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**IMPACT OF COMMUNITY PARTICIPATION ON SUSTAINABILITY OF WATER
AND SANITATION PROJECTS IN RURAL AREAS. CASE STUDY OF MUSANZE
DISTRICT, NORTHERN PROVINCE OF RWANDA.**

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SUSTAINABILITY OF WATER AND SANITATION
PROJECTS IN RURAL AREAS.**

**A CASE STUDY OF MUSANZE DISTRICT, NORTHERN
PROVINCE OF RWANDA.**

BY

Bénigne ISHIMWE MUGWANEZA

A Research Thesis Submitted in Partial Fulfilment of the Requirements for the Award of the
Degree of Master of Science in Water Policy of Pan African University Institute of Water and
Energy Science (including climate change) Tlemcen, Algeria

August, 2019

CERTIFICATION

This thesis has been submitted for examination with my approval as the university supervisor

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DEDICATION

This work is dedicated to my family and friends. You were cordial to me in a very unique way.

DECLARATION

I, **Bénigne ISHIMWE MUGWANEZA**, hereby declare that this thesis represents my personal work, realized to the best of my knowledge and has never been presented for a degree in any other University. I also declare that all information, material and results from other works presented herein, have been fully cited and referenced in accordance with the academic rules and ethics.



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BIOGRAPHICAL SKETCH

Bénigne is a Rwandan Civil Engineer, now finalizing her MSc in Water Policy from the Pan African University Institute of Water and Energy Sciences (including climate change). She has a unique diverse background including her Bachelors of Science in Civil Engineering from the University of Rwanda, her volunteering and work experience in journalism, community organizing and workshop content development and delivery. She is deeply enthusiastic about the 2030 Agenda for Sustainable Development and aims to contribute to the achievement of water-related Sustainable Development Goals (SDGs) by working on the science-policy interface.

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I extend my gratitude to fellow 4th cohort graduates who gave me a chance to serve them as their representative at the Pan Africa University Senate, you have all shaped me as a good listener and leader. Our diversity makes us a great team and I can't wait to see what a great contribution we will have in transforming our Continent. To the Algerian Government, to all PAUWES staff members, to PAUWES Stakeholders, to the people of Tlemcen and all Algerians in general; for their support, assistance and provision of enabling learning environment during my stay in Algeria.

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ABBREVIATION AND ACRONYMS

12yBE: Twelve Years Basic Education

AFDB: African Development Bank

AU: African Union

CBO: Community Based Organization

CDD: Community Driven Development

CEO: Chief Executive Officer

ECA: Economic Commission for Africa

FAO: The Food and Agriculture Organization of the United Nations

GDP: Gross Domestic Product

GOR: Government of Rwanda

GWP: Global Water Partnership

HCD: Human Centered Design

IAP: International Association for Public Participation

ISO: International Organization for Standardization

IWA: International Water Association

IWMI: International Water Management Institute

IWRM: Integrated Water Resources Management

LODA: Local Administrative Entities Development Agency

MDG: Millenium Development Goals

MIDIMAR: Ministry of Disaster Management and Refugee Affairs

MININFRA: Ministry of Infrastructure

NISR: The National Institute of Statistics of Rwanda

O&M: Operations and Maintenance

PAUWES: Pan African University Institute for Water and Energy Sciences (incl. Climate Change)

PPP: Public Private Partnership

RURA: Rwanda Utilities Regulatory Authority

SDG: Sustainable Development Goals

SuSanA: Sustainable Sanitation Alliance

UNDP: United Nations Development Programme

UNEP: The United Nations Environment Programme

UNICEF: The United Nations Children's Fund

UN-Water: The United Nations Water Programme

WASAC: Water and Sanitation Corporation

WASH: Water, Sanitation and Hygiene

WC: Water Committee

WHO: World Health Organization

WSS: Water Supply Schemes

WUA: Water Users Association

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ABSTRACT

Water-related diseases are closely linked to poverty and disproportionately affect vulnerable communities of developing countries including Rwanda. Most development projects highlight community participation as one of the prerequisites for the improved performance of water and sanitation. In that regard, this research was conducted to evaluate the impact of community participation on sustainability of water and sanitation projects with a focus on rural areas where the services are usually significantly low compared to similar services provided to cities. Three rural villages in Musanze District (Gataraga, Gitega, Rwinuma) were taken as the case study. The methodology applied to assess community participation was thoroughly discussed to see the extent of community involvement at different stages of the projects. Data was collected using questionnaires and analyzed using Statistical Package for the Social Sciences (SPSS). A total of 192 participants responded to the questionnaires of whom 189 were water and sanitation projects beneficiaries. In addition, Water and Sanitation District and sectors officials were also interviewed. From the results, it was noted that there were measures in place at the District level to ensure project sustainability from the initial stages. The measures include community mobilization during project initial planning to ensure that the people understand and accept the project while committing to safeguard it, and the structure put in place for project operations and maintenance activities from the District level down to the village level with user committees. However, from the findings of this study, it was observed that despite the measures put in place, communities still do not have the capacity to maintain the water and sanitation systems. At the same time they don't have a sense of ownership. In addition, it was concluded that sufficient attention was not given to the community involvement in different stages of projects implementation including design, construction as well as operations and maintenance. Hence community participation management approach was not effectively used in the case study of all the projects and this threatened sustainability of the water and sanitation schemes. The study recommends to the GOR/Districts to incorporate the user centered design methodology in projects initial stages in order to involve community in early stages and produce interventions that fully solve community problems and to prioritize proper training and technical support at all levels and for all groups engaging in water and sanitation projects study and implementation in order to ensure project sustainability.

Key words: Sustainability, Community Participation, User Centered Designs

RESUME

Les maladies liées à l'eau sont étroitement liées à la pauvreté et affectent de manière disproportionnée les communautés vulnérables des pays en développement, y compris le Rwanda. La plupart des projets de développement soulignent la participation communautaire comme l'une des conditions préalables à l'amélioration des performances de l'eau et de l'assainissement. À cet égard, cette recherche a été menée pour évaluer l'impact de la participation communautaire sur la durabilité des projets d'approvisionnement en eau et d'assainissement, en particulier dans les zones rurales où les services sont généralement très bas comparés aux services similaires fournis aux villes. L'étude de cas a porté sur trois villages ruraux du district de Musanze (Gataraga, Gitega, Rwinuma). La méthodologie appliquée pour évaluer la participation de la communauté a fait l'objet de discussions approfondies afin de déterminer l'étendue de la participation de la communauté aux différentes étapes des projets. Les données ont été collectées à l'aide de questionnaires et analysées à l'aide du logiciel statistique pour les sciences sociales (SPSS). Au total, 192 participants ont répondu aux questionnaires, dont 189 étaient des bénéficiaires de projets d'approvisionnement en eau et d'assainissement. En outre, des responsables de l'eau et de l'assainissement au niveau du District et des Secteurs ont également été interrogés. D'après les résultats, il a été noté que des mesures étaient en place au niveau du district pour assurer la durabilité du projet dès les premières étapes. Les mesures comprennent la mobilisation de la communauté lors de la planification initiale du projet pour s'assurer que le peuple comprend et accepte le projet tout en s'engageant à le sauvegarder, ainsi que la structure mise en place pour les activités d'opération et de maintenance, à partir du district au niveau du village avec des comités d'utilisateurs. Toutefois, il ressort des conclusions de cette étude que malgré les mesures mises en place, les communautés n'ont toujours pas la capacité de maintenir les systèmes d'approvisionnement en eau et d'assainissement. En même temps, ils n'ont pas le sens de la propriété. En outre, il a été conclu qu'aucune attention suffisante n'avait été accordée à la participation de la communauté à différentes étapes de la mise en œuvre des projets, notamment la conception, la construction, l'exploitation et la maintenance. Par conséquent, l'approche de gestion de la participation communautaire n'a pas été utilisée efficacement dans l'étude de cas de tous les projets et cela a menacé la durabilité des systèmes d'approvisionnement en eau et d'assainissement. L'étude recommande au GOR / aux districts d'intégrer la méthodologie de conception centrée sur l'utilisateur dans les phases initiales des

projets afin de produire des interventions qui résolvent pleinement les problèmes de la communauté et de donner la priorité à une formation adéquate et à un soutien technique à tous les niveaux et pour tous les groupes engagés dans l'étude et mise en œuvre des projets d'approvisionnement en eau et d'assainissement.

Mots clés: Durabilité, Participation Communautaire, Conceptions Centrées sur l'Utilisateur

1. INTRODUCTION

1.1. Background of the Study

Global Water and Sanitation Crisis

In 2015, over 2.3 billion people all over the world still lacked basic sanitation service, 844 million people still lacked basic drinking water while only two out of five people using safely managed sanitation services (1.2 billion) lived in rural areas (UNICEF, 2017). This explains the need for SDG's 6 on ensuring availability and sustainable management of water and sanitation for all. Goal 6 includes the target of achieving universal and equitable access to safe and affordable drinking water for all and achieving access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations by 2030 (UN News Centre, 2015). In line with that, the Africa water vision aspires sustainable access to safe and adequate water supply and sanitation to meet the basic needs of all by 2025 (African Union, African Development Bank, & Economic Commission for Africa, 2009).

