Cranfield University
Institute of Water and Environment

School of Applied Sciences
MSc in Water Management: Water and Society

Academic Year: 2006-2007

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# Analysis of ways to improve water supplies for sedentary cattle-owning communities: a case study in Rwebisengo, Sub-county of Bundibugyo District, Uganda

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Date of presentation: 31 August 2007

This thesis is submitted in partial fulfilment of the requirements
for the Degree of Master of Science

# Abstract

Water resources management is a particular challenge for cattle-owning communities. Rwebisengo Sub-County lies in Bundibugyo District in Western Uganda. This rural region is water-stressed because water access can be limited regarding quantity and quality, and the conventional technologies present challenges of sustainability. As cattle husbandry firmly remains the primary source of livelihoods, and transhumant pastoralism is the predominant farming system, animals and the mobility involved in the search for pasture and water are other elements of the challenge.

The present study aimed to assess the extent of the water challenge for both domestic and animal consumption. Its objectives were to: (1) understand the attitudes of those pastoralist communities towards water, (2) critique the declared Government and NGOs policies in the light of the realities and needs identified, and (3) appraise the potential for the development of self-supply. These objectives were achieved through semi-structured interviews and observations.

The research clearly found that in this flat and dry area, watering livestock shapes the way the communities manage water. Open shallow hand-dug wells are the main water source for both humans and animals. While their access and maintenance are generally within the capacity of the communities, their reliability and water quality present a lot of weaknesses. In parallel, the conventional rural supplies, such as deep boreholes, remain externally financed and often end up being abandoned.

Alongside the self-supply initiatives which exist in the study area, Government policies fall under three key strategies: decentralisation, privatisation, and a demand-responsive approach with full community responsibility for water supply operation and maintenance. However, the implementation and monitoring of Government strategies show numerous shortcomings on the ground.

The gap can be bridged especially by providing incremental support to self-supply, while continuing to develop conventional water supplies with significant community empowerment and follow-up in order to achieve sustainability.



Keywords: pastoralist, livestock, community-based water supply, wells, self supply, Uganda

## Acknowledgments

I would like to thank George Alito for his kindness and all the support he provided me during my stay in Uganda. I will always have your Smile on mind!

I should like to send my warmest thanks and deepest appreciation to Rajabu Olimi Kituku and his family for their hospitality and kind-heartedness. My gratitude goes to all the people of Rwebisengo, especially those who let me interview them! A big thanks to my interpreter Lucky Kamakune Agaba for her warmth, performance and patience. I insist to thank her mother for her kindness.

I pay my last respects to the former Member of Parliament of Rwebisengo.

I would like to thank all the following people for their support and kind attention provided during my research project: Jaana Misisera, Wilson and Vincent Maher and his wife Jackie Nabulowam. A special thanks to Catherine Muhumuza and Kerstin Danert for their assistance and kindness and for giving me the opportunity to conduct this research.

I express my particular gratitude to Richard Carter for his advice in the execution of my thesis and his gentleness.

I wish to thank all my family for their support- especially my mother and sisters!

Warm thanks to my friends, Aurelien, Heloise and Morgane for their attention. I should like to extend my grateful thanks to Maarten and David for their precious help.

*“When the emphasis is on people, communication problems become paramount… If the people cannot adapt themselves to the methods, then the methods must be adapted to the people."*

E.F Schumacher

Small is Beautiful

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# Glossary

The following definitions as used for the purpose of this report:

**Animal husbandry** (from Encyclopedia Dictionary, 2007):
It is the agricultural practice of breeding and raising livestock. As such, it is a vital skill for farmers and in some countries, a form of art.

**Cattle** (from Encyclopedia Dictionary, 2007):
Any various chiefly domesticated mammals of the genus *Bos*, including cows, steers, bulls, and oxen, often raised for meat and dairy products.

**Livestock** (from Encyclopedia Dictionary, 2007):
It is the term used to refer (singularly or plurally) to a domesticated animal intentionally reared in an agricultural setting to make products such as food or fibre, or for its labour. Livestock may be raised for subsistence or for profit

**Pastoralism** (from Encyclopedia Dictionary, 2007):
It is a form of animal husbandry which contains a mobile element, moving herds in search of fresh pasture and water.

**Transhumance** (adapted from Encyclopedia Dictionary, 2007):
This occurs when herdsmen move the cattle seasonally from one area to another, often between higher and lower pastures. The rest of the family is able to stay in the same location, resulting in longer-standing housing.

**Nomadic Pastoralism** (from Hussein, 1998)
Farmers who depend largely on animal production for their livelihoods, have no fixed residence due to a need for mobility to search for grazing and water resources, and practise crop production only as a supplement to livestock-raising

**Transhumant Pastoralism** (from Hussein, 1998)
Farmers who practise both livestock rearing and crop cultivation, who follow a particular movement with their herds over fairly regular routes, but maintain a "home area" where they settle for part of the year.

**Agro-Pastoralism** (from Hussein, 1998)
Farmers who gain their livelihoods from crop production and animal husbandry in about equal proportions, live in semi-permanent settlements, and supplement farming activities with other income earning activities as required

**Sedentary Farmers** (from Hussein, 1998)
Farmers living in permanent settlements gaining their livelihood mainly from crop production, with domestic animals providing supplementary income

**Improved water sources** (WHO, UNICEF, JMP, 2006)
Piped water into dwelling, plot or yard, public tap/standpipe, tube well/borehole, protected dug well, protected spring, rainwater collection

**Unimproved water sources** (WHO, UNICEF, JMP, 2006)
Unprotected dug well, unprotected spring, cart with small tank/drum, bottled water[1], tanker-truck, surface water (river, dam, lake, pond, stream, canal, irrigation channels)

[1] Bottled water is considered improved only when the household uses water from an improved source for cooking and personal hygiene.

# Notations

| | |
|---|---|
| BTC | Belgium Technical Cooperation |
| BDLC | Bundibugyo District Local Government |
| CAO | Chief Administrative Officer of District |
| CBG | Capacity Building Grant |
| CBO | Community Based Organisation |
| CDF | Community Development Facilitator |
| CDO | Community Development Officer |
| DBs | Deep Boreholes |
| DRA | Demand Responsive Approach |
| DRC | Democratic Republic of Congo |
| DWD | Directorate of Water Development |
| DWO | District Water Officer |
| DWDCG | District Water Development Conditional Grants |
| FPO | Focal Point Officer |
| FY | Financial Year |
| GoU | Government of Uganda |
| HH | Household |
| JMP | Joint Monitoring Programme |
| LDG | Local Development Grant |
| LGs | Local Governments |
| MAAHWR | Ministry of Agriculture, Animal Husbandry and Water Resources of Kenya |
| MDG | Millennium Development Goal |
| MoLG | Ministry of Local Government |
| MoWE | Ministry of Water and Environment |
| MRDP | Multi-sectoral Rural Development Programme |
| NGO | Non Governmental Organisation |
| NFO&MRWS | The National Framework for O&M of Rural Water Supplies (2004) |
| O&M | Operation and Maintenance |
| OP-5 | GoU 5-year Operation Plan for the Water Sector (2007-2012) |
| OW | Open Well |
| OSHW | Open shallow hand-dug well |
| PEAP | Poverty Eradication Action Plan |
| PRSP | Poverty Reduction strategy Programme |
| RGC | Rural Growth Centre |
| RMCCC | Rwebisengo Maternal & Child Care Centre |
| RWH | Rainwater Harvesting |
| RWSN | Rural Water Supply Network |
| RWSS | Rural Water and Sanitation Sub-sector |
| SDWs | Shallow Drilled Wells |
| SIP | Sector Investment Plan |
| S/C | Sub-county |
| TSU | Technical Support Unit (Bundibugyo District is included in TSU6) |
| UFW | Upgrading of Family Wells |
| UCC | Uganda Communication Commission |
| UMURDA | Uganda Muslim Rural Development Association |
| UNICEF | United Nations International Children's Emergency Fund |

| | |
|---|---|
| UN OCHA | United Nations Office for the Coordination of Humanitarian Affairs |
| Ushs | Ugandan Shillings (£1 = Ushs3443) |
| WEDA | Wera Development Association |
| WFP | Water For Production |
| WHO | World Health Organisation |
| WSP | Water and Sanitation Programme (World Bank) |
| WUC | Water User Committee |

# 1. Introduction

## 1.1. Background of the research project

"*People scratch sand to get water*" was one highlight of the 2006 communication addressed to the Ministry of Water and Environment (MoWE) by the late Member of Parliament of Rwebisengo (Sub-county of Bundibugyo District). This cry of alarm aimed to bring to notice his concern on the water and sanitation challenges faced by the populations in Rwebisengo Sub-county. In response to this claim expressed in late 2006, the Directorate of Water Development (DWD) reacted quickly by undertaking two two-day field visits in January and February 2007 in an attempt to assess the extent of the problem (Danert, 2007).

According to this assessment, Rwebisengo Sub-county is as a water-stressed area in terms of water quantity, water quality and the inefficiency and ineffectiveness of the conventional hand-pump supplies. Furthermore, the local populations are traditionally and still firmly pastoralists. Beyond its traditional and cultural value, cattle husbandry represents the pillar of their economic activity and livelihood. The coexistence of few humans with large herds of cattle has a huge impact on water resource management in terms of both quantity and quality. This particular context results in a dual challenge for the local communities who strive to provide water for both themselves (domestic use) and their animals. At the end, despite the intensive labour and bad water quality they involve, the open hand-dug wells are the main water supplies and seem to stand up to the conventional technologies which present challenges of sustainability. This work has opened room for required further investigations in order to understand those challenges in-depth; find out their causes and develop appropriate solutions.

## 1.2. Context

### 1.2.1. Administrative structure

Rwebisengo Sub-county is located in Bundibugyo District and is composed of seven parishes. The administrative organisation is shown in the Table 1.1. Every level from

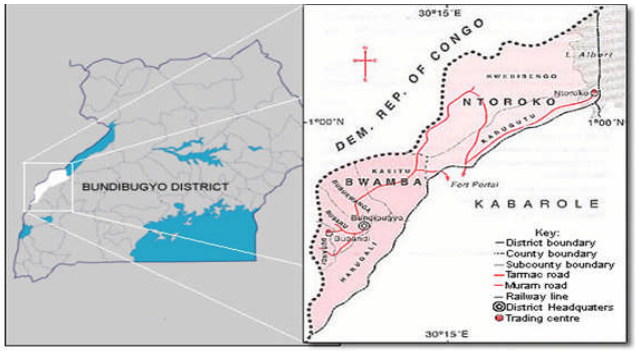
the village to the District is represented by locally elected political leaders called Local Councillors (LCs).

**Table 1-1: Administrative structure of Rwebisengo Sub-county**

| Administrative sub-divisions | Names | Local Councillors |
|---|---|---|
| District | Bundibugyo | LC5 |
| County | Ntoroko | LC4 |
| Sub-county | Rwebisengo | LC3 |
| Parish | Butungama, Bweramule, Haibale, Kasungu, Kiranga, Masaka and Rwebisengo Town | LC2 |
| Village | 39 Villages | LC1 |

### 1.2.2. Physical environment

Bundibugyo District lies in Western Uganda (see Figure 1-1), covers 2338 km² and borders the Democratic Republic of Congo (DRC) and four other Districts (Kabarole, Kibaale, Hoima and Kasese).




Source : Uganda Communication Commission, 2003

**Figure 1-1: Location of Bundibugyo District**

Bundibugyo stretches between western Rift Valley and the northern face of the Rwenzori Mountains. Rwebisengo (777 km²) and Kanara Sub-counties lie on the floodplain of the Semiliki Valley. The flat area of Rwebisengo is stretched along the meandering River Semiliki and is enclosed within the two mountain chains. The soil is sand and clay. Rwebisengo is susceptible to seasonal floods and droughts (UN OCHA, 2001).

Bundibugyo District experiences a bi-annual rainfall pattern (between 800 and 1600 mm depending on the altitude) which occurs between March and May and from August to November. The water table is very shallow and contains a significant concentration of salts increasing with the depth. Data on the variation and type of salts remains very limited and requires further investigations which can start with the water quality data collected from deep boreholes by two the contractors: Kiba and Aquatech (Danert, 2007).

Rwebisengo is a group of villages where the houses are very scattered, in contrast to the densely populated Rwebisengo Rural Growth Centre (RGC). Murram and poor dry weather roads hinder mobility within the whole County. However, a road scheme from Bundibugyo to Rwebisengo is at the planning stage with the Local Governments and the Belgium Development Cooperation agency (BTC).

### 1.2.3. Population and local economic activities

The population of Rwebisengo is estimated[2] today at around 30,000 people called Batuku (there as many males as females). Most of them firmly depend on a long tradition of livestock farming for their primary subsistence and livelihood (98% of the population depends on selling their animals in the livestock markets to raise cash to buy food (BDLC, 2007)). Cattle husbandry represents the major income generator for the Sub-county which has 84,232 head of cattle and where *"A Home without cattle is not respected even if the headmaster has an accumulated account"* (Interview of the S/C Veterinary Officer, 2007). Crop cultivation (cassava, maize and cocoa) is practised but at a very small scale since the community has traditionally dedicated only 5 % of Rwebisengo land to it. Fishing along the Semiliki River and from the Lake Albert and gypsum mining in Kibbuku Mountains (Bweramule Parish) remain other minor economic and subsistence activities. See Table 1-2

[2] Considering the last 2002 national census and the Ugandan rural growth rate of 3.3% (MoWE, 2007)

**Table 1-2: Distribution of the sources of income for the population of the Sub-county, FY 2006-2007**

| Activities | Sources of income for the population of the S/C |
|---|---|
| Animal rearing | 80% |
| Fishing | 8% |
| Trade | 10% |
| Crop growing | 2% |

(Source: BDLG, 2007)

### 1.2.4. From nomadism to pastoralism and transhumance

Historically the Batuku used to be nomadic pastoralists associated with seasonal migrations in search of pasture and water and temporary housing. But most if not all of the cattle farmers have settled and built longer-standing houses from mud and wattle with thin roofs or from bricks in the case of the richest. Much of this has happened as a result of the Land Act 1998, according to which "all land is vested in the citizens of Uganda to be owned". Seasonal migrations have transformed into simple transhumance and/or daily movements around the Semiliki valley and within, on average, a 5 km radius of the owner's house. These daily movements can still take place because unlike land private ownership, grazing remains strongly communal.

"Food insecurity" occurs mainly because some people own no cattle, and very limited land is dedicated to crop cultivation by the local land management rules.

## 1.3. Aim and objectives

The aim of this research project was to investigate ways of water supply improvement based on the self help supply concept especially for pastoralists. While this study considers water demand for both domestic uses and watering animals, it explicitly excludes the subject of sanitation. The specific objectives were to:

- Understand water users' attitudes and perceptions towards water supplies for both domestic uses and livestock: assess (in terms of water quantity and quality) the current practices, knowledge, needs, aspirations, and priorities.

- Determine reasons for the failure of the existing conventional technologies and the extent of the existing self help supply initiatives
- Identify the declared strategies and policies of the Central government, Local governments (District and S/C levels), NGOs, and compare them to the realities at Parish and Village levels.
- Identify potential solutions (in terms of technologies, management and policies) for improving the existing self help supplies and the self supply support by government.

# 2. Literature Review

## 2.1. Challenges at a global scale

### 2.1.1. The drinking water MDG and Sub-Saharan Africa

Target ten under the Seventh Millennium Development Goal (MDG) aims by 2015 to reduce by half the more than 1.1 billion people (of whom 84% live in rural areas) who in early 2000 remained without sustainable access to safe drinking water (JMP, 2006). Sub-Saharan Africa is of greatest concern since its ongoing pace of progress makes the continent unlikely to reach the MDG target by 2040 (UNDP, 2006).

### 2.1.2. The drinking water MDG and Uganda

Uganda needs to more than double its 1990-2004 rate of increase in order to meet the drinking water MDG target by 2015 (JMP, 2006). In response to this, the government of Uganda has particularly addressed the rural water supply and sanitation relating it to the 1998 Poverty Reduction Strategy Programme and the Poverty Action Funds (Sutton, 2004, Water Aid, 2005). The strong commitment of GoU is acknowledged by its plan to increase the current 58.5% rural water coverage to 77% by 2015 which is even more ambitious than the drinking water MDG objective (MoWE, 2006).

## 2.2. Specific challenges for pastoralists

### 2.2.1. Different types of pastoralisms

Regarding the extent that people are settling and the relative importance of livestock and crops within the group, Hussein (1998) distinguished different types of pastoralism defined in the Glossary and illustrated in Figure 2-1. In this respect, Rwebisengo Sub-county is mainly composed of sedentary cattle owning communities who practice transhumant pastoralism.

