technology in Ntoroko District

*Birungi Stephen, Kabasinguzi Pamela, Tim Sutton*

*HEWASA Program with support from SIMAVI and PRACTICA foundation introduced and piloted manual drilling technologies and low cost pumps in Ntoroko district. This meant to address challenges the district had been hit by dry spell that dried up pastures and water for animals. Over 20,000 heads of cattle died. Cattle markets closed. Economic situation of people was affected. People did not have portable drinking water. Initial situational assessment results showed that manual drilling technology was feasible in the region. The prevailing short term gap measure was using water from wells for irrigation and watering animals. The technology was introduced basing on the "Diamond Business model" this enabled farmers, to engage in self-supply arrangements to consume services of Rwebisengo Drillers Association. This association capacity in drilling and repair of manually drilled water sources was developed under the project. Due increased availability of manually drilled water sources, cattle drinking at River Semuliki bank has reduced by 65,000 thus protecting the bank while farmers' incomes have increased.*

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## Promoting financial sustainability in Water Service Provision: A case of the Rainwater4Sale Project.

*James W. Kisekka (RAIN/Aidenvironment, Uganda) and Anne Kikundwa (URWA)*

*A business case for rainwater harvesting installations has been tested by URWA and RAIN since 2016. The business has been modeled around local entrepreneurs with proven experience in starting and operating a (small) business. A set of criteria and indicators was developed based on which the potential sites and entrepreneurs were assessed. An entrepreneur with a higher total score had a higher chance of being selected to participate in the project. The Selected entrepreneur receives a loan (in form of a rainwater harvesting installation constructed by experts), operates it and becomes its full owner after the loan repayment. it can be seen that rainwater harvesting for sale can be a self-financing business, but there are several factors to take into account. In this paper, the project approach, early results, and lessons learned are presented.*

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## Political involvement as a leverage factor for achieving Sustainable WASH for all.

*Martin Watsisi  
IRC*

*WASH implementers at the district level often denote the involvement of political leaders in WASH matters as interference. However, a sustainable WASH factor analysis and stakeholder mapping in Kabarole identified, district political leaders as central actors and political involvement in WASH*

as a leverage factor for Sustainable WASH services. Political leaders have authority to facilitate the skills, and resources usage for sustainable WASH. The question is how to best engage them to harness the political involvement and the centrality of the political leaders to accelerate activities towards sustainable WASH for all. This has been the focus since 2016 whereby IRC has developed a focused process of bringing the political leaders to the forefront of driving the Sustainable WASH agenda in Kabarole district. This paper demonstrates the central nature of the district political leaders and how their involvement can leverage other factors for sustainable WASH services. It further demonstrates the political engagement processes by IRC and the resulting changes so far from technocrats and traditional WASH implementers to political promoters, influencers and advocates.

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## 5.0 Weather and Climate Change and capacity building

My waste my Mint

ODYEK Bosco,  
Agency for Sustainable Rural Transformation (AFSRT), Uganda,

Over 90% of Ugandans use Onsite Sanitation and most of the growing towns have no sewer systems and few faecal sludge treatment plants exist in the country. This is due to high construction and maintenance costs, coupled with very long distances that limit Faecal Sludge Management (FSM). In order to address this challenge, Decentralized Faecal Sludge Treatment (DEFAST) Plant was constructed in Kole district. This has promoted small emptying businesses that use the gulper technology and ensure appropriate re-use of faecal sludge for energy in form of briquettes and feeds, hence leading to sustainable FSM. Based on the field experience, DEFAST presents a suitable technology where the cost is reduced with contextual designs, which can be managed by local private entrepreneurs for sustainability of the facility. Reuse of the sludge presents more business opportunities, with ability to scale to other growing towns.

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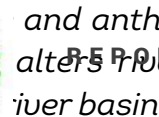
## Quantification of the effects of landuse changes and climate variability on the flooding in Manafwa sub-catchment, Eastern Uganda

Bogere Robert, Deogratias M.M. Mulungu and S.H. Mkhandi  
College of Engineering and Technology, Water Resources Engineering Department  
University of Dares Salaam

Flooding and drought are a natural environmental events occurring in many countries in the world causing fatal economic and human losses. The occurrence of these events are increasing due to alteration of local hydrology and anthropogenic factors. Climate change /variability alters the hydrological cycle and river discharge. As a result, these have major influence on the river basin in Eastern Uganda is flooded regularly causing inundations to the downstream plains of the districts of Butaleja,