Water challenge

In 2015, 263 million people spent over 30 minutes per round trip to collect water from an improved source (constituting a limited drinking water service). 159 million people still collected drinking water directly from surface water sources, 58% lived in sub-Saharan Africa (UNICEF, 2017). Water has attracted attention for long. In 1970s the UN Water Conference held in Marta Plata was the first big international conference on the subject and declared the first decade of international water supply and sanitation from the 80s to 90s. In 1992, the Dublin Principles on water resources management were issued, while in 2000 the Millennium Development Goals set a specific target to cut in half by 2015 the proportion of people without access to sustainable, safe and drinking water. Now the Sustainable Development Goals setting at having everyone safe with safe and sustainable water, as well as other water-related targets. But after all, still today, 3 out of 10 people in the world are without access to safe water and 6 in 10 homes, lack safely managed sanitation (UNICEF, 2017). This shows how progress

remains difficult, no matter how essential water is for human life. Water is an essential and non-sustainable good that has economic, social, cultural and environmental role. Water is needed for drinking, bathing, cooking, etc. With contaminated water, very dangerous diseases are spread, particularly among the children. Water also has cultural and spiritual, and recreational values and in addition to that, the whole range of earth on marine ecosystems need water; animals and plants cannot live without water. On top of that, water is essential for energy production, agriculture, and industry, as well. Going deeper, water is also complicated; what comes from the sky, is found at the seas, the rivers, or from the underground. As such it is free, but obstructing water, purifying, bringing it to home or to the industries through pipes is at a cost in money and in energy. However, the price paid for that water is typically not covering the cost of production and transport. Moreover, water is not unlimited, if too much of it is extracted, the ecosystems is affected, water pollution and ecosystem degradation are being made worse by increasing amounts of untreated wastewater. At the same time the demand for energy, food, industry, households and the environment in terms of water is rising above the available supply all over the world, hence the need for governance of available water resources (UNDP, 2013), and all of this is happening against a backdrop of climate change, which is playing havoc with the predictability of our most precious resource(UN-Water, 2018a) .

Sanitation challenge

In 2015, 4.5 billion people globally lacked access to safely managed sanitation and 890 million of those still practice open defecation mostly in sub-Saharan Africa and in Asia(UN-Water, 2018b). Rural sanitation is considered as a particular challenge as many people don't have any toilets, or if they do, they have precarious structures which can be dangerous or even frightening for children to use. According to the 2015, SDG baseline, 68% have access to basic facilities, but that's not necessarily safely managed sanitation, 8% have shared improved sanitation while 12% still open defecate (UNICEF, 2017) . This varies considerably by region and by wealth status. The results of this lack of sanitation are the environmental degradation, endemic disease that leads to mortality, morbidity, especially among children, and stunting for those children, low productivity, poor school attendance and performance, especially for girls, and a vicious cycle that leads to poor economic growth, poor urban and rural development, and competitiveness of cities.

Safe sanitation and hygiene is fundamental to protecting health. Water-related diseases are also closely linked to poverty and disproportionately affect vulnerable communities. Much of the global burden of diarrheal disease could be averted through better sanitation and hygiene. There are also some non-health related benefits, for instance school enrollment and attendance, and these are particularly important for women and girls due to biological factors and also cultural taboos. There are other reasons like dignity, privacy, having the convenience of having your own toilet, as well as status and prestige (Christensen Rand, Smets, Bevan, & Perez, 2014). For Governments there are also benefits in terms of saved health costs for the economy, there is also potential opportunities for income generation through ecological sanitation in rural areas. There are also benefits for the environment in terms of protecting ecosystems from contamination and degradation, this is especially important where people are relying on these ecosystems for their livelihoods and wellbeing (UN Environment/UNEP, 2018).

SDG goal 6 and target 6.2 seeks to achieve adequate and equitable sanitation and hygiene for all, and there's also a focus on ending open defecation and the needs of women and girls and those in vulnerable situations (UN-Water, 2018a). There are some specific challenges for achieving sanitation in rural areas. For instance, there are low population densities and there are longer distances to travel, this makes it challenging for implementation. In addition, there are lower literacy rates and less educated public with higher levels of poverty, which can make awareness building more challenging. Moreover, there is a less qualified staff and the sector is in general less developed, hence fewer private actors and civil society, and there may also be a traditional social hierarchies in certain rural areas. Another challenge is that rural sanitation has a lower priority and visibility in many countries. There is also less understanding of the needs of people who are living in rural communities, and why they might want to use sanitation, and what it implies for them. In addition, there are issues around inadequate financing for sanitation programs (Christensen Rand et al., 2014).

Water and Sanitation interlinkages across the 2030 agenda of SDG's

In a nutshell, achieving SDG 6, the water and sanitation goal, is essential for progress in all other SDGs and vice versa, which means also progress in the other SDGs is critical for making progress with SDG 6. Water cuts across climate change, poverty, health, food security, energy security, education, gender, etc. Therefore water can be considered on one hand as an enabler to achieve all the other goals, while it is also critical to make progress in the other goals for

achieving SDG 6 (UN-Water Task Force, 2016). Looking at the main users of water, about 70% of the total global water withdrawals go into agriculture (FAO, 2017), while a bit less than 20% go into industry and energy. Without proper water supply, the human being can't live without drinking water, but also without water security, the industry and the economic development come to a halt. Water is absolutely critical for agriculture and without water security agricultural productivity goes down. For example a drought year can really reduce economic growth very significantly. Some agricultural based economies need more than 90% of the withdrawals for their agriculture but it is globally variable. In Europe only 21% of the withdrawals go to agriculture, while almost 60% of the water is actually used for industries. In agriculture-based economies like Africa the agricultural water use is more than 90% (FAO, 2017). In a globally connected economy, water use in different countries are impacted throughout. Water is also directly related to energy security, globally, about 4% of the global electricity is going to the water sector. Energy is used for water transfers, water distribution, and desalination and for wastewater treatment. Another key linkage between water and other sectors is the cities which are growing rapidly; currently some 52% of the world's population lives in urban areas. The rapid urbanization is posing some major challenges for the water sector.

Water and sanitation in Africa

In Africa, a considerable percentage of the population still lacks the basic need of safe drinking water. 89% of people have at least one basic water service globally, which mean an improved drinking-water source within a 30-minute round trip. In Africa, only six countries are above that threshold: Algeria, Tunisia, Seychelles, Libya, Egypt and Mauritius. Many countries are still far below the line; only 19.3 % of the population of Eritrea has access to a basic water service, followed by Uganda and Ethiopia, both with 39%. In order to achieve the target of “universal and equitable access to safe and affordable drinking water for all” it will require significant investment in infrastructure – nearly 40% of African countries currently provide basic drinking services to less two thirds of their people. Regarding sanitation, Africa has the lowest levels of basic sanitation services amongst world regions, although North African countries, Equatorial Guinea, and South Africa have coverage levels comparable to other regions. The proportion of the population with access to at least basic sanitation services in Africa increased from 25% in 2000 to 28% in 2015 (AU, ECA, AfDB, 2018) . Based on (UNICEF, 2017), it is estimated that most countries will not be able to achieve the access target

despite making notable progress between 2000 and 2015. Similarly, it is projected that in some countries access to basic sanitation will continue to decrease between now and 2030. These countries are: Kenya, Gambia, Nigeria and Democratic Republic of Congo. Rates will remain constant in Libya, Egypt and Seychelles and the only country that will achieve the 100% target by 2030 is Tunisia. It is unlikely that countries with rates of less than 60% today will achieve the target of access to adequate and equitable sanitation and hygiene for all by 2030 (SDGC/A, n.d.).

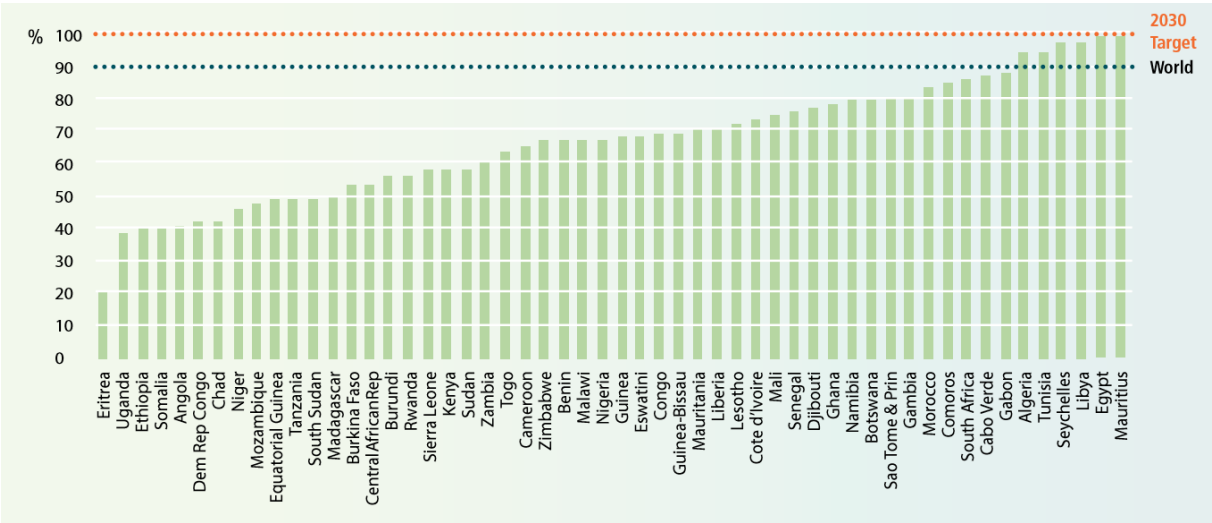


Figure 1.1 : Access to basic water service in African countries

Source: UN SDG Data

Rwandan Government in the Water and Sanitation Sectors

Rwanda has an estimated population of 11.4 million (MIDIMAR, 2015) of which 52 percent are women and 48 percent are men. Of the total population, 83 percent is living in rural areas, while 17% is living in urban areas. With one of the highest population density in Africa of 414 inhabitants per square kilometer, there will be an additional 200 or even more inhabitants per square km by 2032 (NISR, 2014). Rwanda’s progress since the 1994 genocide is tremendous, particularly in promoting good governance as well as delivering essential services to the poor such as health, education, water and sanitation. Rwanda has met MDGs targets and has demonstrated a rapid economic growth where specifically in the water and sanitation sector, people with access to clean drinking water increased from 68% in 2006 to 74.1% in 2012 while people with access to hygienic sanitation increased from 38% in 2006 to 74.5% in 2012(WHO,

2015). The coverage was estimated at 85% and 83%, respectively, in 2014 (MININFRA, 2017). The Government of Rwanda has taken into consideration the key role of water and sanitation in protection of public health, socio-economic development as well as gender empowerment, in committing to reaching the very ambitious target of 100 % service coverage by 2020 (Rep. of Rwanda, 2012). In order to achieve its ambitious goal, the Government of Rwanda in partnership with all the water and sanitation stakeholders will need to expand water supply and sanitation services through construction, extension and rehabilitation of water supply systems as well as sanitation infrastructure. For that to be effectively accomplished, the community as the end user of the services, should play a role in the planning, implementation as well as management of the projects. This research seeks to evaluate the impact of community participation on sustainability of water and sanitation project with a focus on rural areas where the services are usually significantly low compared to cities and where the Government of Rwanda's ambition is highest.