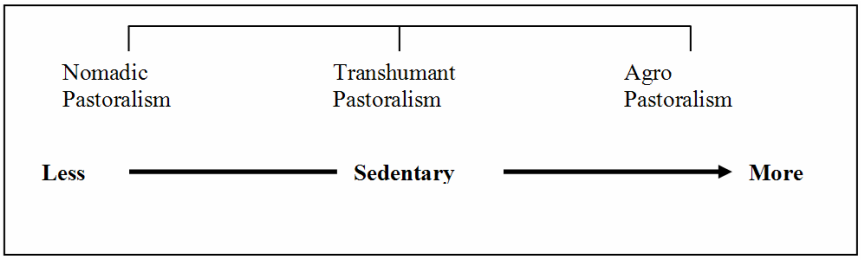



**Figure 2-1: Different Pastoralism against degree of sedentary process**

### 2.2.2. The pastoral system: land, water need, human and livestock

***Land***

Although it can occur in humid areas, pastoralism is generally practised in arid or semi-arid areas which are prone to drought and where rainfall is often unreliable and/or unpredictable. *"Pastoralists live in risky ecosystems which remain very marginal lands from the point of view of human exploitation"* (Owen, 1979). In Uganda, those pastoral systems are often characterised by scattered-housing and hemmed-in positions due to poor and dry weather roads which hinder mobility (NEPAD & FAO, 2004). An important feature of pastoral systems is communal grazing which is further discussed below.

***Livestock***

Livestock movement along regular routes or transhumance made by herdsmen in search of pasture and/or water shape the natural resources management in pastoral systems. Dr. Wright (1985) stated that this is a result of the requirements livestock have for small

volumes of water from dispersed sources to allow flexible grazing systems. However all species have their own water requirements. General data and those specific to the indigenous Ntuku cattle of Rwebisengo are below:

- Cattle constantly need fresh and salted water and have to be kept within 4-8 km of a water source (Owen, 1979; Humphreys, 1991)
- The salinity required is acceptable up to 10 g/l of total dissolved solids (LEGS, 2007)

**Table 2-1: Data on the indigenous Ntuku cattle of Rwebisengo**

| **Average of water requirements for a cow** | |
|---|---|
| With normal diet without any restriction | 20-30 L/day |
| For maintenance | 10 L/day |
| **Local economic value** | |
| A cow | 300,000 - 400,000 Ushs |
| A bullock | 500,000 - 700,000 Ushs |
| **Total cattle heads** | |
| Total of heads in Rwebisengo S/C | 84,232 |
| Total average of a private herd | 200 |

Source: Veterinary Officer of Ntoroko County based in Rwebisengo S/C (from his interview)

***Water facilities for animals and humans***

*"In traditional pastoral systems herdsmen generally rely on base flow in rivers, seasonal water holes, and shallow groundwater, accessible by dug wells"* (Wright, 1985). Ponds and wells are used respectively during the wet and dry seasons (Humphreys, 1991). The wells are usually equipped with watering troughs for animals.

Open wells are pointed out by Sutton (2004) as the main water points for domestic consumption since in semi-arid areas, where the water table is less than 15m below ground, many households get water from pen wells they dig and deepen themselves according the rate at which the water table falls. These open wells provide water of poor quality due to potentially high faecal coliform counts (Carter, 1994).

***Pastoralists' attitude towards natural resource management (water, land)***

As livestock is almost the only means of asset accumulation and at the same time prone to disease and drought, life in such areas is precarious. This results in pastoralists being generous and understanding as concerns natural resources such as private water holes for which they claim no exclusive use (MAAHWR, 1962). This custom of sharing private water facilities between neighbours has been pointed out by Carter *et al.* (2006).

### 2.2.3. The Challenges in pastoral system

As *"man, water, livestock and rangeland have to be considered as elements of the same system"* (Pallas, 1986), their coexistence results in different challenges.

- In arid or semi arid areas water storage may not meet the demand
- The demand is growing since pastoral systems experience demographic pressure due to combined factors: natural population growth (Rural Ugandan growth rate is 3.3%), settlement imposed by Governments (under the Land Act 1998 in Uganda) and the increasing population of livestock.
- The coexistence between humans and animals has an impact on water quantity and quality. McDonald (2006) described the latter by discussing the various routes for water-born diseases: Human-to-animal-to-human and Animal-to-human via the environment. Dung and animal corpses have to be prevented from entering into water intended for domestic use and watering animals. Another challenge consists of reducing trampling around water holes since poaching reduces the total porosity, moisture retention and drainage (Owen, 1979; Humphreys, 1991).
- Meeting the water needs of human and animals without damaging cultivators' interests;
- Adapting development projects to the specific context: scattered houses, poor roads, daily mobility or transhumance of herdsmen.

## 2.3. The Ugandan rural water sector

In Uganda most of the people without access to improved water supply and sanitation live in the rural area where the coverage is estimated at 61% (MoWE, 2006).

### 2.3.1. Description of the legal, policy and institutional framework

***The legal and institutional framework***

- **National level**

The Directorate of Water Development (DWD) is in charge of the rural water supply under the Ministry of Water and Environment (MoWE). Along with the decentralisation, eight Technical Support Units (TSUs) headed by a Focal Point, have

been established with the responsibility to help LGs to strategically build their capacity and implement the rural water services through guidance.

Most of the rural water projects are Government funded chiefly through the District Water and Sanitation Conditional Grant (DWSCG) (MoWE, 2006). The support of the NGOs to the RWS is only less than 20 percent of the total expenditures (Carter *et al.*, 2006). This reflects the strong commitment of the government to address the rural water sector and thereby meet its Poverty Eradication Action Plan (PEAP) objectives.

- **Local level**

With respect to the Fiscal Decentralisation Strategy, these funds are budgeted at the District and Sub-county levels especially through the District Government Planning Cycle. LGs are in charge of planning, resource allocation and community mobilization. Within the District Water Office, the key staff include: a District Engineer, a District Water Officer (DWO), and Assistant District Water and County Water Officers (ADWOs and CWOs). In addition to this, some other officers such as the Community Development Officer (CDO) or Community Development Assistant (CDA) do exist but are not sufficient or not skilled enough to carry out all water-supply related tasks. The Sub-county is vested with specific duties while being allocated no officers for water services implementation and monitoring.

> ***Sub-county Government*** has a major role in following up communities regarding O&M (through monitoring visits, re-training of committees and caretakers) and co-financing major repairs. It is important that sub-county Governments plan and budget for O&M activities accordingly. (MoWE, 2007)

**Box 2-1: Sub-County Government role**

The end-users are responsible not only for requesting and planning improved water and sanitation services, but also for their operation and maintenance without external support (O&M) (MoWE, 2007).

***Policy and strategies***

The overall national policy objectives for, (domestic)[3] water supply and sanitation and water for production are shown in the box below (MoWE, 2007).

(i) "*To manage and develop the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs of the present and future generations with the full participation of all stakeholders*" (The National Water Policy, 1999).

(ii) To provide "*sustainable provision of safe water within easy reach and hygienic sanitation facilities, based on management responsibility and ownership by the users, to 77% of the population in rural areas and 100% of the urban population by the year 2015 with an 80%-90% effective use and functionality of facilities*" (Medium Term Budget Paper, 2006). This is more ambitious than the MDG which aims to halve the percentage of people without access to safe water by 2015 in Uganda.

(iii) "*Promote development of water supply for agricultural production in order to modernise agriculture and mitigate effects of climatic variations on rain fed agriculture"* **(**The National Water Policy, 1999).

**Box 2-2: The overall national water policy objectives**

*"Today Uganda is held up by donors as a model of how sector reform can contribute towards building a dynamic water and sanitation sector"* (Water Aid, 2006). This reform is particularly due to the 5 key strategies provided in the Rural Water Supply and Sanitation (RWSS) 15 year-Sector Investment Plan (SIP-15) for provision and management of rural water services: a Sector Wide Approach to Planning SWAP[4] and a decentralised privatised and demand responsive approach (DRA), with full community responsibility for O&M of the water sources (MoWE, 2007; Carter, 2006). Concerning their implementation, the (2007-2012) 5-year Operational Plan (OP-5) provides guidelines and critical requirements especially for sustainable maintenance (MoWE, 2007) given below (Box 2-3) and detailed in the Appendix A. However some of those requirements remain unclear such as the third for the increase of 30% of the latrine coverage with no precision on the measurement or the sixth which provided that the S/C should facilitated the community O&M with no Water Officer.

[3] Domestic use is legally defined to include use for the purpose of basic human consumption, watering not more than thirty livestock units (about 43 cattle or 50 horses or 75 donkeys or 200 goats or 200 sheep or a mixture of these animals), subsistence agriculture, and watering a subsistence fish pond (Obitre-Gama, 1999)

[4] SWAP was adopted in 2002 in view of Government and development partners supporting a single policy and expenditure programme under the leadership of the Government (RWSS is the most advanced in terms of its implementation)

1. ***Signed Memoranda of Understanding***
2. ***Meaningful involvement of women***.
3. ***Hygiene Promotion and Sanitation.***
4. ***Community Contributions***.
5. ***Settlement of Land and Ownership Conflicts***.
6. ***Operation and Maintenance Plan.***

**Box 2-3: Critical requirements provided in the 2007-2012 OP-5**

### 2.3.2. Some challenges to highlight

The main challenges concern the investment sources and O&M described below:

- About 30% of the existing facilities are not functioning (DWD, 2004)
- Subsidies in the RWSS exceeded the 95% in 2001 (Mills, 2006)
- The community-based O&M remains flawed

In response to the first challenge of O&M and as a result of the emphasis on water quality and coverage, the DWD released a '*National Framework for Operation and Maintenance of Rural Water Supplies'* in 2004 in an attempt to give guidance for more efficient O&M, which has recently been recognised as crucial for the sustainability of water supplies. Because the potential improvements in O&M are a long process, the Government and the Uganda Rainwater Association (URWA) have incorporated community-level and institutional rainwater harvesting (RWH) into the agenda (Carter. *et al*., 2006). The progressive consideration of RWH household-level initiatives has given a more conducive context to self-supply which is further discussed below.

### 2.3.3. Non-Governmental Organisations (NGOs), Community Based Organisations (CBOs)

Under the supervision of the DWO, the role of NGOs and CBOs in rural water supply and sanitation provision is acknowledged (construction of facilities, community mobilisation, training of communities and LGs, hygiene promotion, advocacy and lobbying) to be actively supporting the water sector improvements. In August 2006 the Uganda Water and Sanitation NGO Network (UWASNET) included 100 NGOs/CBOs implementing projects in the sector (Carter, 2006).

### 2.3.4. Private sector

The Private sector is a main actor contracted out by and under the supervision of the DWO which implements the activities (such as construction of water sources). This sector has been strengthened for more than ten years, but its service delivery and cost-effectiveness remain problematic (Carter *et al.*, 2006).

## 2.4. Self Help Supply

Self-supply fundamentally refers to a community or individual initiatives to improve communal or private water supplies with little or no external assistance from the Government or Non-governmental organisation (NGO). Therefore it essentially refers to low cost and locally available technologies.

### 2.4.1. Previous study

In 1980 the acknowledgement of the potential of so-called “family” wells in Zimbabwe added a significant if not the first contribution to Self Supply building. From 1990 to 2002 a pioneering programme subsidised about 30% of the upgrade of about 50 000 family wells serving nearly half a million Zimbabwean people with domestic and small scale productive water (Carter, 2006). In parallel, Zambia incorporated the self supply approach into national policy between 1998 and 2002. Two significant following steps are the study of self-supply potentials carried out by Sutton (2004) in Sub-Saharan Africa and the ongoing investigations supported by WSP and RWSN in Uganda (Carter, 2006).

### 2.4.2. Outcomes

The main outcomes of those studies are below:

- An existing barrier: the implicit or explicit opposition made by many organisations between conventional systems considered as “improved” and “safe” and the traditional water supplies regarded as “unimproved” and “unsafe”.
- Conceptualisation of Self-supply based on community ownership and initiative and the incremental upgrade of any technology (even if this outcome is not optimal to the water user). Carter gives possible improvements shown in Table 8-5, Appendix C

- A set of tools to evaluate the performance of self-supplies within a pluralistic approach: the classification of groundwater sources into four main types and a scoring system according access, water quality, reliability, cost and management (See Tables 8-3 and 8-4 in Appendix C)

Overall, the concept of self-supply built on the above principles is judged by the researcher to bring out an unbiased basis to appraise the potential of self-supply and an open room for effective implementation and incentives for Government support. However, not all the categorisations made within these studies are acknowledged, such as the recurrent association of conventional technologies to expensive maintenance or the systematic location of self-help sources within household boundary or 100 metres (See Appendix B) (Sutton, 2004). The present research project finds this concept lacking concern for water for productive purposes, which is rarely mentioned especially by Carter (2006), who suggests the separation of domestic and livestock water sources in case of high level of conflict (See Table 8-5 in Appendix C).

## 2.5. The Ugandan Self Supply context

### 2.5.1. An external and general perspective

While in 2004 Sutton concluded that as other Sub-Saharan countries[5], Uganda has a context conducive to the development of self supply in terms of promotion and support, Carter *et al*. (2006) acknowledged the potential for self-supply to improve water supply provision in Uganda because the types[6] 1 and 2 sources may serve around a third of the Ugandan rural populations while types 3 and 4 sources possibly and respectively provide water to less than 5% and 1% of the rural populations water needs.

[5] The other countries concerned by this conclusion are Cote d'Ivoire, Benin, the Democratic Republic of Congo, Liberia, Mali, Nigeria, Sierra Leone, and Zambia and parts of Chad, Malawi, Mozambique and Tanzania

[6] The four types of groundwater are described by Carter (2006) in Table 8-3 in Appendix C.

### 2.5.2. Self-supply and the Ugandan Government

In Uganda self-supply has been ignored until 2005 when a steering committee chaired by the Assistant Commissioner Rural Water (including DWD, UWASNET and WaterAid) was set up and vested with the research and development of self-supply. This national commitment and action are still ongoing through the continuing implementation and evaluation of both the Self Supply Pilot projects (UMURDA and WEDA). The barriers and opportunities to self-supply development identified in the Ugandan context are summarised in the Table 2-2 (Carter et al., 2006, Mills, 2006).

**Table 2-2: Barriers and opportunities for Self-Supply in the Ugandan context**

| Barriers | Opportunities |
|---|---|
| ▪ The gap between the authorities and water users perceptions: while accessibility and reliability are the priorities of the latter, water quality standard is the emphasis of the authorities who even officially discourage use of poor water quality<br>▪ The provision of support to communities but not to household and the perception of self-supply support as incompatible with the Local Government scheduling<br>▪ The disregard of the groundwater source types 1 and 2 and their potential according to GoU and NGOs; the great number of households not able to invest into type 3 and 4<br>▪ The lack of knowledge of GoU and NGOs and water sector professionals of alternatives referring to self-supplies | ▪ The running of the pilot projects to bring out the effectiveness of self-supply support and strategies<br>▪ The consideration of rainwater harvesting (RWH) in estimating access to improved water supplies and coverage in rural areas (MoWE, 2006)<br>▪ The existing support for RWH self-supply initiatives to the lowest levels; RWH is one of the most active areas of rural water self-supply in Uganda: NGO support to households, institutions and communities and Government support to communities have been practised over respectively 15 years and 5 years (Carter, 2006)<br>▪ The current Draft Action Plan aims to bring about an increase in the number of household enjoying the benefits of improved RWH from 6,000 to 21,000 over the 5-year period commencing in July 2005 (Carter, 2006). |

In view of these barriers and opportunities, it is clear that Uganda is not an unexplored field vis-à-vis self-supply acknowledgment and support. Even if up to 2006, any NGOs in Uganda neither government nor LLGs have adopted the self-supply approach (Carter, 2006), their all-or-nothing vision of water supplies is increasingly superseded by its pluralistic conception. In the end the increasing interest in domestic RWH and shallow groundwater in Uganda may turn its rural water sector to the advantage of self-supply concept and implementation. However to allow effective implementation of self-supply support strategies, some clarification can be expected from statements such as the one below (Box 2-5) where the term *"wealthier"* is not defined.

In the long term a system could be established to encourage more investment into self-supply sources by wealthier households and enable Government funds to target the very poor.
(MoWE, 2006, page v)

**Box 2-4: A Government Strategy for RWH support**

# 3. Methodology

This section aims to provide the theoretical and practical dimensions of the research and explains the techniques involved, justifies the results and point out the barriers met. The theoretical part mainly refers to the social research textbook authored by Neuman (2003).