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*This study therefore is aimed at quantifying the relative contributions of the two drivers in order to fully understand their individual effects. Using SWAT (Soil and Water Assessment Tools) model and GIS techniques, the impacts of land use change and climatic variability on flooding of the basin will be assessed. SWAT model has been calibrated and validated using performance tests and the NSE and R2 for calibration was 0.5 and 0.64 and 0.57 and 0.61 for validation.*

*Stream discharge and precipitation trend analysis was performed using Mann-Kendall and Sen's slope method at annual and seasonal basis and Land use and land cover change detection has been performed using GIS techniques. Trend analysis of mean areal precipitation (MAR) of the catchment showed a statistically significant decreasing trend at rates of -4.19, -2.27 and -1.67 mm per year for annual, December, January and February season (DJF), March, April and May season (MAM) respectively. For stream discharge the trend was increasing but statistically insignificantly in all cases. Land use and Land cover change (LULC) detection shows that forests and wetlands are being converted to cultivation areas at rates of 263.74 and 613.74 ha per year respectively. LULC and trends analysis will be the SWAT input scenarios for quantifying impacts on floods.*

*The outcome of this study can be used as a references for decision makers in establishment of proper land use planning and water policy aimed at proper Water Resources Management in the catchment.*

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### Piloting of a Mobile Faecal Sludge Transfer Tank in 5 Divisions of Kampala City

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Water for People-Uganda

*A mobile faecal sludge transfer station was designed to reduce sludge transportation costs of small scale manual latrine pit emptying entrepreneurs. Two pilot transfer stations have been developed within Kampala City and these are being implemented within five slums. Small scale gulper pit emptying operators deliver faecal sludge in small quantities from the filled-up latrines to these transfer stations. Operational costs for these emptying operators have reduced significantly and consequently the charge of pit emptying to households has reduced by roughly 40% and in turn more pits within the slums are being emptied.*

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### Water Resources Management in the Face of Natural and Human Systems Changes

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*Water is an integral component of climate change and the primary medium through which climate change mainly exhibits its impacts. Thus, water in a changing world affects the core and the dynamic linkages that interconnect changes in climate, the state of our water resources,*

demographic expansion and migration issues, food and energy shortages, and the continuing challenge of poverty. Thus, with the world facing growing water challenges in many regions, the extent to which climate change affects future societies cannot be understood without looking at its connectedness not only with the water resources but also with inequities and inequalities within affected communities especially in Africa.

Consequently, changes in the water resources in Africa are mainly shaped to a great extent by a number of key externalities, among them climate change itself, and the decisions taken far from the conventionally defined water sector and how these resources are used or misused. All these are further linked to the inequities and inequalities within the affected communities.

The inter-linkages between climate change, inequity and inequality need to be understood. This is a critical aspect in the process of strengthening the capacity of countries and people to avoid development reversals from climate hazards. Owing to structural inequalities and inequities, the impacts of climate change on water resources in Africa are not felt evenly by all people, even when the policies are the same. This paper address these challenges using the climate change, equality and equity nexus

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## Beyond Water Service Coverage for Slum Dwellers: Multiple Water Uses for Livelihood Enhancement'

C Kanyesigye, R Kitakufe, M Nambiro; JB Otema, R Mafunguro, R. Kaggwa, S Kayaga, J Fisher and S. Goodall.

National Water and Sewerage Corporation, in collaboration with the Water, Engineering and Development Centre (WEDC) of Loughborough University, the Lead Collaborator, implemented a research project 'Livelihoods from Enhanced Water Access for the Poor in Slums' (LEAPS), funded under the DFID's Water Security for the Poor (REACH) Program, and managed by the University of Oxford. The LEAPS Project intended to exploit further opportunities from advances made by progressive urban water utilities such as Uganda's National Water and Sewerage Corporation (NWSC) to improve water service coverage to high-density, low-income urban settlements. For instance, NWSC has installed over 20,000 PSPs and 1600 prepaid meters since 2006 in Kampala alone, leading to better water service quality in the informal settlement. The overall aim of the LEAPS project was to holistically improve water security for development growth for the urban poor, by exploiting improved water services in selected slums, beyond basic household use – and extend its utility to productive uses, in line with the Multiple water Uses Services (MUS) approach.

Using Kampala slums as a case study, the specific objectives of LEAPS were to (i) analyse opportunities for MUS, and develop a customisable MUS framework for enhancing the livelihood benefits for poor and vulnerable households in slums of cities of developing countries, which are currently only receiving a basic level of water services; (ii) work NWSC and its Urban Pro-Poor Department to implement the MUS framework, for the benefit of poor and vulnerable households in slums; and (iii) work with other relevant stakeholder organisations and selected poor and vulnerable households in the study area to validate the slum-specific MUS framework for enhancing livelihoods.