Inequalities in water and sanitation

There are large inequalities when it comes to water and sanitation, through the connection to water supply, sanitation, etc. This is directly correlated with the GDP of a country and it can be seen that the developing countries are lagging behind. A big difference is also seen between the urban and the rural, and the rich and the poor neighborhoods, hence inequalities within every country. Water is also directly linked to gender issues where there are also inequalities. Looking, for instance, at the percentage of women versus men bearing the burden of collecting water for the family, it's largely the women and the girls who have the responsibility of collecting water and bringing it home, especially in the rural areas. According to (Geere & Cortobius, 2017) survey of 127,271 households that provided information on the main person responsible for collecting water (Figure 2), the greatest proportion of households identified an adult woman as the main person responsible. In urban areas however, the proportion of households who identified men as the main person carrying water is almost equal to the proportion of households identifying a woman as the main person carrying water. In rural areas approximately twice as many households identify women as main carriers of water than men.

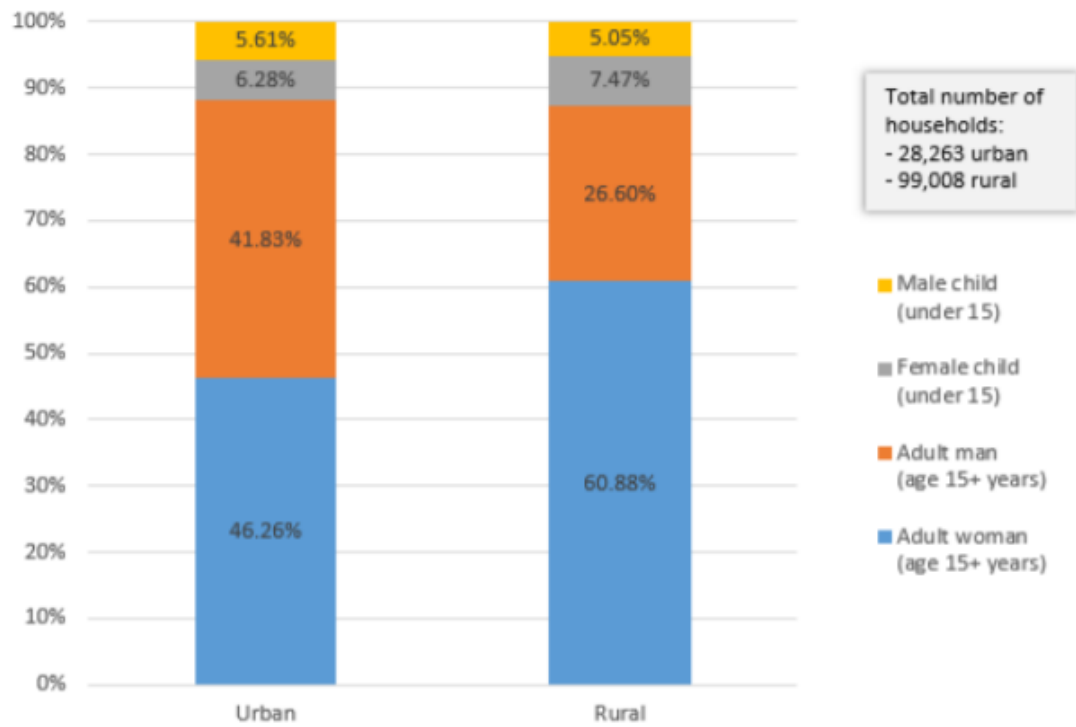


Figure 1.2: The main person responsible for collecting water in the household

Source: (Geere & Cortobius, 2017)

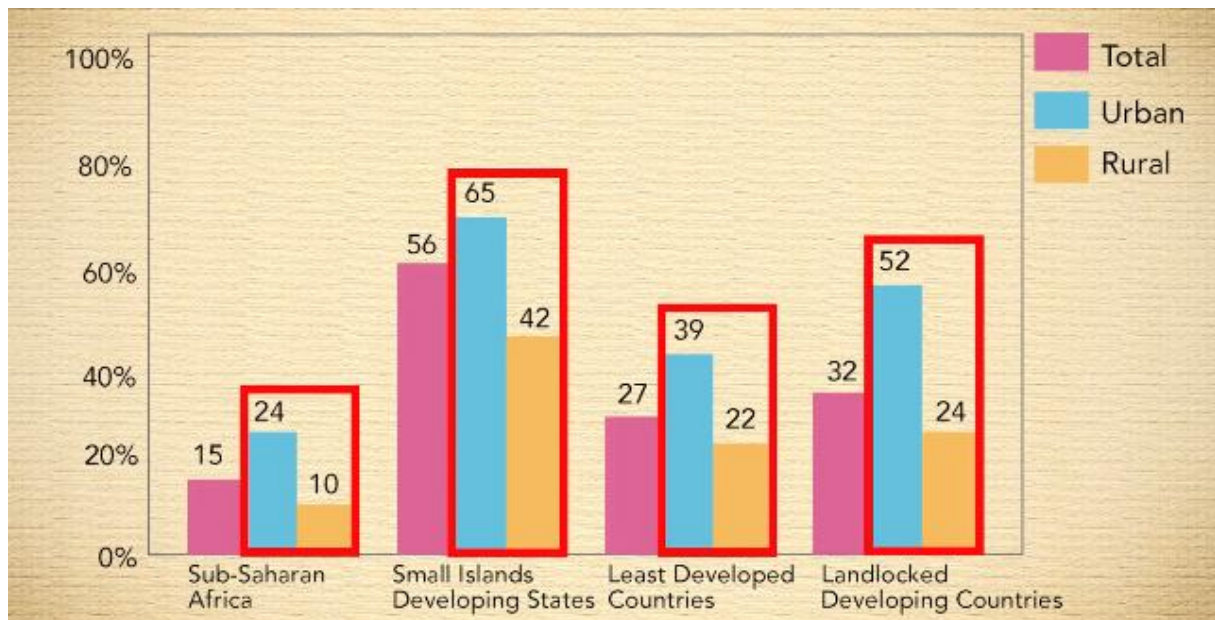


Figure 1.3 : Population with Basic Handwashing Facilities Including Soap and water at Home by Region, in 2015

Source: (UNICEF, 2017)

Looking at sanitation in a rural setting, there are significant disparities in safely managed sanitation services. Rural communities often lag behind those in the urban sector. Figure 3 shows the disparities in hand washing, which is important for hygiene. The disparities between handwashing levels in rural versus urban areas can be seen.

1.2. Problem Statement

According to World Health Organization, around 3.4 million people die annually from water-related diseases (UNICEF, 2017). Waterborne diseases are a global issue which is affecting countries at different magnitude, the Rwanda Biomedical Center in 2016 confirmed outbreak of non-bloody diarrhea, typhoid, Shigellosis and cholera cases in Rwanda. Due to Rwanda's hilly terrain and geographical position as a landlocked country, the cost of infrastructure is generally high. Particularly Musanze district, as the case study area, has extremely challenging geographical conditions, including steep slopes, volcanic rock, which make digging very difficult, and unfavorable ground water conditions. These geographical features make the implementation of certain project activities very difficult, particularly the construction of water supply and sanitation facilities. In 2008, Musanze was among the least served districts in the country in terms of water, sanitation and hygiene (WASH) services (Murtaza et al., 2017). According to (MININFRA, 2017), Rwanda's main challenge to achieve its 2020 target of 100% access to basic water supply and sanitation is the funding gap for WASH services in scattered settlements in difficult and hilly terrain. Among the constraints to overcome that challenge include human resource constraints, particularly at the decentralized level and lack of a comprehensive sector management information system. Most development projects donors identify community participation as one of the prerequisite for the improved performance of water and sanitation sector (Mdendemi, 2013). This puts into question the role of community participation in planning, implementing and maintaining water and sanitation projects in rural areas of Rwanda in a bid to ensure sustainability of those projects. This study seeks to generate information that will be useful to the different stakeholders at the community and national level on how to ensure community participation in water and sanitation projects. This knowledge will help to establish sustainability of water and sanitation projects in the rural areas of Rwanda despite the challenging geographical conditions. The study will also enable the government to attain vision 2020 and the sustainable development goals due in 2030.