## 3.1. Theoretical and practical dimensions

### 3.1.1. Type and purpose of the research study

This study is meant to be an *"applied research"* since this small-scale project was conducted to address the specific issue of water supply in Rwebisengo S/C and provide practical results and potential solutions for the decision-makers: GoU, LGs and NGOs.
The purpose of this research can be described as a combination of both description and explanation. First description represents the main goal of this study especially because it provides a detailed and accurate picture of the communities' attitude towards water resource management, and creates a set of categories of the water sources used. Secondly this research is meant to be also explanatory since the reasons behind the recurrent failure of conventional technologies such as deep boreholes were investigated.

### 3.1.2. Data collection technique

There are some quantitative data related to the surveys conducted and the use of existing statistics provided by DWD and LGs (e.g. number of water facilities). As the issue of water quality was excluded from this study, no measurements of water quality were taken including any experimental research. The core of this study is field research using as a qualitative techniques based on observations, interactions, semi-structured interviews and focus groups. Daily notes were taken.

## 3.2. Field research

### 3.2.1. Sampling

This research project is basically applied to the whole s/c of Rwebisengo which covers 777 km² and is composed of seven parishes occupied by approximately 30,000 people. In view of the limited time and budget dedicated to this field work, three parishes were selected which are relevant and representative of the whole S/C. The selection was based on insights provided by the CDO, BTC and two members of the communities (See Box 3-1).

- The seven parishes are more or less the same from the point of view of the pattern of the populations' distribution (scattered houses), landscape and water sources. However some overall particular features can be notified:
- Rwebisengo Parish stands out of the seven because of its highly populated RGC and its piped water system which provides water to the RGC and its fringes
- Bweramule and Kasungu Parishes are particularly challenging because in some villages the access to water is very limited due to the high depth of the water table, and the lack of functional water supplies.

**Box 3-1: General data on Rwebisengo S/C**

As a result, Rwebisengo, Bweramule and Kasungu parishes were chosen as the specific target parishes and judged representative of the whole S/C according to the main strengths and weaknesses pointed out in the Table 3-1.

The sampling was a combination of purposive and theoretical techniques. The latter was used because some interviewees were selected following up the provision of insights and along with the progressive understanding of the process behind the management of the conventional technologies such as boreholes. The sampling was also purposive as some cases of special interests were targeted such as the WUC of a broken borehole.

**Table 3-1: Rwebisengo, Bweramule & Kasungu: A representative sample of the S/C**

| Opportunities | Weaknesses |
|---|---|
| ▪ Validity of the information ensured by the triangulation of observers from different backgrounds and not originating from the selected parishes<br><br>▪ Bweramule and Kasungu parish are the most problematic and deprived areas in terms of water access<br><br>▪ The specificities of Rwebisengo parish such as the RGC, and the customers of the piped water supply can serve as a tool of comparison for assessing the WTP and ATP for water improvements<br><br>▪ Geographically, the three selected parishes represent the three topographic patterns of the whole S/C: inland, border of the River Semiliki, RGC<br><br>▪ The choice of the three parishes ensure that a wide range of water sources would be visited | ▪ No direct observations of the non selected parishes<br><br>▪ Not detailed information<br><br>▪ The most visible needs may not be the most acute or serious (Neuman, 2003)<br><br>▪ Choice influenced by the limited resources (transport, time and budget) resulting in the relative proximity of the selected parishes |

### 3.2.2. Interviews

***Stakeholders***

All the stakeholders were targeted and the targets met: all categories of water users including cattle rearers (owners and herdsmen), cultivators, fishermen, businessmen and pupils; local governments' officials including technical staff and political leaders (District, S/C, Parishes and Villages), DWD and TSU officials, NGOs and the private sector. Each interviewee was allocated a number (See list in Appendix I) used in the coding part (Appendix H) and referred as follows for quotations in the report: "I No" (e.g. I 35 refers to the Interviewee 35). Only the basic elements to know about the interviewees (communities, S/C and District levels) and their water sources are given in Appendix I.

***Interview guides***

Two interview guides were specifically and respectively used to guide the semi-structured interviews with the communities (See Appendix D) and officials (See Appendix E) in order to stimulate discussions.

***Surveys: semi-interviews and focus groups***

**41 households** were visited involving discussions with **111 individuals** (including small groups) through semi-interviews which allowed detailed and in-depth information to be collected. Interviews and focus group lasted between half an hour and two hours and observations were made to cross-check the validity of what was said. Four class-visits allowed talks with **92 pupils** (aged from 8 to 19 years old) and three opportunistic focus groups resulted in general information covering the whole S/C collected from **40 collectively interviewed informants** (political leaders).

All the interviews in the communities were conducted using the same translator. Notes were taken during all the discussions. The distribution of all the interviewees per village is given in Appendix F. A representative cross-section of the water users was obtained (See Figure 3-1) and had 64% of males and 36% of females.

Before visiting households in any village, the researcher insisted to meet the LC1 (local leader of the village) in order to introduce the purpose of the project conducted in the village and respect the African custom. This particular procedure allowed the researcher to have an overview of the specific water issues and detailed information on the water facilities used over the village. The political leader is meant to be aware of almost every thing going on in his village such as the location of facilities, existence of WUCs, total population and number of houses with appropriate roofs to collect rainwater.

***List of the key informants***

The 49 key informants interviewed individually and the 37 others polled during focus groups (notified into brackets) are presented in Table 3-2 below. The full list of all the informants with their name and address are given in Appendix G.

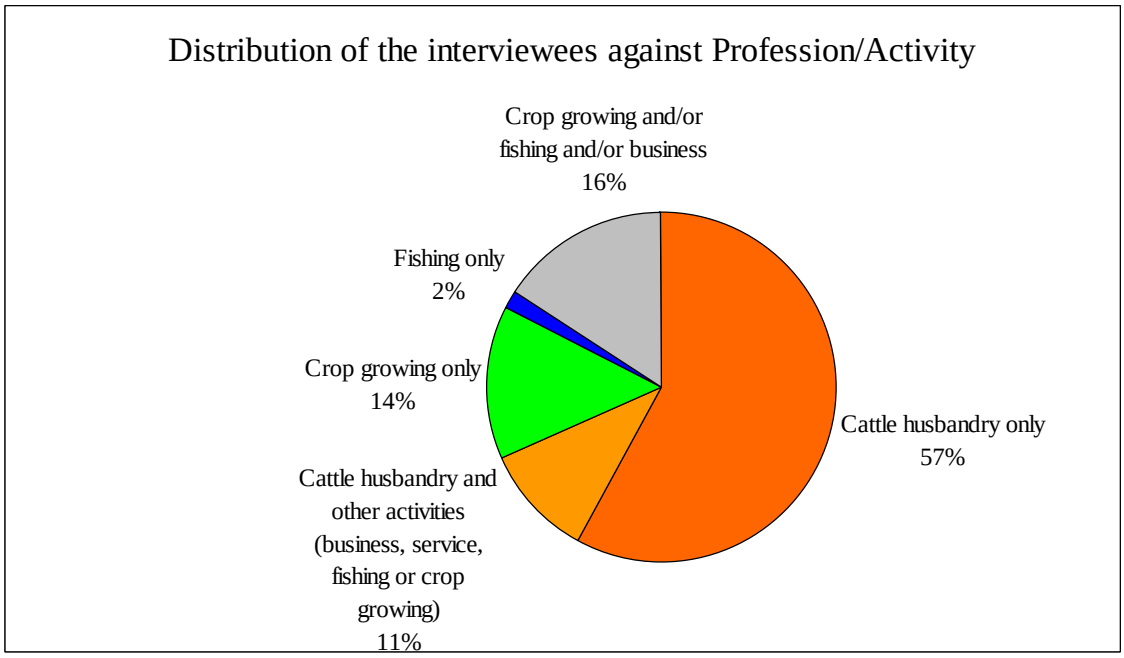



**Figure 3-1: Distribution of the interviewees against Profession/Activity**[7]

**Table 3-2: List of the 49 key-informants classified per categories**

| Stakeholders Category | Level | Stakeholder Function | Number of informants |
|---|---|---|---|
| **Researcher** | **International** | Water and Sanitation Supply Researcher (especially on self-supply subject) | 1 |
| **Government** | **National** | Rural Water Supply & Sanitation (RWSS) Department | |
| | | Assistant Commissioner | 1 |
| | | Principal Engineer | 1 |
| | | Social Scientist | 1 |
| | | DWD Water and Sanitation Engineer Advisor / consultant | 1 |
| | | DWD Focal Point Officer | 2 |
| | | Water For Production (WFP) Department | |
| | | Principal Engineer | 1 |
| | | Engineer | 1 |
| | | Social Scientists | 2 |
| | **District** | Chief Administrative Officer (CAO) | 1 |
| | | Acting District Water Officer (DWO) | 1 |
| | | LC5 Bundibugyo District | 1 |
| | | District Councillor | 1 |
| | | Clerk to Council Bundibugyo | 1 |
| | **County** | Veterinary Officer based in Rwebisengo | 1 |
| | **Sub-county** | Sub-county Chief | 1 |
| | | Sub-accountant | 2 |

[7] The profession or main activity of the household's headmaster

| | | | |
|---|---|---|---|
| | | Community Development Officer (CDO) | 1 |
| | | Water Operator | 2 |
| | | Medical Assistant | 2 |
| | | Vice LC3 | 1 |
| | **Parish** | LC2 Rwebisengo Parish | 1 |
| | **Village** | LC1 | 7 (3) |
| | | Vice LC1 | 1 (3) |
| | | General Secretary LC1 | 3 (5) |
| | | Facilitators | (3) |
| | | S/C Programmes officers (Child Protection Committee) | (23) |
| **NGOs/CBOs** | **International** | GOAL Partnership Officer | 1 |
| | | World Vision (CDF) | 1 |
| | **Regional** | HEWASA Principal Officer | 1 |
| | **Local** | RMCCC Project Coordinator | 2 |
| | | WUC and Caretaker | 6 |
| **Private Sector** | **National** | DAVIS & SHIRTLIFF Sales Manager | 1 |
| **TOTAL of Key informants** | | | **49 (+ 37)** |

### 3.2.3. Data analysis

***Qualitative analysis***

The qualitative analysis was based on comparisons between and a microscopic inspection of data through a line-by-line analysis of the notes taken during the interviews, and classified into the different themed boxes for coding (See Appendix H). These were either pre-organised in the interview guides (as subjects of particular interest) or frequently they arose from the interviews. Some frequency analysis was used as evidence for some of the findings highlighted in the following chapter.

***Constraints and limitations***

The constraints and limitations peculiar to this research project are detailed below:

- Language was the mother tongue of neither the researcher nor the communities which created a double barrier which was more or less overcome by the interpreter native from Rwebisengo and student in Makerere University;
- Limiting logistics due to impassible roads during the rainy seasons, very scattered houses involving covering large areas, and a small budget hindered the flow of daily work.

- Lack of electricity delayed the daily and continuous coding which requires the use of a computer and is meant to start very early on in the study (Strauss, 1995). This may have resulted in the oversight of some data in view of the mass of data collected;
- The researcher may also have conveyed some images that could shape the answers of the interviewees;
- The limited time of 3 days dedicated to the District Officials compared to the 29 and 6 days allocated to the communities and DWD Officials respectively is acknowledged.

# 4. Findings

## 4.1. A non-uniform study area

The study area was found to be non-uniform in terms of topography, water availability (ground and surface waters accessibility), community's main activities and local development. This non-homogeny was observed to have an impact on the community water resources management. The use of Excel tables (See Appendix I) allowed four patterns to be distinguished, each associated with specific water sources and water users' attitudes described in the Table 4-1. All the sources are further detailed below while their main features are summarised in Appendix K.

All the sources used are: Open Shallow Hand-dug Wells (**OSHWs**), Handpumps of Deep Boreholes (**DBs**) and Shallow Drilled Wells (**SDWs**), Scoopholes, Rainwater Harvesting (**RWH**), Ponds and swamp, The River Semiliki (or Lake Albert), Private tap connections in a public piped water supply scheme, Gravity Flow Water Supply Scheme (**GFS**), Rower pump of protected shallow wells.

**Table 4-1: Water users' attitudes identified and classified against the four patterns distinguished and illustrated with examples of villages visited (*)**

| Patterns / Features | | The bulk: most of the villages (1) | Bweramule Village (*) (2) | Kibbuku, Kimara, Nyakabira Villages (*) (3) | Rwebisengo Rural Growth Centre (4) |
|---|---|---|---|---|---|
| **Topography** | | ▪ Flat<br>▪ Inland | ▪ Flat<br>▪ Bordering surface water | ▪ Foothills<br>▪ Inland | ▪ Flat<br>▪ Inland |
| **Water availability** | | ▪ Shallow water table | ▪ River Semiliki or Lake Albert | ▪ Very deep water table | ▪ Shallow water table |
| **Major activity (development)** | | ▪ Cattle husbandry | ▪ Subsistence crop growing and/or fishing<br>▪ (Cattle husbandry is minor) | ▪ Cattle husbandry or<br>▪ Subsistence crop growing | ▪ Trades, shops,<br>▪ Offices |
| **Water users' attitude trends** | **The most used sources: combination or alternatives**<br><br>**Description of the**<br>▪ **water uses**<br>▪ **Period of use**<br>▪ **Cost**<br>▪ **Access**<br>▪ **Interactions** | **OSHWs** during the dry season for animals and domestic uses<br><br>**DBs/SDWs** during both the seasons within an area of less than 1km radius for all the domestic uses, and reserved for drinking if the **OSHW** is very nearer the home<br><br>**Ponds/swamp** during the rainy season for animals and bathing and washing<br><br>**RWH** reserved to drinking<br><br>**Rower pump** of a shallow | **River Semiliki** during both the seasons for both animal and domestic uses<br><br>**DBs/SDWs** during both the seasons within an area of less than 1km radius for all the domestic uses, and reserved for drinking if the OSHW is very near the home<br><br>**Ponds/swamp** during the rainy season for animals, if the River is further than 0.5 km and for bathing and washing<br><br>**RWH** reserved for | **Scoopholes** in **The Lower Kisege river bed** during 10 month (Kibbuku)<br>Access up to 1 hour walk<br><br>**Upper Kisege** or **ponds** during the rainy season (Kibbuku)<br>Access up to 2hours walk and climb<br><br>**GFS** (Nyakabira) for all domestic uses<br>**OSHWs** located within an area of even 6km radius during the dry season for animals and domestic use (Kimara) | **Tap water** at home at 29 Ushs/20L paid monthly for all domestic uses<br><br>**Resold tap water** at 100 Ushs/20L reserved for drinking if DB/SDW located within an area of more than 0.5 km where whether water is free of charge or sold at 50 Ushs/20L<br><br>**DBs/SDWs** located within an area of less than 0.5 km where whether water is free of charge or sold at 50 Ushs/20L for all domestic |

| | | | | | |
|---|---|---|---|---|---|
| | | protected well for all uses or reserved for drinking and cooking if use of **OSHWs** for bathing and washing | drinking<br><br>**Rower pump** of a shallow protected well for all uses or reserved for drinking and cooking if use of OSHWs for bathing and washing | **DBs/SDWs** during both the seasons within an area of even 3km for all the domestic uses, and reserved for drinking when the OSHW is nearer the home<br><br>**Ponds/swamp** during the rainy season for animals and domestic uses<br><br>**RWH** for drinking<br><br>**Rower pump** of a shallow protected well for all uses or reserved for drinking and cooking if use of OSHWs for bathing and washing | uses<br><br>**Ponds/swamp** for the poorest people and for all uses during the rainy season<br><br>**Rower pump** of a shallow protected well for all uses or reserved for drinking and cooking if use of OSHWs for bathing and washing |
| | **Secondary sources** | **DBs/SDWs** during both the seasons within an area of more than 2km radius reserved for drinking; water fetched between 2 and 4 times in a week<br><br>**River Semiliki** during dry season if the OSHWs are dried | **DBs/SDWs** during both the seasons within an area of more than 2km radius reserved for drinking; water fetched between 2 and 4 times in a week | **DBs/SDWs** during both the seasons within an area of more than 6km radius reserved for drinking; water fetched between 2 and 4 times in a week<br><br>**River Semiliki** during dry season if the OSHWs are dried | **Resold tap water** at 100 Ushs/20L for all uses if DB/SDW broken or dried |

These four patterns were identified from the analysis of the results obtained during the fieldwork in 21 villages out of the 39 of the S/C.

## 4.2. Pastoralist communities and their water supplies

There is evidence that communities provide **water for themselves from the same sources used for animals**. Those sources are mainly: open shallow hand-dug wells (OSHWs), the River Semiliki, ponds. In parallel, RWH, the public piped water scheme, GFS and protected dug wells: public DBs and SDWs, and private Rower pumps are other water sources used but **exclusively for domestic consumption**. The research found that multiple sources are used within most of the households in relation to access and reliability primarily and also to water quality concerns. All the water sources used for both human and animal consumption are analysed along with two categories: those falling into self supply initiatives with no external support and those brought by the Government, NGOs and/or donors. Even though different water sources are used within the same pattern to various extents, each is used to introduce its specific main water source.