Since January 2017, LEAPS research activities were implemented in eight zones located in the three divisions of Makindye, Rubaga and Central Divisions. A stakeholder group to steer

the project was formed since the project inception. It comprised of NWSC, WEDC, KCCA, WaterAid Uganda; AC Together; Community Integrated Development Initiative (CIDI), Shelter and Settlements Alternatives (SSA); and Slum Dwellers Federation of Uganda. Data collected through community meetings, observations, focus group discussions, key informant interviews and household interviews were used to develop and validate a slum-specific MUS framework.

The key findings were (i) community groups and individual households were already predominantly using piped water for productive uses such as second-hand shoe washing and car washing; (ii) access to water services was still perceived a challenge for some communities in terms of availability, quality, accessibility and cost; (iii) community groups and households involved or interested in MUS activities required start-up/top up funding; and (iv) stakeholder organisations that participated in the research were willing to work with NWSC to implement the MUS framework in Kampala slums.

The developed slum-specific MUS framework could be implemented by urban water utilities, as part of their corporate social responsibility, to support community groups and individual households to engage in well-organised, monitored and regulated productive uses of water, leading to improved livelihoods. Collaboration with other relevant organisations involved in community welfare and development would enable efficient and effective mobilisation, organisation, capacity development and monitoring of the community groups and individual households engaged in the MUS activities.

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## Do Forecast-Based-Interventions Reduce Household Vulnerability to Diarrhoeal Diseases During Extreme Rainfall Events? The Case of Kapalabyong sub-county, North Eastern Uganda.

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The use of early-warning systems to strengthen primary diarrhoea preventive actions is one of the strategies being implemented in North-eastern Uganda as part of the Forecast-based Financing Initiative. Despite these actions, there is a lack of evidence to demonstrate that excessive rainfall increases diarrhoea cases in North-eastern Uganda. It is also unknown whether forecast-based WaSH interventions reduced household susceptibility to diarrhoea following the November-2015 predicted extreme rainfall event.

Analysis of time-series rainfall and diarrhoea records indicate that diarrhoea is positively correlated to rainfall ( $r=0.33$ ,  $p=0.003<0.01$ ); an increase in rainfall (1mm) leads to a 1.3% increase in diarrhoeal cases following an extreme-rainfall event. Further evaluation of household data collected through a prospective comparative cross-sectional survey revealed a significant difference ( $z=-6.248$ ,  $p=0.0000$ ) in the number of households reporting a diarrhoea incidence 0-4 weeks following the November-2015 rainfall event across intervention (50.9%) and non-intervention (70.9%) villages. Despite the differences, there is no strong statistical evidence to demonstrate that forecast-based WaSH interventions reduce household susceptibility to diarrhoea.



James W. Kisekka: (RAIN/Aidenuironment, Uganda) and Marion Iceduna (JESE)

*The Rwambu area faced several challenges: encroachment on the wetland for crop farming, and reports (by the community) of reduced soil fertility on the slopes and reduced dry-season-yield of boreholes as well as increased incidence of water borne diseases. Realising that the challenges inter-connected (i.e. one causing the other) RAIN, Wetlands International and JESE devised an integrated approach combining water harvesting, wetland protection and WASH service provision at landscape level. The partners zoned the project area according to location along the slope, determined which interventions best suit the different zones and collaborated with local leaders and farmers to implement the interventions. On the slopes (uphill and mid hill) water harvesting measures were implemented. Downhill strategies to discourage wetland degradation were implemented. In the entire project area sanitation and hygiene improvement efforts were launched.*

*After 3 years remarkable changes were observed: crop yields increased by 40%, while the water table rose to the extent that the boreholes and shallow wells no longer dried in the project area compared to elsewhere in the same sub-county. Farming in the wetland had been reduced, allowing wetland vegetation to regenerate.*

*In implementing the Rwambu project the partners identified some issues that need to be taken into consideration in promoting integrated land and water initiatives. For instance communities are reluctant to try “new things” without having seen the results, yet these results would only be seen once the “new things” have been tried. The project team decided to start with (training and) hiring youth to set up demo plots at which other people could see the results. While this approach was sound in itself, because the interventions needed to be demonstrated and tested, it seemed to have given community members an impression that they will all be supported by these youths. Further, the community was slow to adopt the measures until results became visible. Addressing this paradoxical situation would call for awareness creation on the benefits of the yet-to-be implemented measures –the best avenue would be visual tools (like videos) or learning visits to areas where the interventions have worked.*

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