While assessing the effect of community participation on sustainability of rural water projects in Delta Central agricultural zone of Delta State, Nigeria, (Ofuoku, 2011) also found a significant relationship between participation and sustainability of water projects and recommended that the level of participation should be increased, emphasizing on regular conference and institution of sanctions/rewards to encourage citizens to participate in development projects. (Haq, Hassan, & Ahmad, 2014) examined the relationship between the level of community participation and sustainability of the rural water supply programs in the rural area of Faisalabd District in Pakistan and their findings clearly demonstrated that community participation at all stages played a positive role in the ownership and sustainability of the rural water supply programs. The results also showed that there is a need of increased community participation in operation and maintenance of water supply projects in order to ensure the quality assurance of the programs. The study further suggested that local people should be involved before launching any development projects in communities.

The previous studies have highlighted the importance of community involvement at the different stages of water and sanitation projects. The different stages include planning, design, construction, operation, maintenance and administration. In this research, we will analyze the involvement of the community in all the phases with a highlight on the design phase as a strong foundation of sustainability of projects. Using the concept of Human Centered Design, the research will tackle the uniqueness of water and sanitation projects during the design stage. Water and sanitation availability includes acceptability, water for instance should be of an acceptable color, odor and taste for each personal or domestic use. All water and sanitation facilities and services must be culturally appropriate and sensitive to gender, lifecycle and privacy requirements. Those elements explain the requirement of projects alignment with cultural norms and habits of the people. In designing water and sanitation project, it is important to co-design with the users (community) in order to make the system usable and useful for them. According to Len Abrams et al., (2011) there are two important phases in the provision of services which are critical to sustainability. These are the initiation phase and the ongoing phase. The initiation phase is explained as the establishment of the service, including from when the service is recognized as needed, through the articulation of a demand, the planning of the service, the design and construction of the physical infrastructure, the establishment of the institutional framework, and the initial commissioning. The ongoing phase is the rest of the service life which includes operating the services to the satisfaction of the consumers, collecting revenue, maintenance of the infrastructure, administration, and all of the other day-to-day

activities. The scholars explain the latter as the most difficult phase since it involves human organization and use of technology it must be expected that things might go wrong during the ongoing process. However, much effort is usually invested into getting the initiation phase done right and very little is given to the ongoing phase. The purpose of this study is to assess the impact of community participation on the sustainability in both the Initiation and the Continuation phases of water and sanitation projects.

1.3. Objectives

The main objective of this study is to investigate the influence of community participation on sustainability of water and sanitation projects in rural areas. A case study is selected in Musanze District, Northern Province of Rwanda. Therefore, the following are the specific objectives of this study are:

1. To assess the way sustainability of water and sanitation projects is being addressed at the initial stages
2. To assess community involvement in project planning
3. To assess community involvement in project implementation
4. To assess community involvement in the project management

1.4. Research Questions

1. How was sustainability addressed/built in during the initial designing stage of the projects?
2. To what extent does the community participate in the planning of water and sanitation projects?
3. To what extent does the community participate in the implementation of water and sanitation projects?
4. How does the community participate in the management of rural water and sanitation projects?

1.5. Research Hypothesis

Community participation plays a significant role in the sustainability of water and sanitation projects in rural areas of Rwanda.

1.6. Relevance of the Study

This study is directly in line with two goals among the current SDG' and indirectly with many others. Water and sanitation come in SDG 1 which calls on Member States to “End poverty in all its forms everywhere” and includes a target for universal access to basic services, with a particular focus on poor and vulnerable groups (1.4). Moreover, Goal 6 is to “Ensure availability and sustainable management of water and sanitation for all” and includes targets: 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all; 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations (UNICEF, 2017). In addition, the findings will help in the attainment of the Rwanda's vision 2020's target of 100% water and sanitation coverage in line with Africa Water Vision 2025, by helping policy makers in understanding how to address issues of community involvement in the management of their provided social services. More importantly, this study will be an added value to the literature on the subject of community participation and project sustainability in Rwanda. It will encourage government's efforts on promoting community participation in sustainable water and sanitation projects in the rural areas as articulated in the National Sanitation Policy and the National Water Supply Policy of 2016. The study's findings will bridge the gap existing between studies in community participation, poverty alleviation and sustainable development in Rwanda. No similar study has been previously done in the specific area of Musanze District, therefore lessons that will be drawn from this study will help the district in planning better ways of implementing sustainable community projects.

1.7. Scope of the Study

This study was carried out in the Northern Province of Rwanda, within the selected district of Musanze, the population of this study considered the respondents from three selected villages in the rural area of Musanze (Gataraga, Gitega and Rwinuma). The respondents are residents of those villages, using public and water sanitation facilities that were visited. In addition, interviews were conducted with water and sanitation department official(s) and land managers in charge of monitoring the villages' water and sanitation projects.

2: LITERATURE REVIEW

2.0. Introduction

This chapter describes the literatures related to this specific objective of this work. The literatures were retrieved from books, official reports and scientific papers published in highly reviewed journals and they are references according to the academic rules and regulations.

2.1. Addressing Sustainability of Water and Sanitation Projects

According to Carter, Tyrrel, & Howsam (1999), organizational sustainability, at a broader level, consists of three components: the natural environment, society, and economic performance. It is widely accepted that to achieve sustainability we must balance economic, environmental and social factors in equal harmony. In this study, we refer sustainability to the ability of project beneficiaries to maintain and sustain project activities, services and any measure initiated by a project so as to last long after the expiring of the funding period. (Fig. 2.1) shows a visual representation of these three components.

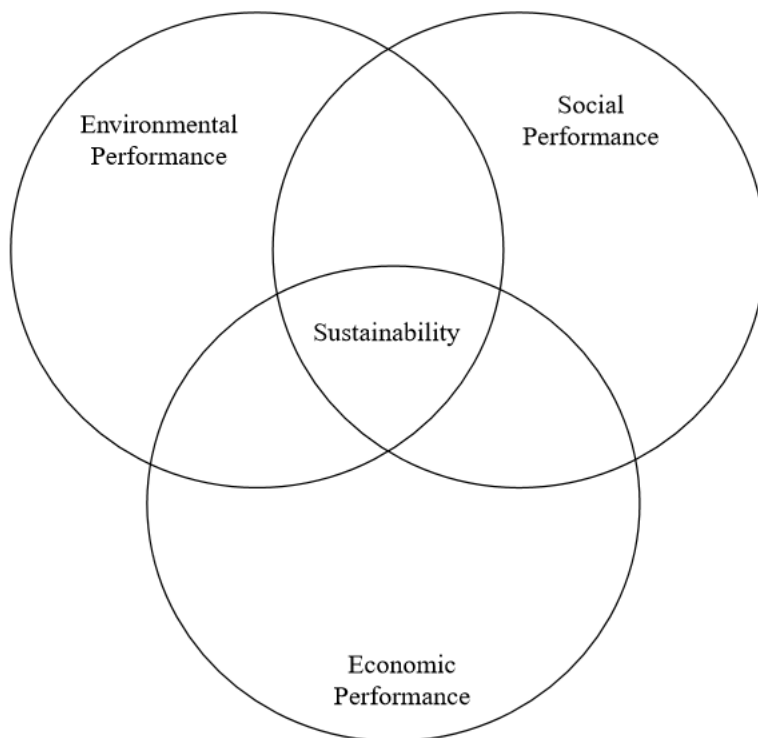


Figure 2.1 : Visual Representation of three components of sustainability

Source: (Carter & Rogers, 2008): A framework of sustainable supply chain management.

2.1.1. Sustainability of rural water supply and sanitation as a concept

Water and Sanitation services have a critical importance to the development of societies and are essential to public health, general welfare and decent standard of living, therefore they must be sustainable (IWA, 2015). In water and sanitation projects, we cannot talk of sustainability without mentioning operation and maintenance issues. Safe and clean drinking water supply is sustainable only if, the water consumed is not overexploited but naturally replenished, facilities maintained in a condition that ensures reliable and adequate portable water supply. The benefits for the water supply should continue to be realized over a prolonged period of time (Mdendemi, 2013). The most quoted definition defines sustainability as “development that meets the needs of the present without compromising the ability of future generations to meet their needs” (Carter & Rogers, 2008). However, according to Carter et al., (1999), that definition of sustainability should not be taken as a static concept, for them what is required of sustainable water and sanitation is a fixed or improving output, water supply and sanitation services which are constant, which may be achieved through evolving and adaptive delivery mechanisms. The Agenda 21 by the UN provides a general framework for examining sustainability of water and sanitation. The document declares that “sustainability is the integration of environmental and development concerns for the fulfillment of basic needs and improved living standards for all”(UN, 1992).