### 4.2.1. The Existing Self-Help Supplies

The research clearly found that all the water sources used for animals are from self-supply initiatives while this is the case in only some of those used for human consumption including both improved and unimproved technologies[8]. There is an emphasis on the analysis of the OSDW because this is the main source for this pastoralist system.

***Private Open shallow hand-dug well (OSHW): main water source of the Pattern 1***

Open shallow hand-dug wells are used as the traditional and primary source.

Uses: Water for animals and human consumption even drinking.

Access: The water table is readily available nearby in most of the villages

**Table 4-2: The main characteristics of the open shallow hand-dug wells (OSHW)**

| | |
|---|---|
| Depth | From 2m to 5m |
| Diameter | From 1m to 2.5 m |
| Distance to the house | From 0.5 km to 6 km depending on the availability of sub-surface water and its saltiness. |
| Soil Nature | Sand or clay |

[8] As defined in the Glossary

| | |
|---|---|
| Inside and cap surface | No lining, No cover |
| Equipment | Trough (locally made from mud) |
| Period of use | Chiefly during the dry season |
| Construction requirements | Locally dug by 2 men with hoes and spade within 2 days |
| Cost: digging OSHW alone | 20,000 Ushs |
| Cost: OSHW + trough | 50,000 Ushs |
| Cost: OSHW + trough + fencing | 100,000 Ushs |

Owners and initiators: Primarily needed for watering animals, OSHWs are initiated and privately owned by the cattle owners who are usually wealthier than farmers and fishermen. However among the non cattle-owning communities, there also exist owners of OSHWs exclusively reserved for domestic use. As a result *"On average every household has its own OW but some share also the OW"* (Makondo LC1, Focus Group: FG 31). Usually sharing occurs between the owner and on average between four and fifteen neighbouring households. The main reasons behind sharing are the preference for maintenance cost sharing or the non-availability of sub-surface water under one's land. Indeed the construction of any OSHW out of one's land requires the permission of the other land's owner who can easily demand significant fees for it.

*"People do not dig OW because the water table is quite far in Kimara and they walk every day about 2 km to get water from other OW. I do not dig my own OW there because I do not have any land there"* (I35)

*"We prefer share our own OW with our 4 neighbours rather than keeping the exclusive use because when the OW is communal like this, the other users contribute towards the repairs of our OW through labour"* (A cattle owner, I54)

**Box 4-1: OSDWs source sharing**

Operation: the process of watering cattle (at 12:00 and 6pm) from those traditional OSHWs requires a minimum of 2-people and huge physical effort which can even take three hours depending on the size of the herd to be watered. (See Figure 4-1) Discussions with herdsmen revealed some acceptance of this system: *"This traditional system is adequate because we are used to it despite of the great effort it involves"* (LC2 of Rwebisengo). This research found that water users do not draw water from the trough but from the well with a small can tied a rope (See Figure 4-2). The pupils interviewed pointed out the risks taken when fetching water *"we can easily slip and fall inside / snake can bite us / heavy jerry can and long process"* (FG27).


**Figure 4-1: Traditional OSDW and trough**

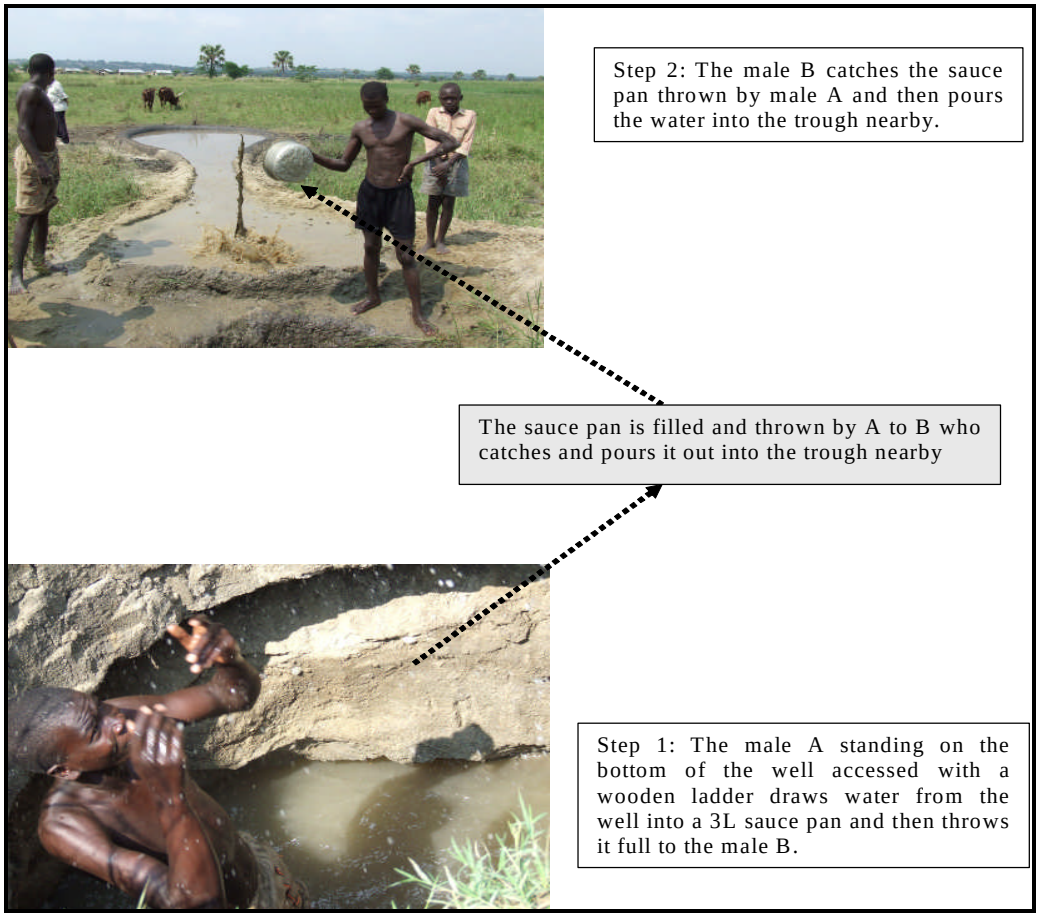



**Figure 4-2: Process of watering animals observed from OSHW in Makondo Village**

Reliability: Prone to drought, the resource can become very limited, which results in conflict and competition between the needs of the animals and humans. Most of the time pastoralism allows cattle to be watered first. For domestic activities water users can end up in waiting a long time to get some water or none. During the rainy season they collapse and even become inoperable after heavy rains. On average OSDWs are said to last less than one year and require deepening or re-digging at least three times a year.

*"We fill the trough first and then there may be enough water for ourselves because the remainder is just muddy in the bottom and no way to use it for domestic uses"* (A cattle owner's wife, I22)

*"If we find people filling the trough, we'll have to wait for water to come out again. This can even take 2 hours. This does include the time required to fill the can and the way back home"* (A woman, I35)

**Box 4-2: Low reliability of OSHWs against Competition of humans and animals needs**

Maintenance: This depends on the nature of soil, and involves intensive labour which consists of regularly removing sand and mud from the bottom, re-digging or digging new wells when the OSHW collapses, deepening when the water table drops down during the dry season (re-digging or deepening cost about 10,000 Ushs).

Cost management: This is implicitly the responsibility of the owner. However in case of sharing, a few do not charge the different users (e.g. wealthy owners), but most expect the other users to contribute towards the maintenance through manual labour or fees of usually 500 Ushs when re-digging is necessary.

*"We do not ask any money to our neighbours for repairing the OW because this is the culture"*
(A rich cattle owner's wife, I23)

*"The owner collects money (500 Ushs / HH) when the OW collapses and needs to be repaired or re-dug. You are refused any access to the OW if you refuse to pay and this until you pay"* (A retired woman, I16)

*"We provide labour to contribute to the OW maintenance which is not ours but we use it and we feel responsible for it since we need it every day"* (I 35)

**Box 4-3: Cost management of the OSHWs**

Water quality: *"Water is salty here"* is the recurrent comment given by the communities concerning water quality. Accordingly salts give a bad taste to water and prevent foam during washing. However *"Cattle like salted water and it is good for them. The salts improve the quality of meat which becomes tasteful."* (Veterinary Officer, I58). When asked about the water quality for human consumption, most of the people acknowledged the poor quality due to the factors below even if few people consider water of good quality for themselves claiming that *"As open wells are used to water animals, water is renewed all the time and therefore of good quality"* (FG 39).

Herdsmen stand bare feet on the bottom of the well every day

"Run-off carries rubbish and dung from animals and percolation of the numerous stagnant waters occurs" (A Medical Officer, I 30)

The water contains "bilharzias, worms and mosquitoes" giving large room to water-born diseases: "50% of the cases we receive at the Clinic are typhoid fever, birhazia, dysentery, cholera and different types of worms" (A Medical Assistant, I1).

Cattle can easily urinate and drop their waste into the troughs because most of them remain unfenced due to the excessive cost of fencing (100,000 Ushs). (Veterinary Officer, I 58)

**Box 4-4: Sources of pollution of the OSHWs**

Improvements of the OSHWs could consist of lining and covering the wells or cementing the trough. This has not been done up to by now because people claim not to have the appropriate skills.

*"No facility is available to cover the OW"* (A cattle owner, I54)
*"Covering OW is good but lack of model"* (The water operator, I3)

**Box 4-5: Lack of skills in the community and technology for improvements of existing water supplies**

***Scoopholes in the pattern 2***

In some places such as Kibbuku Village where the water table is very deep the main water sources are scoopholes dug into the sandy river bed of the Gorge Kisege.

Uses: domestic uses and watering goats[9]

Access: The scoopholes are used on a daily basis and the users even walk one hour to get to the source

Owners & Initiators: This source is communally owned and used

Operation: Long and tiresome the process requires 2 hours to fill a 20L jerrycan. The banks can collapse when fetching water

Reliability: The River flows two months per year and remains dry during ten months

Maintenance and cost management: There is no maintenance to ensure.

Water quality: The water users denoted very poor quality since the same holes are used by both humans and animals using the same process (See Figure 4-3).

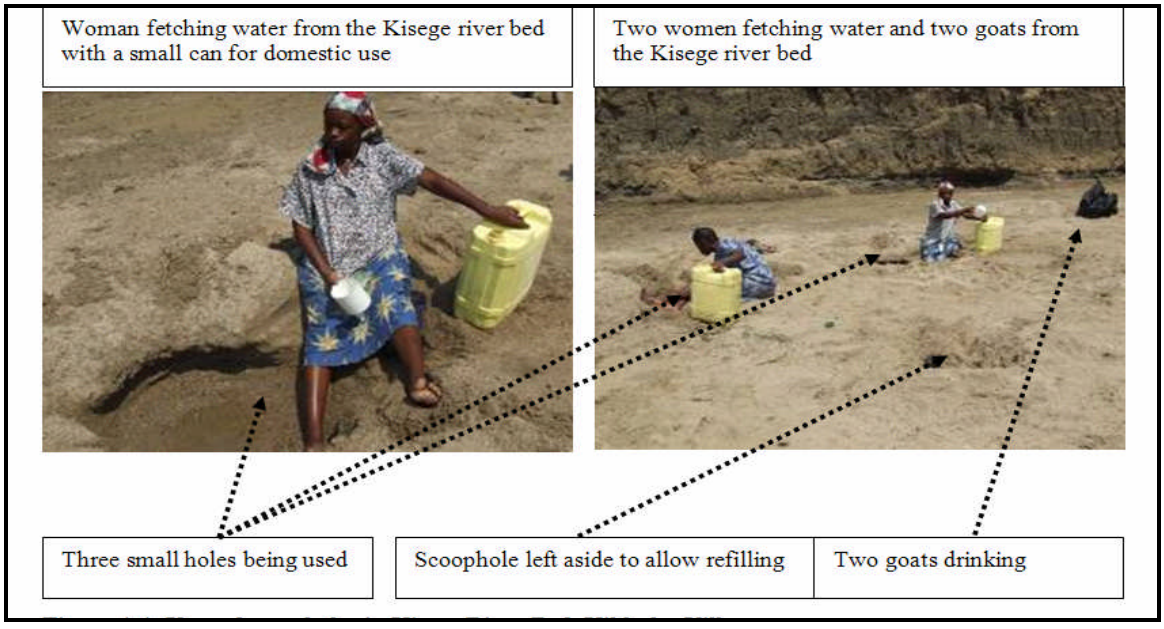



**Figure 4-3: Uses of scoopholes in Kisege river bed, Kibbuku Village**

[9] In this part pastoralism is not pronounced because most of the populations are cultivators or fishermen. Cattle rearers are only 100 out of 600 people (A cattle owner of Kibbuku, I51).

***The River Semiliki: the main source of the Pattern 3***

The River Semiliki is the main water source for the communities living nearby the bed, and remains the principal alternative when the handpumps fail and the OSHWs dry up.

Uses: domestic uses and watering animals

Access: Some corridors were formed over time by compaction (Fig. 4-4)

Owners & Initiators: This source is communally owned and used

Operation: The inconvenience often mentioned is the frequent crocodile attacks when fetching. A riverside resident explained that *"two years ago two children were killed by crocodiles when drawing water from the River"* (I38).

Reliability: The River Semiliki is a permanent source

Maintenance and cost management: There is no maintenance to ensure.

Water quality: The water users acknowledged the poor quality (even though many use it for drinking) because people bathe and cattle defecate in.

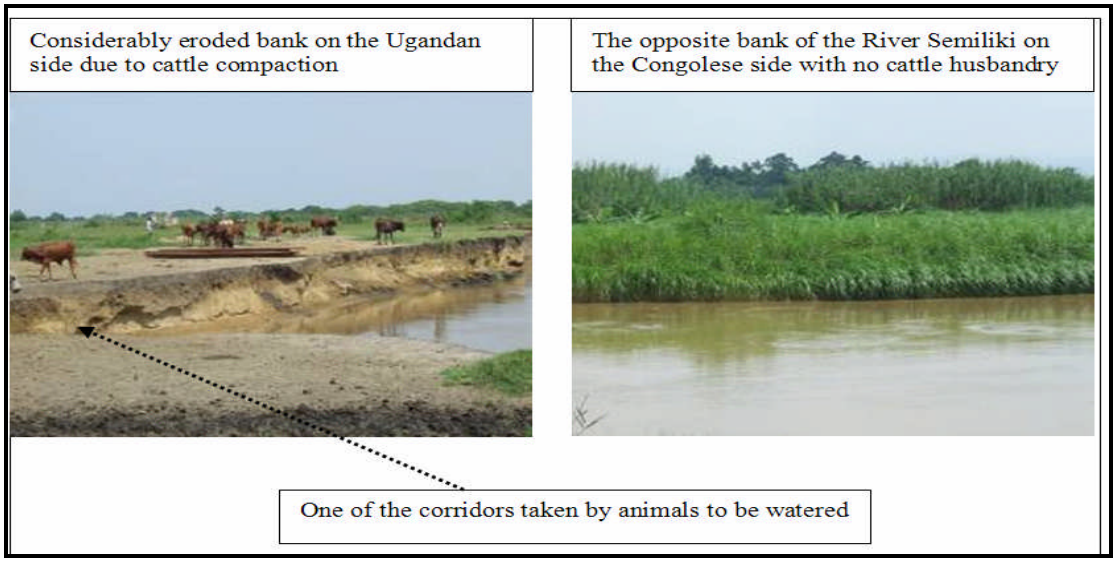



**Figure 4-4: Both the banks of the River Semiliki bordering Uganda & DRC**

***Swamp and Ponds: Communal sources***

During the rainy season, numerous ponds and swamp naturally become the main source.

Uses: First watering animals and then bathing and washing. Some people admitted to also drinking it because of the difficult mobility during the rainy season.

Access: The access is easy since the pieces of land remain not unfenced for free and communal grazing and the ponds are everywhere

Owners & Initiators: This source is communally owned and used

Operation: Convenient for animals because they are well spread out and numerous

Reliability: Present only during the rainy season

Maintenance and cost management: There is no maintenance to ensure.

Water quality: The water is said to be of very poor quality since the waters are stagnant and mixed with cattle dung spread

*"During the rain season OW collapse and become ponds. Therefore swamps become the only water source during the rain season"* (I 21)

*"Thanks to ponds, we can spend 2 months without watering animals"* (Cattle keeper, I23)

**Box 4-6: Ponds: the main source used for animals during the rainy season**

***A privately owned dam***

Uses: First watering animals and then bathing and washing.

Access: Located in Makondo Village, only those neighbouring use it

Owners & Initiators: The dam is privately owned by a wealthy cattle owner called Mwamba. The other users were initially allowed controlled access by Mwamba's herdsman. The origins of the dam remain vague to the researcher who did not meet the owner himself but rather his wife.

Operation: Convenient for animals because the dam is big[10]

Reliability: The dam dries up during the dry season

Maintenance and cost management: The owner asks the other users to maintain the fencing

Water quality: The water is said to be of very poor quality since the water is stagnant

[10] According to the visit (the area is estimated to about10 km²)

***Rainwater harvesting (RWH): a main source of the pattern 4***

This source is one of the two improved water sources falling into self-supply.

Uses: Rainwater is reserved for drinking

Access: Within all the villages visited most of the houses have a roof made from grass and only a few estimated from interviews as about 5 % have iron sheet roofs

Owners & Initiators: Relatively wealthy householders. The few who have big tanks share with their neighbours (from 2 to 4 households)

Operation: Rainwater is collected either into small basins (5L), a 20L jerry can or a more sophisticated and larger plastic tank for the richest.

Reliability: It entirely depends on the rain

Maintenance and cost management: The tanks are said to be expensive but the maintenance is very slight (e.g. washing the tank)

Water quality: The water users find this source of good quality while a Medical Assistant interviewed underlined that this is true only if the first waters are thrown away in order to clean the roof (I30).

*"Only few people harvest rain water. While the majority of them use sauce pans, only very few afforded a tank"* (I 21)

**Box 4-7: Sauce pan used for RWH**

***The Rower pumps***

The most improved self-supplies observed are the few protected wells equipped with Rower pumps to lift the water; these are very appreciated by three owners interviewed.

Uses: It is usually used for all domestic uses of which drinking is the first purpose

Access: Used in an area where the water table is shallow, the well can be easily dug and re-dug in case of repair

Owners & Initiators: Relatively wealthy householders. According to the Vice Rwebisengo LC3, only thirty homesteads managed to get a Rower pump in the whole S/C about twenty years ago when they were brought from DRC and purchased very cheaply (around 50 US$ at that time).

Operation: the process consists of manually pulling the suction piston to draw water

Reliability: The well can collapse or dries up and then requires respectively re-digging or deepening.

Maintenance and cost management: The maintenance is said to be about 30,000 Ushs/year and some labour for replacing the spares (rubber valves) about three times in a year (even less depending on the use frequency) and deepening when the well collapses or the water table falls significantly. The only constraint to the maintenance raised is the fact that those rubber valves are not readily available and can be found only in one shop of the Fort Portal Town (three hours drive from the S/C RGC).
The main challenge is that according to the owners those Rower pumps are no longer available nowadays. However the visited private water supplies shop Davis & Shirtliff in Kampala claimed to commercialize Rower pumps from about 200,000 Ushs. This is deemed to be further investigated.

Water quality: As the well is protected the water is of relatively good quality. However during the rainy season the water can be coloured due to the percolation of stagnant water.

Rower pump used to lift water from covered shallow well

Plunger assembly of a Rower pump composed of rubber valves

**Figure 4-5: Rower pump (Sources: (1) Danert (2007) and (2) Reasercher)**

### 4.2.2. The externally supported improved water points

There is a particular emphasis on the handpumps because of the numerous challenges to sustainability they present in Rwebisengo.

***Deep Boreholes (DBs), Shallow Drilled Wells (SDWs)***

The general data were neither gathered nor available in the S/C headquarters and those collected during the field work are gathered in Appendix J.

Uses: People living near any handpump tend to use it as the single source for domestic uses while those constrained either by a distance exceeding 1 km[11] or are charged fees are inclined to reserve this source exclusively for drinking.

Access: The total numbers of the 124 handpumps and 23 RWH tank of 10 $m^3$ of the S/C are detailed in the Table 4-3. There is no doubt that all the 10 $m^3$ RWH tanks are located in the schools but the way the DBs and SDWs are spread out over the S/C remains unknown. Even if the average can be estimated[12] at three communal handpumps per village, the study found some villages had none. According to the District Water Officer (DWO), by June 2007 more than half of those improved facilities were not functioning and abandoned.

**Table 4-3: Total of functioning and non functioning deep boreholes and shallow wells in the S/C**

| By June 2007 | Deep Boreholes | Shallow Drilled Wells | Rainwater Tank ($10m^3$) |
|---|---|---|---|
| Total in Rwebisengo S/C | 11[13] | 113 | 23 |
| Functioning | 3 | 48 | 2 |
| Non functioning | 8 | 65 | 21 |
| Government funds | 3 | 80 | 0 |
| NGOs or Donor funds | 8 | 33 | 23 |

Owners & Initiators: All the handpumps were externally funded and initiated either by Government or the communities through their Parish Plan according to the DRA. Regarding ownership, *"It is a thing of the Government"* was the statement of most of

[11] According to the results obtained
[12] This average is calculated as follows: (Total number of handpumps)/(Total number of village) = 124/39= 3%
[13] This number is contradicted by the local Principal mechanic who gave a total of 7 DBs

the water users who did not feel like owning or being responsible for the DBs and SDWs they use. Except one, all the water users interviewed have neither financially contributed towards the investments costs nor been involved or welcomed to the construction initially.

*"They [Government, NGOs] come, construct and then leave"* (FG 31)

*"Before the construction HEWASA called meetings with the whole community to discuss on the location"* (I 48)

*"Before constructing the 3 handpumps, HEWASA consulted me about the location. People haven't been asked to collect any money before construction of the handpump. The LCs were asked to contribute 25% of the capital cost. They mobilised the community members to dig the wells without paying them"* (I 55)

*"People [contractors for TORUP NGO] who constructed the shallow well [4-5 m deep] near the Hotel did not want to listen to the communities asking to dig deeper. They even answered "Do you want to teach us how to dig?"* (I 39)

**Box 4-8: Handpumps ownership**

Operation: Most of the handpumps observed were used by about 50-60 households. Many beneficiaries complained about daily long queues especially in the RGC (up to 2 hours including back and forth home) due to the **overuse of the few functional supplies**. The overexploitation is a result of and cause of the ineffectiveness and inefficiency of those handpumps. Long distances and tiresome carry were also of concern.

Reliability: According to the water users and mechanics most the handpumps last on average between one and two years after construction or repair putting forward the "universal reasons": *"Water is very salted and corrodes pumps and metal pipes"* and *"the water table fluctuates significantly making the SDWs dry up easily especially because of their insufficient depth"*. The high mineralisation was corroborated by the observations of red-colour layers in the basins used to store water, which may be iron.

Maintenance and cost management: Most of the water users pay no maintenance fees. Out of the 47 handpumps considered only 14 had WUCs of which only 2 dating from 2004 were effective in terms of maintenance collection fees and maintenance. At the SDW near the Mosque in Rwebisengo South water users pay 50Ushs/ 20L jerrycan

while at the SDW near Rukoora Clinic the beneficiaries pay between 200 and 300 Ushs monthly.

The two mechanics present in the S/C denoted their incapacity to cover all the villages and ensure an effective maintenance of the handpumps because of **a lack of staff and difficult access to the spares** stored at the District Headquarters. The common repairs range from minors breakdown such as a broken rods and rustled pipes to the major repairs such as the re-digging of collapsed wells, which requiring a tractor for the DBs. SDWs are preferred to the DBs which are said to involve huge and inaffordable maintenance unaffordable. On his side, the CAO said that: *Ironically spares are a lot here while the S/C HQ may not have any storage capacity to prevent stealing*. Such contradictions highlight the inappropriate context for and barriers to good community O&M.

Water quality: Most of the water users complained about the saltiness of the water. Some water users and the mechanics claimed that water from SDWs becomes easily contaminated through percolations during the rainy season due to the insufficient depth.

The WUCs: The existing WUCs members were elected[14] by the LC1 among and with the commitment of the beneficiary communities. The water users and all the LC1s clearly defined the role of the WUCs as keeping the place clean by involving regular and formal labour from the beneficiaries, prevent children from playing with the handle, to collect charge fees and report any breakdown to the LC1 and the mechanic. Discussions with some WUCs and water users allowed the researcher to identify some important combined or interdependent factors behind the non collection of maintenance fees and poor community management for O&M:

- No prerequisite for the collection of maintenance fees was set up in writing
- The non commitment of beneficiaries who are reluctant and refuse to pay for water
- Lack of authority and motivation
- Proclivity of the water users to fall back to alternatives involving no charge fees such as The River Semiliki, ponds and OSHWs
- Ignorance or misunderstanding of the roles

[14] The choice was in relation with the chosen member's home.

- Costly repairs (especially for boreholes) against poor cost of recovery in view of the amount collected

*"Those WUCs have failed because they were neither trained nor taught their roles"*
*"As the LC1 of Kasungu II, I decided to make people pay for water they get from the BH/SW regardless the quantity of water they fetch. Some people pay while others did not pay"* (I 34)

*"Some people pay the 200 UShs collected monthly while others do not pay. As LC1 I have appointed the WUC.* ***If the WUCs do not work is not my business because my job is done****. People are not efficient to collect the money monthly maybe because they can still get water from the river. So for them there is not point of paying for water"* (I 39)

**Box 4-9: Challenges of WUCs**

***Public Piped water system***

Uses: All domestic uses or reserved for drinking

Access: Private tap in the backyard's owner

Owners & Initiators: It is a public motorised piped water system installed in 2006 by the Government in the RGC of Rwebisengo and managed by the S/C through a specific WUC recently re-appointed and not paid. The scheme deserves 52 private taps.

Operation: The process remains simple

Reliability: The water users complained about 2-day cut offs which were frequent due to the lack of fuel until May 2007 when the ineffective WUC was replaced with an emphasis on the responsibility of good accountability

Maintenance and cost management: Regarding investment costs, an initial Government support programme aiming to promote the functionality of the network allows the first 52 families willing to be connected to pay only 50,000 Ushs out of the real cost of 250,000 Ushs[1]. Because it is no longer in place, the communities found the current cost for new connections too expensive.

Water is sold at 30 Ushs / 20L and bills are collected monthly by the water operator. About 40 taps owners re-sell water at 100 Ushs/20L jerrycan. People tend to first rely on the functioning DBs/SDWs where water is free or charged 50 Ushs/20L jerrycan at the SDW near the Mosque in Rwebisengo South.

Water quality: Most of the users acknowledged the quality of the tap water.

**Figure 4-6: Tank of the piped water system in the RGC**

***Gravity Flow Scheme (GFS)***

There is only one gravity flow scheme (GFS) in Nyakabira Village located in the foothills of the Rwenzori Mountains.

Uses: This source is used for all domestic uses

Access: The source is within a camp of 330 people and is also accessed by also far-away villages such as Kayanja and Nyakaseni

Owners & Initiators: This sole GFS was constructed by the Government in 2006

Operation: The water collection is simple but the transport remains tiresome

Reliability: This source has flowed continuously since its construction

Maintenance and cost management: By now slashing has been the only maintenance which is ensured by Nyakabira LC1 who involves every week every household in the communal work

Water quality: According to the Medical Assistant of Nyakabira and his water analysis: "*this water is of very poor quality and contains worms, aarchistes*" (I45). But the water users find it of good quality (taste and appearance)

### 4.2.3. Perception of potential improvements

***Water users's standpoint***

To most of the water users there is no real challenge concerning watering animals since the ponds present a free access and enough quantity during the rainy season, while the River Semiliki is still an available alternative to the OSHWs during the dry season. All cattle owners and keepers would appreciate a motorised system for filling the troughs from the existing well, but most of them are neither willing nor able to pay for this improvement. The development of a dam was also welcomed by the cattle owners who were willing to give pieces of land as a contribution.

*"I prefer to keep the traditional system rather than paying for a tap feeding the trough"* (I 3)

*"I would like to improve the traditional system (trough + OW) but she cannot afford a tap feeding the trough and I am not willing to pay for any improvements concerning watering animals* (A cattle owner, I4)

*"Animals do not have any problem to be watered. There is only a problem to water people"* (FG 18)

**Box 4-10: Unwillingness of the water users to invest in improvements of animals water facilities**

There is evidence that access and reliability are of greater importance than water quality for human consumption which does, however, remain a concern. When questioned about their aspirations, all the water users demanded the construction of more improved water sources: handpumps and GFS. The latter presents the advantage of lower capital expenditure and no running costs. There is a high demand for water of better quality, but the WTP, ATP for the improvements involved varied according to the users from the poorest who declared to have no money but was willing to provide manual labour to the richest (nearly all cattle owners) committing to contribute to the capital (50,000 Ushs) and maintenance costs (10,000 Ushs/month). The contributions were more important for improvements of private source than community source. Generally most of the people acknowledged the benefits of paying for water up to 50 Ushs/jerrycan while important financial support from external agencies was always suggested as a precondition to any development. They all claimed to be highly dependent on the Government for any improvement.

***Local Governments' standpoint***

Discussion with the local leaders and the former S/C chief revealed that there is a general de-motivation[15] towards handpumps and that the only solution to improve the water supply is to extend the GFS. Despite its difficult feasibility in a short and medium term because of its huge cost, they prefer to make the populations dream.

The influential the CDO at the time of the fieldwork, who is acting as the new S/C chief, promoted the development of Rower pumps and acknowledged the possibilities of Government support for this. While very sceptical towards the possibilities of Government support at the individual and households level the DWO approved the ongoing District programme. This consists of repairing the broken SDWs with the installation of plastic pipes U3 instead of metal pipes to reduce their corrosion. Regarding the improvements of the WUCs, most of the political leaders and officials had no suggestions.

Concerning water for Production, the construction of a valley dams is stated in Rwebisengo 2007-2010 Development Plan as a priority to be financed by the local revenue or an external agency. But the new S/C chief is not in favour of such a project.

***Government and NGOs standpoint***

Discussions with the DWD Officials revealed that RWH is highly promoted while Government support is possible even at the household scale. The promotion of the SDWs equipped with plastic rather than galvanised pipes is another part of the ongoing Government policy. Self-supply support was acknowledged in different ways. While Danert (DWD Engineer Consultant) was confident about the extension of the existing Government support for RWH to other water source improvements, the most recurrent response was that this is unrealistic since the fair allocation of subsidies at the individual and household levels is the core of the challenge.

[15] The S/C chief stressed this: out of the 26 SDWs rehabilitated during the FY 2005/2006 by replacing the metal pipes (type U2) by plastic pipes (type U3) in order to reduce the high corrosion, 11 are already inoperative.

# 5. Discussion

## 5.1. Critics of the declared policies

Beyond the issue of the saltiness of the groundwater and its significant fluctuations, poor community management of O&M has caused the common failure of the conventional technologies (DBs, SDWs and 10 $m^3$ RWH tanks). Many of the community weaknesses can be attributed to ongoing flaws in the policies and strategies declared by the Government and LGs.

### 5.1.1. Contradictions between theory and reality

***Ownership***

To begin with there is already an ambiguity at the National level because ownership is defined in two different ways. While the owner is supposed to be the beneficiary community in the National Water Policy, the Water Statute points to DWD as the owner.

The rules provided in the OP-5 involve the set up of a WUC but also minimum community contributions in cash and kind ranging from 5% to 15% of the capital cost as a demonstration of commitment towards ownership and responsibility (Carter, 2005; DWD, 2007). Discussions with a DWD Senior Engineer revealed that *the minimum required for a Deep Borehole is 200,000 Ushs*. These requirements do not square with what has happened in the field since the LC1s are aware only of the prerogative to form a 5-people WUC for any new facility constructed in their village. However there is no provision on an official in charge of the collection of the community contribution fees. The principle of community contributions remains ignored or unimplemented. There should be a clear statement about the responsible for this and the duty of accountability. An excessively rigid rule is likely to be unsuitable in many cases, but the more open the rule, the greater the chance of misunderstanding and flawed implementation.

***Funding for O&M***

While the OP-5 provides also community contributions towards maintenance, this was effectively implemented at only 2% of the communal handpumps considered in this

study. Even if the National Framework for O&M of Rural Water Supplies (NFO&MRWS) provides useful methods to collect funds (2004), the implementation remains compromised. The researcher identified particular weaknesses:

- Absence of WUC or other prerequisites for the collection of maintenance fees initially
- Lack of clarity of ownership undermined the sense of responsibility
- The non commitment of users who refuse to pay for water and are prone to falling back on free water sources (e.g. OSHWs) or due to a lack of accountability of the WUC
- Ignorance or misunderstanding of the roles
- Lack of authority and lack of motivation of the WUC towards the voluntary work

To overcome those barriers, a key element could be to remunerate or compensate the WUCs members in order to motivate (because they provide a service) and make them more responsible for the O&M. Some simple calculations: assuming 10,000Ushs/month/WUC member and the operation of all the 124 handpumps of the S/C used by about 50 water users each, this results in a total of 6,200,000 Ushs, if all the 5 members of each WUCs are paid. The implementation of such a plan would be difficult since the monthly total is too much to be raised by the S/C. 1000 Ushs/month/household just for the salary of the WUC is unconceivable since they already struggle to collect enough money for cost recovery and repairs. This should be investigated.