From their paper (Montgomery, Bartram, & Elimelech, 2009) , they cited eight main sustainability factors, presented as building blocks and include: policy context, institutional arrangements, financial and economic issues, community and social aspects, technology and natural environment, spare parts supply, maintenance, and monitoring. For each of these factors, issues relating to planning, effective demand, financing, and management are explored along with guidance for addressing sustainability

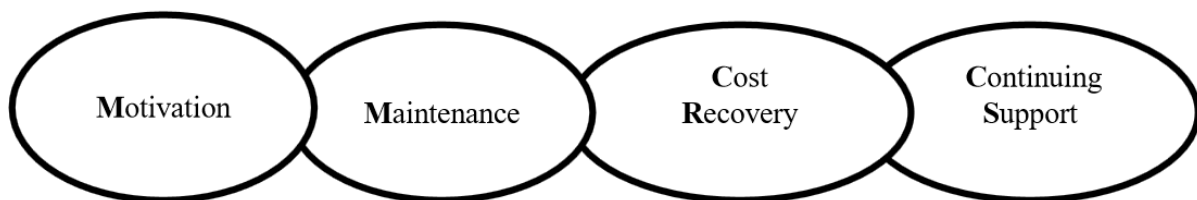


Figure 2.2 : Sustainability Chain

Source: Adapted from (R. C. Carter et al., 1999)

In their study (R. C. Carter et al., 1999) on the impact and sustainability of community water supply and sanitation programmes in developing countries, they offer the “sustainability chain,” involving a four essential links (Figure 2.2) to achieve sustainability, where the failure of any one of which endangers the entire enterprise. Those component elements are; motivation, maintenance, cost recovery and continuing support. Firstly, according to the authors, a community needs to understand and accept the new water and sanitation facilities in order to be motivated to utilize them. It is therefore important to invest in education and involving the community, even it might be a time consuming activity, it increases ownership and motivation increases rapidly as the benefits of the activities become clear. Secondly, as for any other type of technology, maintenance organization is necessary for water and sanitation programmes and community committees may have an important role in that (for which they need training), but in almost all circumstances the committees will need support by some district, regional, or national level organization. Thirdly, all costs associated with the utilities have to be covered, including any subsidies, by water charges preferably by the community. Lastly, the authors emphasize that community and external support agencies need to jointly support water and sanitation provisions on a long term basis, until there is enough good practices within a community to the point where there is no going back.

2.1.2. Sustainability of sanitation systems

According to the sustainable sanitation alliance (SuSanA, 2008), the main objective of a sanitation system is to protect and promote human health by providing a clean environment and breaking the cycle of disease. But in order to be sustainable, a sanitation system also has to be economically viable, socially acceptable, technically and institutionally appropriate, and it should also protect the environment and natural resources. More holistic approaches are needed for rural sanitation, this means going beyond achieving open defecation-free communities, but also ensuring that other health benefits are obtained. This can also mean taking into account local priorities, for instance in rural agricultural communities, reuse has value and can actually be a driver for sanitation use, and these motivational factors can be taken into account. At the same time, solutions need to contribute to the reduction of exposure to pathogens, not just from poor access to toilets, but also other hygiene behaviors. In rural communities, this can also include exposure to animal excreta, as well as the different ways that waste streams are reused, like into agriculture. Other important aspects include gender and social-cultural considerations and these need to be explicitly taken into account. With these more holistic and integrated

approaches, this will reduce fragmentation in implementation activities. Safely managing local risks linked to poor sanitation, as well as recovering resources has the potential to contribute to multiple sustainability goals and targets.

There are a range of sanitation approaches, implementation models, and financing mechanisms that can be used for achieving rural sanitation. Different approaches are appropriate depending on the context, but they all have the same goal of improving sanitation conditions in communities. Two main types of approaches are community-based behavior change approaches and market-based approaches. Community-based behavior change approaches seek to create awareness and demand for sanitation and hygiene with the goal of changing behavior. These include programs like community-led total sanitation that targets elimination of open defecation, community health clubs, participatory hygiene and sanitation transformation, etc. These approaches include other aspects of sanitation and hygiene and other health behaviors. Market-based approaches view the targeted users as customers, they aim to increase toilet sales and repayment of loans. There are also different ways of financing these programs, and this can include different types of subsidies or of micro loans (Andersson et al., 2016).

2.1.3. Sustainability in the water and sanitation policy of Rwanda

One of the objectives of the National Water Supply Policy of Rwanda (Government of Rwanda(GOR), 2016) is “to ensure affordable rural water supply services and sustainable functionality of rural water supply infrastructure”. The objective puts an emphasis on rural water supply and sanitation services to be clustered by Districts in order to guarantee that economies of scale professionalize service delivery, stimulate private investment in scheme enhancements and extensions, and lead to better monitoring and regulation. The objective also puts a highlight on other factors that affect sustainability and that should be considered in project implementation guidelines. Those include the choice of technology, the quality of design and execution, adequate user involvement (ownership), and the sustainable use of water resources.

According to the National Sanitation Policy of Rwanda, in order to ensure cost recovery and financial sustainability; operation and maintenance costs of sanitation infrastructure shall be borne by the users. In addition, affordability shall be addressed by the choice of appropriate technologies and by enhancing efficiency, not only by granting subsidies. However, the

polluter-pays and user-pays principles are to be applied in sewerage and waste management (MININFRA, 2016).

2.2. Community Participation in the Planning Phase

Community management has become a popular model for management of rural water supplies throughout sub-Saharan Africa for past few decades. According to (Harvey & Reed, 2007), despite its widespread among funders and implementing agencies in the regions, the low level of sustainability among water supply systems shows that community management is not the remedy it is presented to be. For community management systems to be sustainable, an ongoing support is needed from an overseeing institution to provide encouragement and motivation, monitoring, participatory planning, capacity building as well as specialist technical assistance.

2.2.1. Conceptualizing community participation

Community participation has been defined by Samuel Paul, in the context of development as:

“An active process whereby beneficiaries influence the direction and execution of development projects rather than merely receive a share of project benefits”.

However, (Bamberger, 1986). In his study, mentioned five objectives of community participation elaborated by Samuel Paul to include: project cost-sharing, increasing project efficiency, increasing project effectiveness, building the beneficiary’s capacity and empowerment. It was however highlighted that depending on the overall goal of development of the project, there is a need to determine which community participation objectives to prioritize. In this study, it was as pointed out that community participation comes with benefits and costs. It is raised that active community participation in project planning and implementation may improve project design through the use of local knowledge. This benefit can be of a high value specifically to water and sanitation projects where the design stage can be costly and complex depending on the type of community nature of the area, this also touches on the second benefit elaborated in the study; “increase of project acceptability” which is very sensitive to water and sanitation projects as Research has found that sanitation infrastructure is cultured or shaped by national level of cultural preferences (Hacker & Kaminsky, 2017). Other benefits from (Bamberger, 1986) include producing a more equitable distribution of benefits

and promoting local resources mobilization as well as helping to ensure project sustainability. Community participation can also entail costs including delays in project start-ups, an increase of necessary staff, and pressure to raise the level or range of services. The study adds that with community participation, there might risks of cooption of the project by certain groups, creation of conflicts, or losses of efficiency due to the lack of experience with participatory approaches.

The Global Center for Public Services suggests that reform-minded public officials can improve development results by using community engagement in a variety of ways: to transfer information and ideas, support public service improvements, ensure the public interest, strengthen the legitimacy of the state in the eyes of citizens and reinforce accountability and governance in the public sector (UNDP - Global Centre for Public Service Excellence, 2016). There is extensive documentation on strategies for promoting community participation and on the factors affecting the degree and success of participatory approaches. Many of the greatest benefits of community participation occur once a project is operational and must be sustained. Considerable experience exists in the rural development sector on the role of popular participation in the design of sustainable projects (Bamberger, 1986).

Community driven development (CDD) is a similar approach, defined by The World Bank's 2003 Poverty Reduction Strategy Paper Sourcebook as an approach that gives control over planning decisions and investment resources for local development projects to community groups. The underlying assumption is that people (individuals or communities) are the best judges of how their lives and livelihoods can be improved and, if given adequate support, resources, and access to information, they can organize themselves to provide for their immediate needs (Levinsohn, 2003). CDD projects are defined by five elements; first, they are community focused because they target beneficiary, grantee, or implementing agent is some form of a community-based organization (CBO) or representative local government. Second, they involve participatory planning and design. Third, the community controls the resources, which ensures that there should be at least some form of resource transfer to the community. Fourth, the community is involved in implementation through direct supply of inputs, labor, or funds, or indirectly through management and supervision of contractors or operation and maintenance (O&M) functions. Finally, CDD projects employ community-based participatory monitoring and evaluation to ensure downward accountability to the community (Asian Development Bank, 2006).

2.2.2. Community participation through human centered design

Human-centered design (HCD) is based on the human user's physical and psychological needs, allowing the user to operate at the greatest possible level. It involves physical environment products and elements that fulfill the user's requirements and skills, not those that require user adaptation to the design. HCD is a process for the design and development of structures, products, and communities that is based on based on information about the individuals who will use them. The process uses study results and information on cognitive skills, physical abilities and constraints, social needs and task requirements to provide living environmental alternatives that allow all users to work at their maximum capacity – irrespective of age or capacity (Greenhouse, 2012). According to (Gordon & Burns, 2014) HCD is a design methodology using techniques of in-depth comprehension, brainstorming and fast creation-feedback processes to produce interventions that solve end-user problems. It acknowledges individuals in their own environments as creative and resourceful, and truly efficient technological knowledge means facilitating design in our everyday life. In recent years, various advocates use the terms "integrative design," "life cycle design," "inclusive design," and "user-centered design" in place of universal design or human-centered design. Whichever names are used, the idea behind is to enable all of society to function at the highest level possible. Advocacy for such designs can be triggered by asking questions like; “Why should the built environment serve as an obstacle to functioning?” or “Why are we designing for a small segment of the population, leaving out millions of others?”(Greenhouse, 2012)

According to the Institute for Human Centered Design, universal or human-centered design "has a parallel in the green design movement, which also offers a framework for design problem-solving based on the core value of environmental responsibility. Universal Design and green design are comfortably two sides of the same coin—green design focusing on environmental sustainability, universal design on social sustainability."