***O&M against WUC***

While "full community responsibility for source O&M" is a key strategy of the Ugandan rural water sector, there is no incentive in place to make the WUCs aware of their responsibility towards the facility management. The National Framework (NFO&MRWS) even recommends DWD to register, supervise and monitor the WUCs (2004). This strategic element is far from being implemented in Rwebisengo S/C. The TSU6 which could be the DWD staff in charge of this function has managed to be in Rwebisengo and the District only once this FY. In addition, the duty of the WUC *"to make a 3-year realistic and viable plan to ensure continuous and reliable operation of the facilities"* is not implemented (OP-5, 2004). The possibility of the S/C as the entity

responsible for this task should be considered. The WUC should be liable for book keeping assuming that they are trained by an entity such as TSU6.

***Spare Availability***

The research brought out the issue of the availability and storage capacity. While there is a pronounced lack of spares for handpumps (e.g. chains and plastic pipes) at the S/C Centre, the CAO said "*Ironically spares are a lot here [District HQ] while the S/C may not have any storage capacity to prevent stealing"*. Such contradictions highlight the inappropriate context for good community O&M. Furthermore, while all the works on water supplies should be supervised by the DWO, the one in Bundibugyo affirmed: *"I do not have the capacity to impose my supervision to the works lead by NGOs"*.

### 5.1.2. An existing but not appropriate Government support at the household level for RWH

In relation to self supplies support, there has been increasing consideration of support of RWH in the communities and households, perhaps up to 50% of the total capital costs (DWD Senior Engineer TSU2 intervieweed). However the implementation remains flawed since neither the local populations nor the DWO of Bundibugyo, who is supposed to be in charge of validating their requests, are aware of those possibilities. Such contradictions can result from a lack of effective top-to-bottom promotion. This questions the effectiveness of the TSU as mediators. At the community scale, all the 10 $m^3$ RWH tanks initially given by UNICEF to twenty-one schools are no longer functional because the maintenance is implicitly vested in the Government by the headmasters who present the school as a governmental entity. This confusion needs to be clarified by the Government and the donors (UNICEF) within the SWAP. Furthermore, Government self-supply support for RWH does not fit the context of Rwebisengo S/C since about 95% of the local houses have grass roofs. That is why this should be developed by enlarging the concept to other technologies and ensuring more effective implementation (through promotion).

The researcher acknowledges the difficulty of implementing such a policy. *Which households are given the priority for Government support, especially when deciding between two of the same social-class?* According to the DWD Senior engineer of TSU2,

the DWO is close enough to the communities to be able to make this assessment. But the fieldwork revealed that this is questionable since the DWO has to cover all the S/Cs.

## 5.2. SWOT Analysis of potential improvements

The research found great potential for self-supply improvements such as the OSHWs, RWH and scoopholes, from which potential improvements are suggested through SWOT analyses.

### 5.2.1. Improvements for animals

Even if there are no real challenges for watering animals, according to the communities, there remain some issues. Against the perception of the River Semiliki as a permanent source, the pronounced erosion of the banks questions its capacity to water the thousands of cattle in the area. Above all this erosion has an adverse impact on the water quantity and quality of this resource, which raises the spectre of the Tragedy of the Commons, as defined by Hardin (1968). Therefore the free and open access of the River Semiliki should be limited and controlled to avoid knock-on effects on its water availability and the pastoralist system it has served. In this respect, the plan of BTC and the S/C to **develop specific corridors to the river** could be a first step towards improving this problem. The set up of regulations to control access should be discussed with the pastoralist communities, who remain very sensitive to issues in relation to their livestock.

In response to this challenge, the construction of valley dams planned by the S/C and improvements of the OSHWs are analysed with SWOT tool below:

**Table 5-1: SWOT analysis of a dam development:**

| **Main features** | |
|---|---|
| **Valley tank**: Average cost: from 270 millions (150 000 US$), Capacity: 10,000 $m^3$<br>**Earth dam**: Average cost: from 1,200 millions (700,000 US$), Capacity: 4 million $m^3$ | |
| **Strengths** | **Weaknesses** |
| ▪ Access (in terms of distances) improved for communities where the water table is very deep<br>▪ Suitable for animals<br>▪ Easy operation to water animals<br>▪ Simple maintenance if no pumps | ▪ Unprotected water<br>▪ Surroundings more prone to floods<br>▪ People may end up using this stagnant and unprotected source for domestic uses such as drinking |
| **Opportunities** | **Threats** |
| ▪ Communities and political leaders in favour of | ▪ Very costly |

| | |
|---|---|
| such improvements<br>▪ Willingness of the most needed communities to contribute towards the project by giving pieces of land<br>▪ **Government Pro-Poor Strategies**: 14th priority: providing the provision of Subsidies will be provided for water services (through construction of small valley tanks and dams) to vulnerable groups (in poorest geographical areas) | ▪ General unwillingness to pay through cash for animals<br>▪ Scheme does not fit self-supply concept<br>▪ Reluctance of relatively poor water users who fear having to release a piece of land<br>▪ Reluctance of the cultivators who fear their land will be flooded<br>▪ Communities where the water table is accessible may not be willing to contribute<br>▪ The herdsmen who would be the first beneficiaries and therefore the firsts in favour of such a project are not ATP<br>▪ The cattle owners who are the wealthiest do not directly face the burden of the intensive labour involved in the operation of the OSHWs |

**Table 5-2: SWOT analysis of SHDWs improvements for animals**

| **Main features** | |
|---|---|
| Lining of a shallow well: Average cost: from 1 million Ushs (200, 000 Ushs/culvert) for stones to carry from Karugutu County according to the DWO and CDO<br>Depth: from 2 meters requiring 9 culverts<br>Handpump | |
| **Strengths** | **Weaknesses** |
| ▪ Greatly reduces time and effort spent to water animals<br>▪ Reliability of the OSDWs improved<br>▪ Suitable for animals<br>▪ Potential for feeding several troughs from the same point<br>▪ Capital and running costs remain within the capacities of the cattle owners | ▪ Materials (stones) are not locally available and their transport from Karugutu County is expensive<br>▪ Relatively demanding and costly maintenance (spares) for the handpump<br>▪ Lack of technical skills locally<br>▪ People may end up using it for domestic uses such as drinking<br>▪ The scale (individual, household or community) and ownership are of utmost concern as they have a great impact on water demand against limited underground capacity, and the responsibility for maintenance |
| **Opportunities** | **Threats** |
| ▪ Government Self-supply support at the individual scale would be appropriate to take away the overexploitation of the River Semiliki | ▪ The communities do not acknowledge the real need for animals<br>▪ General and comprehensible unwillingness to pay with cash for projects intended to improve animals' water supplies leaves little if any room for potential self-help<br>▪ The cattle owners who are the most able to pay do not directly face the burden of the intensive labour involved by the operation of the OSHWs<br>▪ Insufficiency of available technicians at the S/C level |

### 5.2.2. Improvements for human consumption

In order to improve water access (in terms of distance), reliability and water quality of the OSDWs, and to reduce the intensive labour in terms of fetching and lifting water, three potential solutions are identified: lining and covering, the development of Rower pumps and rainwater tanks at the households and small groups' scales. The two first solutions assume the separation of livestock and human water sources. The thrust of this proposal is meant to be the low-cost improvement-based in order to remain within the capacity of the communities, and is presented through SWOT Analyses. The improvements of conventional technologies such DBs are further addressed below.

**Table 5-3: SWOT Analysis of the improvements (lining and covering) of the OSHW intended to be reserved for domestic uses**

| **Main features** | |
|---|---|
| Shallow well: from 2m deep<br>Lining of a 2m deep shallow well: Average cost: from 1 million Ushs (200, 000 Ushs/culvert) for stones to carry from Karugutu County according to the DWO and CDO (2 meters requiring 9 culverts) | |
| **Strengths** | **Weaknesses** |
| ▪ Enhancement of water quality<br>▪ Improvement of reliability and maintenance because lining prevents the OSHW from collapsing<br>▪ Management at the smaller scale: private or small groups | ▪ The materials are not available at the S/C and should be carried from Karugutu County<br>▪ Remains expensive without pump<br>▪ Lack of technical knowledge locally<br>▪ The operation of lifting may remain tiresome<br>▪ Lining will be too costly in area where the water table is very deep (pattern 2) |
| **Opportunities** | **Threats** |
| ▪ **Government Pro-Poor Strategies**: 11th priority: *Encourage self supply based on market solutions (The sector will encourage those who have the resources to build their own private water supply where this is appropriate). A study will be launched to assess and develop the possibilities further.*<br>▪ As sharing exists between households, there can be many beneficiaries<br>▪ Water users are relatively WTP or to contribute towards manual labour | ▪ The Government self-supply support concerns only RWH and is still poorly implemented<br>▪ Half to full investment costs may be still too expensive to be under the responsibility of only the initiator/owner<br>▪ Cost sharing between households can create conflict of ownership<br>▪ Areas prone to floods require the increases in height of the well before being covered to maximise the water protection<br>▪ Some water users remain reluctant to use shallow wells because sub-surface water is salty and prone to contamination during the rainy season through percolation |

**Table 5-4: SWOT Analysis of development through installation of Rower pumps**

| Main features | |
|---|---|
| Shallow well: from 2m deep | |
| **Strengths** | **Weaknesses** |
| ▪ Easy to install (shallow well locally dug)<br>▪ Enhancement of water quality<br>▪ The suction pump is robust and reliable<br>▪ Long-life system<br>▪ Little maintenance<br>▪ Suitable for management at the smaller scale: private or small groups<br>▪ Economical to air-freight because very light<br>▪ Capital and maintenance cost remain within the capacity of the communities if the pump is commercialised locally | ▪ Appropriate only where the water table is shallow (patterns 1, 2 and 4)<br>▪ Because shallow, prone to drying up during droughts<br>▪ The operation of lifting remains tiresome for some people such as the disabled<br>▪ This pump is not currently on the local market in Uganda<br>▪ Remains costly because the pump has to imported from UK: the cost is estimated from £125 (ex-factory in UK) to £275 (air-freighted) i.e. from 950,000 Ushs from UK (SWS-Filtration, 2001) |
| **Opportunities** | **Threats** |
| ▪ **Government Pro-Poor Strategies**: 11th priority: *Encourage self supply based on market solutions*<br>▪ As sharing exists between households, there can be many beneficiaries<br>▪ Water users are relatively WTP or to contribute through manual labour<br>▪ The ongoing study on the commercialisation of Rower pumps in Uganda | ▪ The Government self-supply support concerns only RWH and is still poorly implemented<br>▪ Cost sharing between households can create conflict of ownership<br>▪ Some water users remain reluctant to use shallow wells because sub-surface water is salty and prone to contamination during the rainy season through percolation |

**Table 5-5: SWOT Analysis for Rainwater Harvesting**

| Main features | |
|---|---|
| Iron sheet roof and Plastic tank | |
| **Strengths** | **Weaknesses** |
| ▪ Improved water quality<br>▪ Little maintenance<br>▪ Suitable for management at the smaller scale: private or small groups<br>▪ Easy access | ▪ The number of iron roof sheet are limited in Rwebisengo S/C (estimated at about 5% from this study)<br>▪ Dependent on unreliable rain |
| **Opportunities** | **Threats** |
| ▪ RWSS moves progressively towards RWH self supply support at the household scale<br>▪ **Government Pro-Poor Strategies**: 11th priority<br>▪ As sharing exists between households, there can be many beneficiaries<br>▪ Water users are relatively WTP and ATP for some | ▪ The Government self-supply support concerns only RWH and is still poorly implemented<br>▪ Some water users are not WTP because of the lack of reliability |

### 5.3. The Potential and appropriate improvements along Self-Help Supply concept

These SWOT analyses bring out the significant benefits of the Rower pump when considering the low-cost improvements driven by the self-help supply concept, which are of the utmost importance since the populations claim to be poor. According to the researcher, the OSHWs can remain the same for watering animals but they need, at least, to be separated from the human water sources. This is important for making a first significant step towards water quality improvements, even if this upgrading does not improve water quality by one score, according to the scoring system proposed by Carter *et al*. (2006) (See Appendix C). This questions the pace of upgrading considered in this scale. The Rower pump development could be the next upgrading and would allow a one-unit improvement of all the five characteristics of access, water quality, reliability, cost and management and remaining within the capacity of many community households. Areas where the water table is very deep such as Kibbuku or Kimara bring out the necessity to address the challenges of sustainability presented by the deep boreholes.

## 6. Conclusion and Recommendations

The research provided a detailed picture of the water users' attitudes and perceptions towards water, and further insights concerning the specific challenges of sustainability presented by the handpumps and the WUC in the Rwebisengo Sub-county. Within this pastoralist system livestock has a significant impact on water quality and quantity and can even create conflicts around OSHWs which often end up with the animals watered as the priority. Most of the self-supplies found in the study area provide water of poor quality and have challenges of reliability and access. These improvements are undermined by the lack of local technical skills. Those which are already improved, such as RWH and Rower pump, show the great potential of self-supply improvements. This is a conclusion for the case of Rwebisengo. However many of the recommendations built from the findings of this research are of greater scope such as national level.

## 6.1. Improving Self-supply for humans and animals consumption

The significant potential for self-supply improvements in Rwebisengo Sub-county requires the involvement of all the stakeholders from the individuals and communities to the Government and the LGs. In view of this the recommendations are as follows:

***Every community is different:*** The communities should be considered at the smallest scale and not as a uniform entity (regarding the specific water resources management shaped by many factors such as water availability, topography, local activities and custom) for any development project.

***Separation of domestic and livestock access to water:*** The communities' awareness should be heightened towards the real need to separate the OSHWs for livestock and human consumption. This consciousness-raising campaign could be the responsibility of the CDO through general meetings.

***Incremental steps:*** The potential incremental improvements should be approached successively in order to make them affordable and fit with user-schedules. Possible steps of improvements can be successively: construction of new OSHWs exclusively reserved for domestic functions, covering the well, development of Rower pumps and the lining of the wells.

***Exploration and diffusion of improvement technologies:*** The water users should be made aware of existing and improved technologies such as Rower pump, lining of the OSHWs and so on. To do so, as Danert (2007) suggested technical officials such as CDO and DWO and a community representative should visit the Self-supply Pilot projects being implemented in Amuria and Bugiri Districts.

***Information of the TSU:*** The Rural Water Supply and Sanitation TSU should inform themselves regarding the various pilot initiatives in low-cost water supply technologies and approaches such as the Government self-supply support RWH- in order to disseminate to the communities unbiased information on the different alternatives for the low-cost improvements possible with self-supply.

***Rainwater Harvesting:*** The Government should extent the existing self-supply support for RWH to other technologies at the household, small group and community scales.

***National - Local linkages:*** The TSU should be financially and logistically empowered to facilitate direct support to local development staff (DWO, CDO, S/C chief) and

inform them of the support networks that exist nationally such as the provision of Government support at the household and community scales for RWH.

***Shallow well potential:*** Further investigations should be made by the DWO on alternative sources and technologies such as lining of OSHWs. The current approximate cost of 1 million Ushs for lining OSHWs in Rwebisengo remains beyond reach of the communities. This is because the materials (stones) are not locally available and needs to be transported from Karugutu County. In long-term it can be made affordable.

***Promotion programme:*** If so, a pilot project consisting of lining and covering an OSHW can be undertaken by the DWO in one village in order to concretely improve the communities' awareness.

***Low-cost handpumps as a National strategy:*** The development and commercialisation of Rower pumps should be incorporated by DWD into the National Agenda for rural areas where the water table is shallow (situ).

***Dam construction:*** Dam construction should be approached with caution because despite its benefits (particularly where the water table is very deep), because it represents large cost necessarily subsidised by Government and because the water users are not WTP for it.

## 6.2. Improvements of conventional technologies

The SDWs and DBs should not be left aside because they are valued first valued by the communities for their water quality. Furthermore deep boreholes remain one of the rare solutions for areas such as Kibuuku where the water table is very deep. The challenges which fall into the responsibility of the community, Government and LGs can be addressed. The recommendations below are built from the weaknesses identified:

***Groundwater studies:*** The Government should undertake geological and groundwater studies in Rwebisengo to find out and quantify the problem of high mineralisation, particularly iron

***Develop a monitoring system of data collection:*** The insufficiency of comprehensive data and documentation on the conventional communal technologies should be addressed by laying the responsibility for gathering this data (location, technical features, number of users, and history of the facility) on the S/C. Effective monitoring

will require new staff at the S/C level such as S/C Water Officer who will support the DWO, who has already been assigned many responsibilities, including supervision.