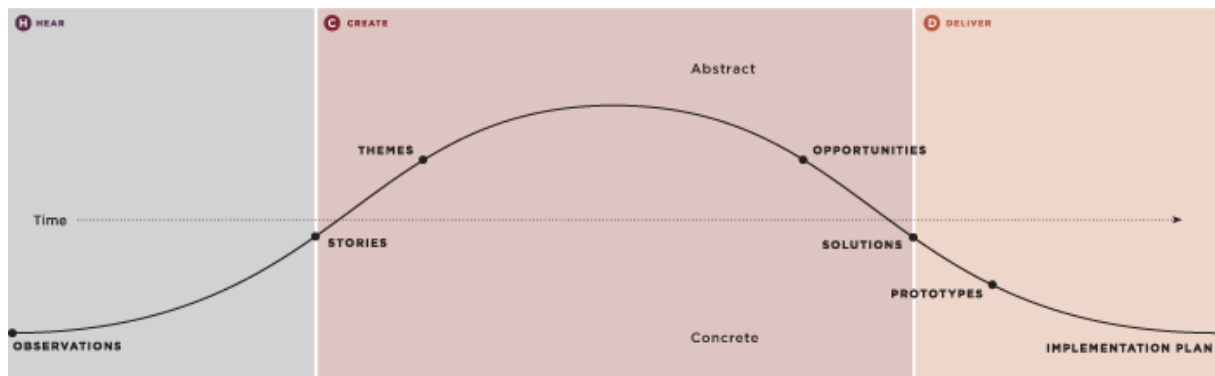


Figure 2.3 : *Chart of the HCD experience with time on the horizontal axis and thought space of concreteness and abstraction on the vertical axis.*

Source: IDEO’s HCD Toolkit (IDEO, 2016).

The design firm IDEO, through their HCD Toolkit, compartmentalizes three phases for HCD: Hear, Create, and Deliver as shown in (Figure 2.3), while IDEO’s CEO uses the names: Inspiration, Ideation, and Implementation (IDEO, 2016). The International Encyclopedia of Ergonomics and Human Factors splits user-centered Product Concept development into five sections which mirror the three mentioned in the toolkit: project commitment and user and technology research (the Hear phase), innovation sprint and concept creation, (the Create phase) and validation and project assessment (the Deliver phase), as shown in (Figure 2.4).

According to the ISO 13407 standard on human-centered design, there are five main processes which should be undertaken in order to ensure that usability requirements are incorporated in the process. The processes are shown in (Figure 2.5), and as depicted they are carried out in an iterative way with the cycle being repeated until the particular usability objectives have been attained (Jokela, Iivari, Matero, & Karukka, 2003).

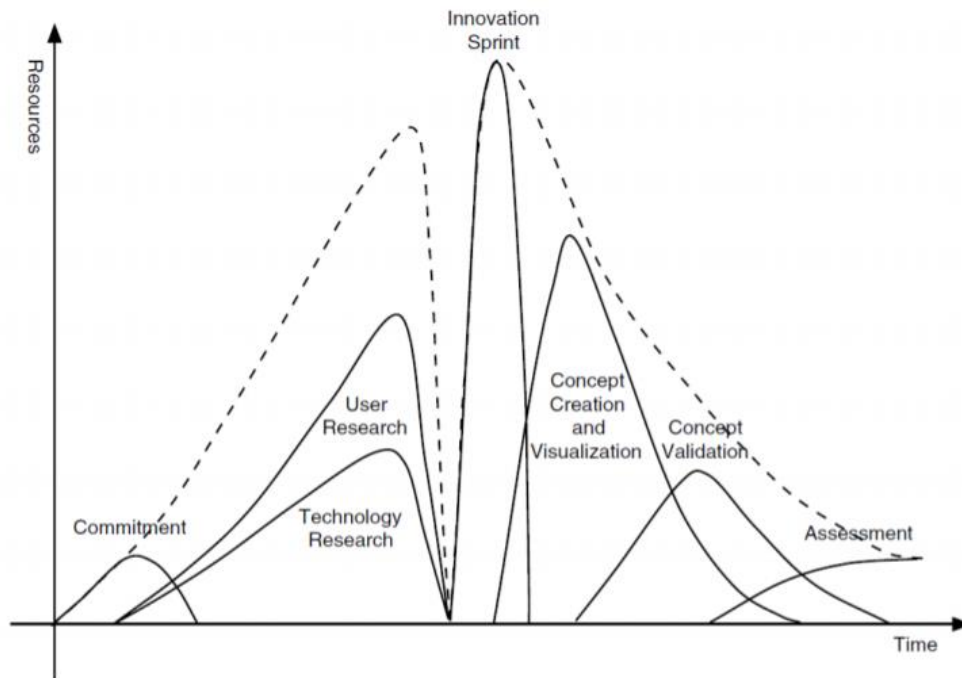


Figure 2.4 : User-centered products development process

Source: International Encyclopedia of Ergonomics and Human Factors, Second Edition: Chapter 343

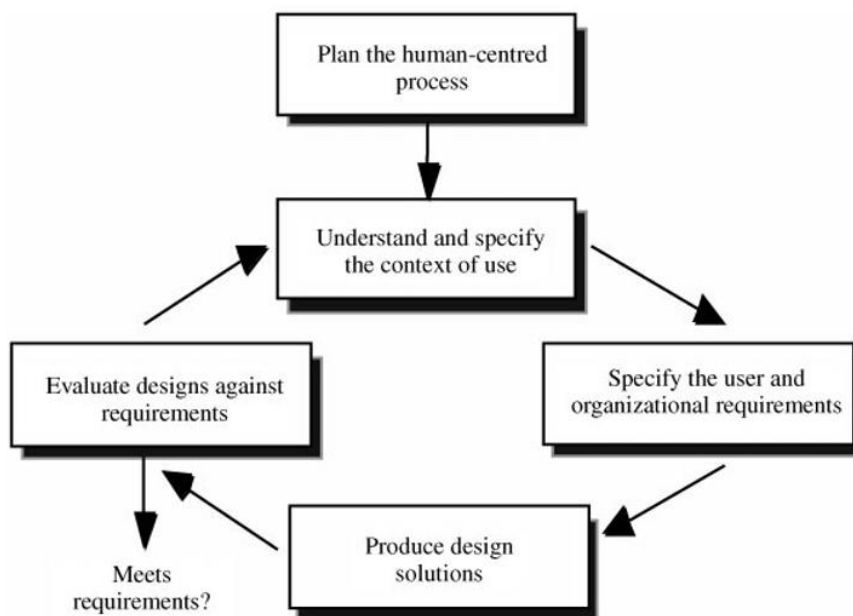


Figure 2.5 : The human-centered design cycle

Source: (Maguire, 2001)

In their study (Maguire, 2001) elaborate that firstly, the human-centered design approach must be carefully planned and managed through all parts of the system development process in order for it to be successful. Secondly, as the system is to be used within a certain context and to be used by users with certain characteristics and with certain goals to perform certain tasks, therefore there must be a good understanding of the context of use of the system to ensure quality of its use. Thirdly, the process of specifying the user and organizational requirements is considered as the most crucial part, and the success of the approach is highly depends on how well this activity is carried out. Fourth, in producing design solutions, all the ideas design must go through iterative development, allowing potential users to interact with, visualize and comment on the future design. Changes in design can then be produced quickly in reaction to user feedback, which helps to prevent the expensive process of correcting design flaws in the subsequent development cycle phases. Lastly, usability evaluation is a very important activity throughout within the system development lifecycle, it has two main reasons; “the formative testing which is to improve the product as part of the development process and the summative testing to find out whether people can use the product successfully.”

2.2.3. Human Centered Design in water and sanitation projects

Water and sanitation infrastructures have been found to be shaped by national level cultural preferences (Hacker & Kaminsky, 2017), for that reason the design of those infrastructures should involve the beneficiaries and should examine not only the needs and dreams of the users but also their behaviors. Improved water and sanitation infrastructure that does not deliver has been documented as one of the major problems of the global water and sanitation challenge. For instance, a 2012 audit of recent European Commission co-financed development projects in Angola, Benin, Burkina Faso, Ghana, Nigeria, and Tanzania concluded that “the needs of beneficiaries as defined in the projects were clearly met in only two of the 23 projects audited”. Classical top-down supply driven planning, which ignores the local context, has long been identified as a cause of stranded infrastructure investments (Starkl, Brunner, & Stenström, 2013). According to a review by (Christensen Rand et al., 2014), the most salient factors influencing rural sanitation include access to and availability of functioning latrines, sanitation products, and services; latrine product attributes (e.g., perceptions of cleanliness and durability); social norms around open defecation; perceived latrine affordability; self-efficacy to build latrines (respondent self-efficacy versus reliance on

masons); and competing priorities for other household expenditures. The review also identified a number of emotional, social, and physical drivers. These include shame and embarrassment associated with open defecation, as well as perceptions of improved social status, privacy, and convenience associated with latrine ownership and use. A number of background characteristics influence sanitation behaviors. These include socioeconomic status, as well as contextual factors that vary by region or country, such as perceptions of physical and geographical conditions (e.g., access to water and soil profile), seasonal factors, and the time of year. Several other factors were identified in the review, including knowledge, enforcement of rules or regulations, values, intention to build latrines, roles and decision-making, and beliefs and attitudes with less certainty on how they influence sanitation behaviors.

2.3. Community Participation in the Implementation Phase

The current Rwanda National Sanitation Policy formulation was guided by community participation among other principles, highlighting that the community as the beneficiaries of sanitation services shall be actively involved in planning, decision making and oversight throughout the project implementation cycle. The principle reaffirms that communities will choose the service level that responds to their needs and capacities (MININFRA, 2016).

2.3.1 Levels of participation as a concept

According to the international association for public participation (IAP2), public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process, and it includes the promise that the public's contribution will influence the decision. It also promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers and as well seeks out and facilitates the involvement of those potentially affected by or interested in a decision. In addition, public participation seeks input from participants in designing how they participate, it provides participants with the information they need to participate in a meaningful way as well as communicates to participants how their input affected the decision. IAP2 has developed the Spectrum of Public Participation to help clarify the role of the public (or community) in planning and decision-making, and how much influence the community has over planning or decision-making processes. It identifies five levels of public participation (or

community engagement) presented in Table 2.1 below. The further the levels of participation, the more influence the community has over decisions, and each level can be appropriate depending on the context (UNDP - Global Centre for Public Service Excellence, 2016).

Table 2.1 The spectrum of Public Participation

Levels of participation	Public Participation Goals
1. Inform	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solution
2. Consult	To obtain public feedback on analysis, alternatives and/or decisions
3. Involve	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered
4. Collaborate	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution
5. Empower	To place final decision-making in the hands of the public

Adapted from: International Association for Public Participation (www.iap2.org/)

2.3.2 Evaluating participation

In their review (Carr, Blöschl, & Loucks, 2012), evaluation of participatory programs and projects is necessary to assess whether these objectives are being achieved and to identify how participatory programs and projects can be improved. The different methods of

evaluation can be classified into three groups: (i) process evaluation assesses the quality of participation process, for example, whether it is legitimate and promotes equal power between participants, (ii) intermediary outcome evaluation assesses the achievement of mainly nontangible outcomes, such as trust and communication, as well as short- to medium-term tangible outcomes, such as agreements and institutional change, and (iii) resource management outcome evaluation assesses the achievement of changes in resource management, such as water quality improvements.

2.3.3 Challenges to effective community participation

Community participation is an approach that is evolutionary and that wouldn't work as a "one size fits all" scenario. Consequently, it has inherent design and implementation challenges but also potentially successful development rewards if well implanted. According to (Asian Development Bank, 2006), there are some valid criticisms and inherent limitations associated with CDD including low capacity of communities. Community based approaches do not cater to problems that are beyond the capacity of local institutions or activities that require economies of scale. In addition, CDD by itself does not guarantee immunity from the risks of elite capture; hence additional measures may be needed to ensure effective participation of the poor and those excluded within the community. Further, because CDD is demand driven, it tends to select communities that already have in kind commitment and planning capacity, this can mean that, in the absence of careful selection criteria, the poorest communities with limited capacity are crowded out. Institutionally, key criticisms have been that CDD projects require higher costs for subproject implementation; safeguard and fiduciary compliance is more difficult to monitor than in non-CDD projects; prior economic analysis for the project is not possible; and subproject preparation is more complex although essential. For (R. C. Carter et al., 1999), despite the fact that community participation is an essential foundation stone of water and sanitation projects in developing countries, this alone is no automatic guarantee of success. They suggest that the only such guarantee is the inclusion at all stages, in as many aspects as possible, and for all stakeholders, which is a perception that participation is more worthwhile than non-participation. According to (Muro & Jeffrey, 2008), for water resources, an improvement in management is expected because water resource problems are complex and involve many different people with many different interests and opinions. Participation approaches may bring together a range of stakeholders with different interests and enable

them to identify their own positions and those of others, leading to a deeper understanding of the issues.

2.4. Community Participation in the Management Phase

Participation in water resource management has gained increasing momentum over the last decades, being tackled in several key water policy documents, these conventions, statements and declarations identify participation with the objective to improve resource management, and enable individuals and/or groups to participate freely and equally in management. According to the second of the four Dublin Principles developed in 1992, water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels (GWP, 2011). This principle raises awareness on collaboration between all users from different levels including the community, as well as other stakeholders. The Lisbon Charter of the International Water Association on Guiding the Public Policy and Regulation of Drinking Water Supply, Sanitation and Wastewater Management Services specifies the responsibilities of the users amongst other stakeholders for a sustainable and continuous provision of the services (IWA, 2015). It highlights that the users are key stakeholders of water and sanitation as they are the final beneficiaries of the services, therefore, they also have responsibilities as other stakeholders do. Users don't only have rights but also duties to fulfill, particularly regarding participating actively in the decisions and making appropriate use of water and sanitation services.

2.4.1. Water Users' Associations

Water User Associations started from earlier in 1990s, as way of decentralising the water management activities to the small farmers (World Bank, 2003). The Water Users Associations intend to promote water use efficiency, to decrease the water management costs, to promote the effective use of incentives in water use, timely dispute solving and water use equity for the sake of improving the water user's involvement in water decision-making and getting effective water use allocation among the water users competitors (IWMI, 2003). For achieving successful WUAs, bottom up approach should be used instead of top down approach, because the decision for being effective must be inclusive, this requires all the types of water users have to have common agreement and understanding for having common goal and objectives of water resources management (IWMI, 2003). The WUAs are responsible for appropriate water

allocation and effective water use efficiency, through a decentralisation of the activities and self-financing to improve water use efficiency and the sustainability of WUAs in general (Ngirazie, Bushara, & Knox, 2015). According to (Wang, Huang, Zhang, Huang, & Rozelle, 2010) five principles govern WUAs in terms of water governance and efficiency (Table 2.2).

Table 2.2 : Principles of WUAs management and performance

Principles	Description
Adequate and reliable water supply	A WUA is well organised when there an effective water supply and when on farm infrastructures are properly managed by WUA members.
Legal status and participatory	A WUA have to be managed and became a legal entity with the elected leadership voted by its members.
WUAs organised with hydraulic boundaries	A jurisdiction of the WUA should be the hydraulic boundaries of the delivery system.
The water delivery can be measured volumetrically	Each member has to get water and its quantity should be measured volumetrically
Equitable collection of WUA water charges.	A water uses charges have to be collected form the members and make payment for the cost of water.

Source: (Wang et al., 2010)

2.4.2. Community led rural sanitation approach

The challenges in rural sanitation are that there's an insufficient or poorly utilized government funding, limited success in reaching the poorest and in reaching the most remote rural areas, fragmented approaches to implementation, and social norms in communities can sometimes hinder the sustained use of toilets. In addition, there may be a lack of affordable and aspirational solutions that reach rural households. In their working paper (Perez et al., 2012) from the Water and Sanitation Program by the World Bank (WSP), elaborate some of the approaches that have

been adopted around the world to help confront this big rural sanitation challenge. These included the scaling-up rural sanitation approach in which they look at the enabling environment, at demand creation in the household, and at the supply of goods to the households to build latrines. Particularly, they have adopted an iterative learning and knowledge loop to make sure they are correcting the approach to learn from what's happening in any particular community in design of the programs. Community-led total sanitation is an important approach to rural sanitation provision, which is used in many countries around the world and by different implementing agencies. It involves triggering households to demand and to request their own rural sanitation solutions at their household. And they use a number of ways, as shown in the (Fig. 2.6), in a community to create demand and to get the community animated and interested in having sanitation for the whole village. The sanitation marketing is an important part of rural sanitation as is the issue of micro-finance for households who can't afford to build their own latrine.



Figure 2.6 : Scaling Up Rural Sanitation (SURS) Initiative

Source: Adapted from (Perez et al., 2012)

2.4.3. Community participation and the global sustainable development goals

The SDGs are considered as a global call for a new different model of development that can address poverty, marginalization, stigmatization and inequalities, and bring about sustainable change. According to the (UN News Centre, 2015), the ambitions of the global SDGs are to put

people ‘at the center of sustainable development’ and ‘strive for a world that is just, equitable and inclusive, and committed to work together to promote sustained and inclusive economic growth, social development and environmental protection and thereby to benefit all, in particular the children of the world, youth and future generations of the world without distinction of any kind such as age, sex, disability, culture, race, ethnicity, origin, migratory status, religion, economic or other status’. The process of how this new global framework for sustainable development has been designed is unique in terms of the extent of opportunities for people’s participation. In their article (Howard & Wheeler, 2015) argue that the new goals are unlikely to make a difference to the citizens living in greatest poverty, they will remain a tool ‘for the North’ or for elites unless participatory research, monitoring and accountability underpin the implementation of the SDGs. The article elaborates that a key way in which intermediary NGOs can play a role in connecting local community development processes to national and global policy spaces and processes is by building participatory approaches into their research and programming, thereby creating spaces for dialogue into which the knowledge of citizens living in the margins can be brought.

2.4.4. Community Participation in the water and sanitation policy of Rwanda

The National Water Supply Policy of Rwanda proposes strengthening community-based organizations as a direction for achieving sustainability of water supply schemes (Government of Rwanda(GOR), 2016). It emphasizes that the beneficiaries of water supply services shall be actively involved in identification, planning, design and project implementation. Also that the communities will be actively involved in M&E of water service levels provided by service providers. Moreover, the communities and user committees shall be supported and supervised by the Districts, sectors and cells, with technical assistance from the directorate in charge of rural water services, taking into consideration that the support will include targeted capacity-building programmes. Among its guiding principles the National Sanitation Policy of Rwanda includes community participation, it elaborates that the beneficiaries of sanitation services shall be actively involved in planning, decision making and oversight throughout the project implementation cycle, they will choose the service level that responds to their needs and capacities. However, the final responsibility for household sanitation shall remain an individual issue (MININFRA, 2016).

3. MATERIALS AND METHODS

3.0. Introduction

This chapter presents briefly the social - economic profile, the environment, administration and population of Musanze District as well as the research methodology used. This research was conducted in three randomly selected sectors in Musanze District, Northern Province, Rwanda. Data were collected using questionnaires and analyzed using Statistical Package for the Social Sciences (SPSS).