***Follow-up support:*** A S/C Water Officer could allow better follow-up of the existing technologies and their WUCs because the former CDO was overwhelmed by running the programmes with BTC and other NGOs.

***Software support:*** The LC1s in charge of forming the WUCs should be made aware of the community contributions towards the investments and maintenance costs. This awareness-raising should be pursued by the initiators of the projects. The development of facilities to bank the money collected should be investigated.

***Spare-parts access:*** In response to the lack of storage capacity for spares, the District or S/C should consider the development of a space suitable for such a function.

***User-fees Management Structures:*** More reliable and/or complementary alternatives for community contribution fees should be investigated (by a MSc Student). For example, the fees imposed by the S/C revenues to any livestock transactions (1,000 Ushs) undertaken during the weekly livestock markets can be increased of 200 Ushs in order to financially support water supply development and repairs. This raises the question of the entity or person in charge of collecting and managing these funds.

***WUC capacities & accountability:*** The research revealed a lack of capacities and accountability of the WUCs for successful management of conventional communal technologies. They should be empowered. In order to make the WUCs more responsible, they should be registered by the proposed S/C Water Officer or DWO rather than DWD (as proposed in the National Framework O&M (2004)) which remains distant in terms of awareness and effective presence in the field in such a remote area. The WUCs should be taught how to keep records book by the TSU in order to be more accountable to the other water users. The WUCs should be remunerated or compensated with about 10,000 Ushs per month/member. The possibilities for this should be investigated along with the alternatives for effective community contributions by a MSc student.

## 6.3. A combined approach

The concept of self-supply should be developed and adopted as a key-strategy by Government and NGOs in order to give room to low-cost and incremental improvements. This would allow short-term and effective improvements in Rwebisengo S/C. The challenge of conventional technologies certainly requires more time for better community organisational structures and appropriation, but remains viable if addressed now. In order to effectively address the water issues identified, a combined approach of self-supply and conventional technology improvements is needed to maximise the strengths of each. This will require the involvement and co-operation of all the stakeholders.

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# 8. Appendices

# Appendix A: Critical requirements provided in the 2007-2012 OP-5

**Table 8-1: Detailed summary of the critical requirements OP-5**

1. ***Signed Memoranda of Understanding*** (MoU), which specify roles and responsibilities of the signatories. MoUs are required between
    a. GoU and Districts;
    b. Districts and Sub-Counties;
    c. Communities, Sub-Counties and Districts; and
2. ***Meaningful involvement of women***. Before any construction goes ahead, community mobilisation should have achieved the following requirements:
    a. The composition of Water User Committees (WUCs)/Water and Sanitation Committees (WSCs) shall include at least 50% women;
    b. Women should take up key positions in the WUC/WSC (ie chair, vice-chair, secretary, treasurer);
    c. Half of the water point attendants and handpump mechanics shall be women;
    d. Training shall target women and their male colleagues;
    e. The entire community shall be involved in discussing the siting of water sources with men and women initially consulted separately;
    f. All communications to communities shall be to both men and women
3. ***Hygiene Promotion and Sanitation.***
    a. All households of community leaders shall have latrines that are safe, clean and used;
    b. Latrine coverage should increase by 30% during the mobilisation phase;
    c. A plan should exisit of how the community intends to increase latrine coverage to 95% in four years
    d. There should be evidence that Districts and Sub-Counties are putting health and sanitation ordinances in place where applicable, and enforcing them.
4. ***Community Contributions***. A minimum community contribution towards the construction cost is required in cash. The Sector Schedules (2007/8) further specify that if items are given in-kind, they must be sold (for cash) by the community themselves.
5. ***Settlement of Land and Ownership Conflicts***. Communities shall be required to satisfactorily prove (eg with written agreements, land titles) that all potential and foreseeable land access and ownership issues have been resolved beforehand.
6. ***Operation and Maintenance Plan.*** There must be a 3-year realistic[16] and viable plan to ensure continuous and reliable operation of the completed facilities. The community *'O&M Plan'* shall be prepared by the community. The process is to be facilitated by District and Sub-County officials.

Source: MoWE, 2007

[16] The OP5 states that the O&M plan should be for 8-years. However, this was revised in 2006 in light of lessons learned from District local Governments.

# Appendix B: Outcomes of studies led by Sutton on Self-supply in Sub-Saharan Africa (2004)

**Table 8-2: Comparison of some features of conventional communal supplies with self supply sources up-grading**

| Attributes | Conventional communal systems | Self supply source up-grading |
|---|---|---|
| **Scale** | Best suited to nucleated, homogeneous communities, with good leadership | Suited to individual households and small groups |
| **Technology** | Technologies available for wide variety of conditions, greater flexibility in siting | Easily established where water is within 15 meters of surface or rainwater adequate |
| **Skills & Knowledge** | Focuses on outside knowledge and remote technologies | Builds on local knowledge, attitudes, and skills |
| **Water Users** | Serves large numbers of people, who may or may not form a community | Serves households or small groups forming natural management units |
| **Water quality** | Safety and quality of water usually assumed, not always correctly; perceived value among users may be less than assumed | Significant improvements in water quality, comparable to fully protected communal shallow wells but at much reduced cost; high perceived value among users |
| **Outputs** | Generally marketed for health benefits; income generation often difficult because of communal ownership | Often generates multiple benefits including income, improved nutrition, and local employment |
| **Ownership** | Depends on committee management which is not traditional and may take time to develop | Well-defined ownership and management by individual or well-established group |
| **Coverage** | Provides good water within 0.5 to 1 kilometers, but households may have nearer alternative sources | Provides good water, usually within household boundary or within 100 meters |
| **Capital cost** | Requires large investment per unit, and very high subsidies (usually around 95 per cent; typically US$15–30 per capita) | Low unit cost means that subsidy can be less than 50 per cent (Zimbabwe 20 per cent) (typically $3–5 per capita) |
| **Construction** | Rapid construction, but construction teams not usually involved in maintenance unless with outside funding | Rapid small changes, slower process to reach final product, construction teams also do maintenance |
| **Maintenance** | Long-term maintenance is expensive, requiring heavy equipment and transport | Regular and long-term maintenance can be carried out by local artisans, including progressive re-deepening at low cost |
| **Sustainability** | Higher standards from the start but sustainability may be low | Gradual steps towards high standards, each bringing sustainable improvement |
| **Initiators & Funding** | Often donor driven | Develops directly from local demand |

(Source: S. Sutton, 2004)

# Appendix C: Outcomes of the studies on Self-supply led in Uganda by Carter *et al*. (2006)

**Table 8-3: Self supply study in Uganda, the main water source types by technology**

| Source type | Description | Comment |
|---|---|---|
| 1. **Water hole** – locally improved domestic water source. | A very shallow (water within 0.5m of surface) hole, usually unlined, but sometimes protected by earth bunds and/or timber. Usually drained, sometimes fenced. | Typically a hill slope or valley bottom location, where shallow groundwater almost emerges as a spring, but it can only be accessed by a shallow excavation. |
| 2. **Valley tank** – locally constructed and acting as shared source of water. | A hand-dug excavation, typically $100m^2$ or more in plan area, up to 2m deep supplying domestic water. | In valley bottom locations, utilising shallow groundwater, but often catching surface runoff too. |
| 3. **Shallow well** – water shared or sold. | Typically a brick-lined hand-dug well, up to about 20m deep, with rope-and-bucket, windlass, rope pump or handpump. | Found in rural locations, trading centres and towns. In eastern Uganda this is known (misleadingly) as a "shadoof". |
| 4. **Borehole** – water sold. | A "deep" drilled borehole with handpump or submersible pump. | Only found in trading centres and towns in Stage 1. |

(Source: Carter *et al.*, 2006)

**Table 8-4: Proposed scoring system for water supply service**

| Characteristic | Score 0 | Score 1 | Score 2 |
|---|---|---|---|
| **Access** | Distance and/or ascent result in very limited consumption (typically less than about 8 litres per person per day. | Water is close to most users (typically within 0.5-1.0km), but still has to be carried home. | Water is supplied into the yard or house. |
| **Water quality** | Water is obviously polluted, reported to taste unacceptable, or is clearly at risk of contamination from pit latrines, livestock or other cause. | Source is well protected but untreated. Any storage is covered, and there are no obvious routes for contamination. | Water is treated (including disinfection), and treatment is managed to a high standard. |
| **Reliability** | Source performance fluctuates with season, or dries up with heavy use, such that users have to go elsewhere at certain times. Unreliability or low yield may lead to conflict between users. | Although consumption may be low because of access, the demands of the users can nearly always be met, and queuing times do not cause conflict or recourse to inferior sources. | Water is always available on demand, and consumption rates exceed 20 litres per person per day. |
| **Cost** | Cost is high. In the case of some "traditional" sources there is a high human cost in time, energy and ill health. In the case of some improved sources, capital cost can only be borne by a state or private investor. User fees may cover part or all of O&M costs, or users may pay no user fees. | Typically the users can contribute 10-15% of the capital cost. User fees cover basic maintenance only, when the need arises (and no contribution to capital cost recovery). | Capital cost is such that users can bear at least 50% of the investment. User fees are negligible. |

| | | | |
|---|---|---|---|
| **Management** | System maintenance is the responsibility of a competent body or person. User contribution to management is purely financial. If the private or public body provides a reliable service, raise score to 1. If the body is permanent, raise to 2. | Long term external support is needed to enable user manage-ment to function satisfactorily. | The source, as constructed, can be managed by the users, without external support. |

(Source: Carter *et al.*, 2006)

**Table 8-5: Possible improvements to self-supply water sources**

| Source Attribute | Possible Means of Improvement |
|---|---|
| Poor access – distant source or difficult physical access (e.g. steep ground) | • construct new shallow well nearer to users (if groundwater is present)<br>• improve physical access to spring (eg by steps)<br>• focus on rainwater harvesting near homes |
| Unreliable source | • deepen shallow well or other groundwater source<br>• increase rainwater storage<br>• in case of hand-pumped source, substitute an alternative pump which is readily maintained by the community |
| Poor water quality | • provide partial or full protection of spring or shallow well |
| High human or financial cost | • human cost: improve access and water quality<br>• financial cost: minimise use of purchased foreign materials and technologies |
| Difficult management | • reduce and simplify maintenance tasks through source protection and minimising dependence on "foreign" materials and technologies |
| High level of conflict between domestic water users and animals | • separate domestic and livestock access to water |

(Source: Carter, 2006)

## Appendix D: Interview guide A used to address the community

This is the interview guide used during discussions with the water users and the Water Users Committees (WUCs). It is composed of two main parts: water for animals and water for domestic use. The questions were not necessarily answered in the same order as suggested because the discussion was meant to remain open and follow the emphasis given by the interviewee (s).
Many questions are precise because the first aim of the discussion was to understand the interviewed water user's attitudes and perceptions towards water resources management and his habits in deep way.
The questions were also oriented by the researcher in function of the profession and status of the interviewee.

Sub-county: Parish: Village:
Date of interview: Sex of respondent: Age (elder, adult, youth):
Role: Occupation:

### IDENTIFICATION

1)What is your name?
2)What do you do for livelihood?
   a) Farmer
   b)Cattle keeper
   c) Cattle owner
   d)Fisherman
   e) Trader
   f) Artisan
   g)Professional/qualified employee
3)How many people are you at home?

### WATER FOR DOMESTIC USES

#### WATER DEMAND

4)What do you use your water for?
(Drinking water, washing, sanitation, animals watering, crop irrigation…) Classify the different uses according to their importance
5)How much water does your household need and fetch daily for domestic uses? (Precise the type of container)
6)Which part does water supply represent in your expenses?

#### WATER ACCESS

7)Where do you get water intended to your domestic needs?
   a) Open wells/shallow wells
   b)Borehole
   c) Improved point sources (hand pumps)
   d)Rower and treadle pumps
   e) River/Lake
   f) Pond and swamp water
   g)Piped water
   h)Rain water

i) Others (specify)

8) Do you use different facilities (number, types…)?
9) Who are the owners of those facilities?
10) Do you have to seek permission to get water from their water sources?
11) Is there any conflict at the water source from where you get domestic water? Specify the conflict if any?
12) Do you have to pay for water? If so, how much do you pay? Who do you pay water to?
13) Do you share the water sources you use?
14) What is the distance from your house to the water source?
15) How much time do you spend when fetching water from the source you get most of your water from?
16) What problems do you face when fetching water?
17) What do you think should be done to solve these problems?

**SEASON IMPACT**

18) Do you change your water sources according to the season?
19) What are the challenges you face during the drought season?
20) What are the challenges you face during the rainy season?

**WATER QUALITY**

21) What do you think about the quality of the water you use?
(Appearance, taste, smell, presence of particles, corrosion, nature)
22) Does the water quality have any impact on your water sources choices?
23) Do you use any particular treatment for your drinking water?
a) Boiling
b) Filtering
c) Wait to settle
d) Filtering and boiling
e) Others (specify)
24) What do you think should be done to solve these problems?

**OPERATION AND MAINTENANCE**

25) What do you or members of your household do towards maintenance of the water source you use?
a) Formal/informal labour
b) Provide of money (specify amount)
c) Provide construction materials
d) Contribute in kind (specify item e.g. coffee)
e) Management committee member
f) Other (specify)
26) Is your contribution different whether the facility is private or common?
27) What do you do when you notice that there is a break down?
28) What is the role of the WUCs?
29) How do the WUCs function?
30) What do you like or dislike about it?

**RELIABILITY**

31) How often do the current facilities fail?
32) How do you think you can improve these water points?
33) What do you do when your water source breaks down?

**WATER SUPPLY DEVELOPMENT PROCESS AND MANAGEMENT**

34) What do you do when your community wants a new source developed in your area?
35) How do you express the request for water supply? Letter, talk…

36) To whom do you express your request?
To the political leaders (LC1, LC2…), Sub-county office, District office, DWD…
37) Which support do you/your community receive from the government or other external agency?
38) What do you think should be done to facilitate the process?
39) Would you be willing to contribute towards making a water source available in your community? If yes, how would you contribute?
   a) Formal/informal labour
   b) Provide of money (specify amount)
   c) Provide construction materials
   d) Contribute in kind (specify item e.g. coffee)
   e) Management committee member
   f) Other (specify)
40) Which facilities do you like to be developed in the area? Why?
41) Are you willing to consider rain water harvesting for your domestic water uses?

## WATER FOR ANIMALS

### LIVESTOCK WATER DEMAND

42) If you are a cattle keeper, which animals do you rear?
43) How large is your herd of animals?
44) How much water do your animals need on average?

### LIVESTOCK WATERING MEANS

45) Where do you water your animals?
46) Which facilities do you use to water animals?
47) Are these facilities adequate to the livestock water needs? If not how can they be improved?
48) Do animals watering have any impact on your water needs and supply?
49) Does livestock have any impact on water quality?
50) Do animals watering create any conflict within the community?
51) Are you animals kept in a fenced area? If not why?

### LIVESTOCK VALUE

52) How much does a cow come to?

### CHALLENGES

53) What are the main challenges involved by livestock watering?
54) In your point of view, what improvements can be done for livestock watering?
   a) Repair / rehabilitation of existing source
   b) Protection of the existing
   c) Construction of new source
   d) Election of water management committee
   e) Others (specify)
55) What do you think you can do as an individual or a community to contribute to this progress?

## Appendix E: Interview guide B used to address the Officials

This is the interview guide used during discussions with officials from the District, S/C, (Veterinary Officer), Government (DWD, TSU), Private sector and NGOs and Political Leaders. It is composed of two main parts: water for animals and water for domestic use. The questions were not necessarily answered in the same order as suggested because the discussion was meant to remain open and follow the emphasis given by the interviewee (s).

### A. IDENTIFICATION

Institution Name Role Date of interview Sex of respondent

### B. PEOPLE AND ECONOMY

1)What are the main economic activities taking place in the local area?
2)What is the income level?

### C. WATER RESOURCES AND THE AREA

3)How do you describe the area in terms of water resources?
4)What are the main challenges in terms of water resources during dry and rainy seasons?

### D. WATER FOR DOMESTIC USES

5)What is mainly water used for?
6)Are the needs met during both the seasons?
7)What are the different facilities used by the communities to get water for domestic uses?
- j) Open wells/shallow wells
- k)Borehole
- l) Improved point sources (hand pumps)
- m) Rower and treadle pumps
- n)River/Lake
- o) Pond and swamp water
- p)Piped water
- q)Rain water
- r) Others (specify)

8)How are spread the facilities out over the area?
9)How does the community manage its water resources?
10) Does the cohabitation of farmers and livestock keepers cause any conflict around water resources management?
11) Do any people have to pay for water?
12) Is the piped water supply system properly maintained?
13) How do the WUCs function?
14) What are the main current challenges?
15) What are the technologies you think adequate and to be developed?
16) How do the individual or communities express their request for water supply?

### E. WATER FOR LIVESTOCK

17) Who does owe the livestock?
18) Where and how is livestock watered?
19) What impact does livestock have on water resources management?
20) What impact does livestock have on water quality?
21) What are the main challenges involved by livestock watering?

22) In you point of you, what are the technologies to be developed?

### F. POLICY AND STRATEGIES

23) What are the main challenges you have been facing in this area?
24) How do the communities do to face these challenges?
25) Which support do you provide? What are the criteria to get it?
26) Are the existing policy and strategies adequate and sufficient to respond to those challenges?
27) Which policy and strategies do you think are necessary to improve the water supplies?
28) In your opinion what should be done to improve water supplies access? What are the priorities?
29) How do you assess future and projected needs?

# Appendix F: Distribution of the Interviewees from communities

**Table 8-6: Total of households per village against number of households visited, number of interviewees from HH visits and Focus groups (FG), and Pupils**

| Parishes | Villages | Total of (HH)[17] | No. of (HH) visited, | No. of interviewees from HH visits | No. of interviewees from FG | | No. of pupils |
|---|---|---|---|---|---|---|---|
| **BWERAMULE** | Bweramule | 325 | 5 HH | 6 | 1 | | - |
| | Kibbuku | 220 | 6 HH | 16 | - | | 14 pupils |
| | Nyakabira | 168 * | 3 HH | 5 | - | | - |
| | Rukoora | 370 * | 4 HH | 15 | 2 | | - |
| | Kiringa | 60 * | 2 HH | 5 | 1 | | - |
| | Kayanja | 280 * | 1 HH | 5 | 1 | | - |
| **KASUNGU** | Kasungu I | 174 | 1 HH | 1 | 1 | | - |
| | Kasungu II | 85 | - | - | 1 | | - |
| | Kajura | 142 | 1 HH | 1 | 1 | | - |
| | Kyabukunguru | - | - | - | - | 31 | - |
| | Kyenyange | 50 * | - | - | - | | - |
| | Kimara | 147 * | 1 HH | 3 | 1 | | - |
| | Kazigiso | - | - | - | - | | - |
| **RWEBISENGO** | Harukoba | 79 | 4 HH | 11 | 2 | | - |
| | Kanyamukura | 95 | 1 HH | 4 | 4 | | 45 pupils |
| | Makondo | 107 | 4 HH | 13 | 1 | | - |
| | Hakibiira LCI | 104 | - | - | - | | - |
| | Mukiimba I | 226 | 1 HH | 1 | 1 | | - |
| | Mukiimba II | 217 | | | 1 | | - |
| | Rwebisengo North | - | 3 HH | 10 | 5 | | - |
| | Rwebisengo South | - | 8 HH | 18 | 9 | | - |
| **TOTAL** | | - | **41 HH** | **114 individuals** | **64 individuals** | | **59 pupils** |

**Table 8-7: Number of informants from the four parishes out of the selection and interviewed the focus groups**

| Parishes out of the selection | Type and number of informants polled during opportunistic focus groups |
|---|---|
| **BUTUNGAMA** | ▪ 7 political leaders or village facilitators |
| **HAIBALE** | ▪ 7 political leaders or village facilitators |
| **KIRANGA** | ▪ 7 political leaders or village facilitators<br>▪ 10 pupils from Rwebisengo Secondary School located in Kiranga |
| **MASAKA** | ▪ 9 political leaders or village facilitators<br>▪ 23 pupils from Nyakasenyi Primary School located in Masaka |
| **TOTAL** | **62 extra informants** |

[17] The figures are taken from the 2002 National Census while the others (*) were collected on the field from the Local Political Leaders at the village level (LC1)

## Appendix G: List of the name and address of the Key informants

| National | | | |
|---|---|---|---|
| Aaron Kabirizi | Assistant Commisioner<br>Rural Water Division | DWD | 0392731289<br>0772400876 |
| Gilbert Kimanzi | Principal Engineer<br>Rural Water Division | DWD | 041505940<br>0772500602 |
| Kerstin Danert | DWD Water and Sanitation Engineer Advisor | DWD Consultant | 0772402304 |
| Catherine Muhumuza | Social Scientist TSU 6 | DWD | 0772660024 |
| Geoge Alito | Focal Point Officer (FPO) TSU 2 | DWD | 0774368915 |
| Gerald Komakech | DWD Water and Sanitation Engineer Consultant | DWD | 0772443616 |
| Gaetan Okello | Senior Engineer / FPO TS3 based in Soroti | DWD | 0772983549 |
| John Twinomujuni | Principal Engineer<br>Water For Production Department | DWD | 0392731287<br>0782727267 |
| Bob Ahibisibwe | Engineer<br>Water For Production | DWD | ahimbobe@yahoo.com |
| Lydia Kaboyo | Social Scientist<br>Water for Production Department | DWD | |
| Mercy Kongo | Social Scientist<br>Water for Production Department | DWD | |
| Frank Tumwebaze | DAVIS & SHIRTLIFF<br>Sales Manager | Private Sector | 0413463378<br>0772466171 |
| Andrew Katorotorwa | Principal Officer | HEWASA | 0772649190<br>andrew_katorotorwa@yahoo.com |
| **District** | | | |
| Jackson Bambahira | LC5 Bundibugyo District | District | 0782865661 |
| Elias Byamungu | Chief Administrative Officer | District | 0782777422<br>chiefaobundibugyo@yahoo.com |
| Hamet Katusume | Clerk to Council Bundibugyo | District | 0772960696 |
| Jaana Misisera | Acting District Water Officer (DWO) | District | 0772541769 |
| Jane Kemigisa | District Councillor | | |
| Vincent Maher | Belgian Technical Cooperation Officer | BTC | 0772221536 |
| Jackie Nalubwama | GOAL Partnership Officer | GOAL (International NGO) | 0772350800 |
| **Sub-county** | | | |
| Name | Function / Role | Village | Addresses |

| | | | |
|---|---|---|---|
| Rajabu Olimi Kisutu | Community Development Officer | S/C Office | 0772640430 |
| Wilfried Sekanabo | Sub-county Chief | Rwebisengo South | 772915854 |
| Emmanuel Otwao | Sub-Accountant | S/C Office | 782397950 |
| Erick Bomeera | County Veterinary Officer | Rwebisengo South | 772885683 |
| Swithen Kwezi | LC2 | Rwebisengo | |
| Ahmed Husseni | LC1 and mechanic | Rwebisengo South | 0782460285 |
| Jackson Bamoruka | LC1 | Bweramule | |
| Kisembo John | LC1 | Rwebisengo South | |
| Christoph Amanoya | LC1 | Majumba | |
| Moses Brown | LC1 | Harukoba | |
| Obadiya Babiiha | LC1 | Makondo | |
| David Kisembo | LC1 | Kasungu II | |
| Swizen Kisembo | LC1 | Kimara | |
| Kabukorwa Erimos | LC1 | Rukoora | |
| Kiiza Swithen | LC1 | Kayanja | |
| William Buguma | Vice LC1 | Kiranga I | |
| S Mwioumubi | Vice LC1 | Mukimba II | |
| D Isungoma | Vice LC1 | Haibale | |
| Charles Rubueza | General secretary LC1 | Kibuuku | |
| James Kasanga | General secretary LC1 | Majumba II | |
| Silva Kyomubenso | General secretary LC1 | Haibale | |
| Herbert Mutabaazi | General Secretary LC1 | Ngege | |
| Mariam Jafari | General secretary LC1 | Rwebisengo | |
| | General Secretary LC1 | Kiranga | |
| Henriette Namusoke | General Secretary LC1 | Nyakabira | |
| Basima Onesimo | General Secretary LC1 | Kibbuku Centre (camp) | |
| David Orone | Community Development Facilitator (CDF) | World Vision NGO Rwebisengo | 0772682062 oronedavid@yahoo.co.uk |
| Mbabazi Isaac | Medical Officer Outreach Africa Medical Centre | Rwebisengo South | |
| George Kodjo | Medical Assistant | Nyakabira | |
| Innocent Tumuheki | Project Coordinator of RMCCC Medical Officer | Rwebisengo North | 0392943242 |
| Johnson Mugisha | Water Operator | Harukoba | |
| Beatrice Mukemba | WUC Deep Borehole Clinic | Rukoora | |
| Hassat Mariam Hussein | WUC SDW (Mosque) | Rwebisengo South | |
| Kabatuku | WUC | Rwebisengo South | |

## <u>Appendix H</u>: Coding and thematic breakdown of the interview field notes (See attached CD-ROM)

This Appendix is saved as a specific Word Document "Appendix H" on the attached CD-ROM.

All the interviews conducted within the communities, S/C and District Officials and political leaders were transcript in the present appendices. Every comment was transcript into the different themed boxes brought out within the interview guides (as subject of particular interest) or frequently arose from the interviews. This facilitates the conceptualisation of the main themes to tackle.
Each comment is therefore associated to its interviewee referred "I" (as interviewee) and followed by the number allocated to him/she. In order to respect the anonymity of the interviewees, they are presented only by the reference "I No" which was associated to them and their interview. The interviewee can be an individual (water user or official), household or small group. The essential features necessary to know to analyse the comment (gender, age, profession and village) are shown in the list of all the interviewees (communities, S/C and District levels) presented in Appendix I.
Regarding the focus groups, they are referenced by FG followed by its specific number (FG No). The focus group can be composed of local political leaders or pupils.
The notes taken during the discussions led with the officials of the National level (DWD, NGO and Private sector) were not transcript here because of the lack of tome. They were only meticulously re-read and the themes highlighted for coding.
There are some specific notations to consider in this coding in order to respect the interviewees' wording. SW: shallow well; BH: borehole; OW: open well

The general outline of the themes (they remain open and very interrelated) are as follows:

**I Open wells**
1. Location & construction
2. Maintenance
3. Operation
4. Water quality
5. Reliability

**II Boreholes (BH) & Shallow wells (SW)**
1. Procedure of construction
2. Operation
3. Ownership
4. Maintenance
5. Usual procedure for repair
6. Requests to Government and LGs
7. Reliability

8. Water quality

**III Water User Committees (WUCs)**
1. Roles (perception)
2. Appointment or Election
3. Problems
4. Improvements suggested
5. Salary, compensation or voluntarism

**IV Land management**
1. Mobility
2. Ownership

**V Improvements**
1. Technical suggestions
2. Willingness to pay (WTP) and Ability to pay (ATP)
3. Perception of Self-help supply, and affordable improvements
4. Government's role

**VI Other water sources**
1. River Semiliki
2. Rainwater Harvesting (RWH)
3. Rower pumps
4. Swamp and ponds
5. The Gorge Kisege
6. Kinyangeni stream
7. Tchobe stream
8. Piped water system
9. GFS (Nyakabira)

**VII Animals and Crops**
1. Types and features of livestock
2. Cattle and issues
3. Goats
4. Crops
5. Facilities used to water animals and challenges
6. Improvements suggested and WTP for any improvements

**VIII Populations and local economic activities**
1. Populations
2. Local economic activities
3. Parish plans

## <u>Appendix I</u>: List of the interviewees from the communities, S/C and District levels (and some elements on their water sources)

All the data gathered are not in this Appendix. Only the basic elements are shown in that Table to keep it simple for the reader.

This Appendix is saved as a specific Excel Document “Appendix I” on the attached CD-ROM.

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## **Appendix J: Data gathered on the handpumps of the study area**

All the data gathered are not in this Appendix. Only the basic elements are shown in that Table to keep it simple for the reader.

This Appendix is saved as a specific Excel Document “Appendix H” on the attached CD-ROM.

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## Appendix K: Categorisation of all the water sources according to the main characteristics along both the approaches: self-supply and conventional technologies

| | The existing Self-Help Supplies | | | | | The existing Conventional Technologies | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Water Sources / Features** | **Open Shallow Hand-dug Well (OSHDW)** | **River Semiliki** | **Ponds / Swamp** | **Rainwater Harvesting (RWH)** | **Rower Pump (RP)** | **Deep Borehole (DB)** | **Shallow Drilled Wells (SDW)** | **Tap Piped Water Supply System** | **Gravity Flow Water Supply Scheme (GFS)** |
| **Ownership** | Private | Communal | Communal | Private | Private | Communal | | Private Tap connection in a public piped water supply scheme in Rwebisengo RGC | Communal Tap in Nyakabira Village |
| **Owners Initiators** | Cattle owners[18] | N/A | N/A | HH with iron sheet roofs (+/- wealthy HH) | Relatively wealthy HH | External Agency[19] | | ▪ Relatively wealthy HH<br>▪ Traders,<br>▪ Health Unit | External Agency |
| **Scale** | Individual (4-10 HH) | Community | Community | ▪ Individual<br>▪ HH<br>▪ Schools | Individual | Community | | Individual | Community |
| **Investment cost** | 20,000 Ushs | - | - | Cost of tank = f(size) Cheap sauce pan | From 200,000 Ushs[20] | 8 million Ushs | 3.5 million Ushs | From 250,000 Ushs (connection fees) | Huge but Unknown |
| **Maintenance cost** | ▪ 30,000 Ushs<br>▪ Personal labour | - | - | - | From 30,000 Ushs[21] | Variable repairs types | | 30 Ushs/jerry can Monthly bills | Unknown |

[18] Most of the initiators/owners are the cattle owners who primarily use the OSHW for watering animals. However other community members dig also OSHW intended only to serve their domestic uses
[19] The external agency can be the Government, NGOs and/or Donors
[20] Current price (2007) of a rower pump in Davis & Shirliff Company Ltd
[21] Cost given by the three rower pump's owners interviewed

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Cost sharing Form (imposed by the owner to the other users)** | ▪ 500 Ushs/HH<br>▪ for repair<br>▪ Manual labour | - | - | Free of charge | - | ▪ Free of charge<br>▪ 100-200 Ushs/month<br>▪ 50 Ushs/jerry can (20L)<br>▪ Manual labour | | 100 Ushs/jerry can | ▪ Free<br>▪ Formal labour |
| **Type of users** | Rural and RGC HH | Rural HH | Rural, RGC HH | Rural, RGC | Cattle owners, Traders, Health Unit | Rural, RGC HH | | RGC HH | Rural HH |
| **Main domestic water uses** | All domestic uses[22] | All domestic uses | Washing, bathing, | Drinking | All domestic uses | Drinking<br>All domestic uses | | All domestic uses | All domestic uses |
| **Animal watering** | Yes | Yes | Yes | No | No | No | No | No | No |
| **Access** | Very high water table | Free | Free | Easy | Easy | Variable | | Fair | Variable |
| **Location** | Inland<br>Every | Bordering many Villages | Overspread over the open area | HH backyard | HH backyard | Overspread in the S/C | | HH backyard | Nyakabira Village |
| **Water quality** | Medium[23]<br>Salted | Bad | Very Bad | Good | variable | Good<br>Salted | Variable<br>Salted | Good | Good appearance & taste<br>Poor quality[24] |
| **Reliability** | Inoperative during the rainy season<br>Prone to drought | Available at any season | Available only during rainy season | Depend on rain intensity | Prone to drought | Often broken | Prone to drought<br><br>Often broken | Fair<br>but depend on the availability of fuel | Permanent |

[22] The domestic uses include water for drinking

[23] Water quality is judged bad by most of the people because those OSHW are not covered but some stress the fact that water is often used and therefore frequently renewed "*The OW is used to water animals. That is why water is renewed all the time and therefore of good quality*" (A cattle owner, I54)

[24] According to the water analyses made by a private local laboratory in Nyakabira ("*This water is of very poor quality and contains worms, aarchistes"* , Medical Assistant, I45)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Operation for human consumption** | Tiresome process water lifting with a can tied to a rod | ▪ Long distances<br>▪ Tiring Carry<br>▪ Crocodiles attacks | - | Fairly operationable | ▪ Tiring lifting | ▪ Long distances<br>▪ Long queues<br>▪ Tiring Carry | | ▪ Easy for owners<br>▪ Long distances<br>▪ Tiring Carry | ▪ Long distances<br>▪ Tiring Carry |
| **Operation for animals consumption** | Intensive labour requiring 2 people, and many hours to fill the trough | | Effortless | N/A | N/A | N/A | | N/A | N/A |
| **Maintenance** | Labour intensive<br>Sand removal<br>Re-digging<br>Deepening | None | None | Cleaning of the tank | ▪ Replacement of valves<br>▪ Deepening | Heavy, costly and regular repairs required | Variable, regular repairs required | Minor repairs | Unknown |