3.1. Study Area

3.1.1. Location, topography and administrative division

This research was conducted in Rwanda. Geographically located in Central Africa between 1°04' and 2°51' south latitude, and between 28°45' and 31°15' East longitude, Rwanda is a land-locked country, bordered by Burundi in the South; Tanzania in the East; Uganda in the North, and the Democratic Republic of Congo in the West. The borders of Rwanda stretched up to 900 kilometers. The country's administrative division comprises of five provinces: Northern Province, Western Province, Southern Province, Eastern Province and the City of Kigali (MIDIMAR, 2015). The study was carried out in Northern Province of Rwanda in the district of Musanze because of its extremely challenging geographical conditions for implementation of water and sanitation projects.

Musanze District as the study focus is one of the 30 Districts. It is situated in the northern part of Rwanda within 1°29'59.4" latitude South of Equator and 29°38'5.9" East of Greenwich. The District has an area of 530 km² and accounts for about 16% of the Northern Province of Rwanda. It borders with Nyabihu District in the East, Gakenye South and Burera District in the West, it as well borders with Uganda in the North (NISR, 2013).

3.1.2. Climatic and Rainfall

Rwanda's rainfall pattern is characterized by four seasons: a short wet season (September - November), a short dry season (December - February), a long wet season (March-May) and a long dry season (June-August). The country's current rainfall pattern shows high annual

average precipitation above 1500 mm in mountainous western regions of the country and just below 700 mm in eastern regions. Rwanda’s average annual temperature is between 15-17°C in high altitude areas and up to 30°C in lowlands in the east and southwest. According to Warner et al.(2015), the analysis of rainfall trends has shown an increasing occurrence of extremes over time and in various regions of the country. Rainy seasons are becoming shorter and more intense, especially in the northern and western provinces, which increases erosion risks in these mountainous parts of the country. Eastern regions have experienced serious rainfall deficits in a number of years over previous decades, alternated with rainfall excesses in other years. At the same time, there has been a trend over the past decades towards a higher temperature: increases up to 2.0°C have been measured between 1970 and 2009.

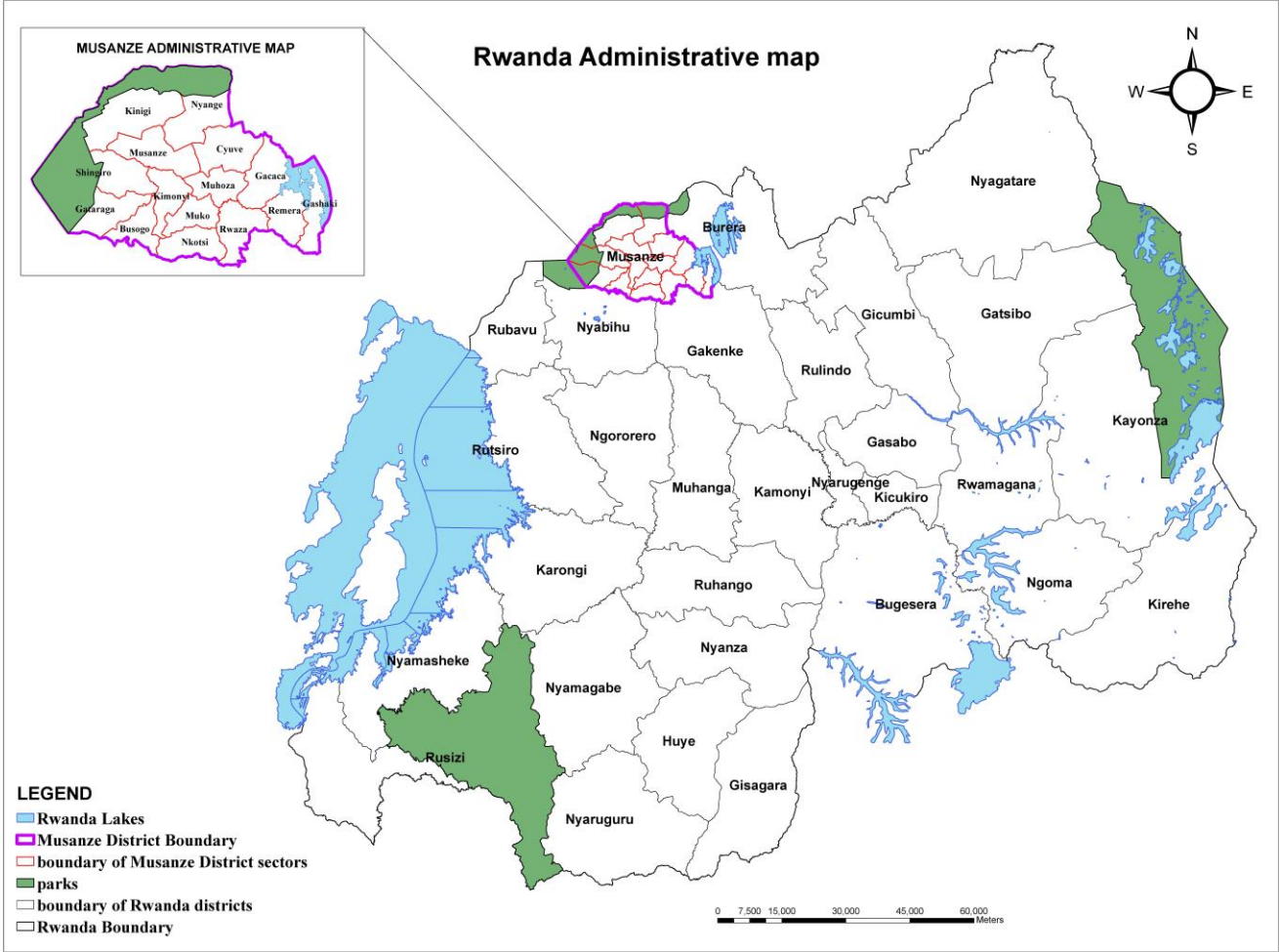


Figure 3.1 : Administrative Map of Rwanda with a highlight on Musanze District

3.1.3. Population Size, Growth and Structure

Based on the 2012 Census, the population of Rwanda was 10,515,973, of which 52% are women and 48% men. Since the 2002 Census, the population has increased by 2.4 million, which has represented an average annual growth rate of 2.6%. The population of Rwanda is still largely rural, with 83% living in rural areas (MIDIMAR, 2015). Table 3.1 shows the distribution of population in the Northern Province of Rwanda as well as the distribution of the population in rural and urban areas.

Table 3.1 Distribution of population of Northern Province by District, Sex, urban and rural

Location	Total			Urban			Rural		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Rwanda	10,515,973	5,064,868	5,451,105	1,737,684	891,806	845,878	8,778,289	4,173,062	4,605,227
Northern Province	1,726,370	818,456	907,914	160,808	77,284	83,524	1,565,562	741,172	824,390
Rulindo	287,681	135,625	152,056	8,630	4,072	4,558	279,051	131,553	147,498
Gakenke	338,234	159,366	178,868	9,347	4,513	4,834	328,887	154,853	174,034
Musanze	368,267	174,399	193,868	102,082	49,107	52,975	266,185	125,292	140,893
Burera	336,582	160,395	176,187	6,205	3,024	3,181	330,377	157,371	173,006
Gicumbi	395,606	188,671	206,935	34,544	16,568	17,976	361,062	172,103	188,959

Source: Adapted from Rwanda 4th Population and Housing Census, 2012

3.2 Research Design

The study was a case study research design. Data was collected at one stage in time for various instances. As a result, it provided a chance for the researcher to do an in-depth survey of the study population as it covered a range of features ranging from people to community level. Different methods of data collection like structured questionnaires, interviews, discussions and personal observations were used to produce primary data. Moreover, secondary data were collected from existing documents, books, journals, and reports.

3.3 Population and Target Population

The population of this study considered the respondents from the three selected villages in the rural area of Musanze (Gataraga, Gitega and Rwinuma). The respondents are residents of those villages, using public and water sanitation facilities that were visited. The exact location of conducting interviews were purposely chosen, near public water and/or sanitation facilities in order to give a sense to questions that were asked. Also purposive sampling method was used for water and sanitation department official(s) and includes land managers in charge of monitoring the villages' water and sanitation projects. Random sampling method was used to pick respondents at the village level.

3.3.1 Sample size and sample determination

Due to the nature of the study, both probability and non-probability sampling techniques were used. These villages were selected randomly but the exact location were selected purposefully because of their proximity to water supply and sanitation services.

The sample size was determined using the formula by Yamane (1967). That is,

$$n = \frac{N}{1 + N(e)^2}$$

where n = sample size, N = the population size and e = level of precision

The study population in Musanze District is expected to be is estimated to be 368,267 (NISR, 2013). While the total population of the three selected rural village is estimated to be 369, by using the above formula at 0.05 level of precision, the sample size was one hundred and ninety two respondents (192), falling in the categories indicated in (Table 3.2)

Table 3.2 The Major Categories of Respondents

	Category of Respondents	Number of Respondents
1.	Gataraga Respondents	63
2.	Gitega Respondents	65
3.	Rwinuma Respondents	61
4.	Water and Sanitation District and sector officials	3
TOTAL		192

3.4. Types and Sources of Data

The study used both primary and secondary data. Primary data were obtained directly from the field and secondary data were obtained from reports and other relevant documents.

3.4.1. Primary Data

Primary data were obtained from the respondents directly in the study area of the three selected villages whose people are using public water and sanitation project of the village centre. Tools used in this group of respondents were filling questionnaires, interview and personal observation. Also other primary data sources were obtained from District water and sanitation officer and sectors' land managers in charge of monitoring water and sanitation projects.

3.4.2. Secondary Data

Secondary data were obtained from different sources both published and unpublished documents and relevant literatures such as reports, journals, pamphlets, newspapers, publications and internet sources. These documents were obtained from libraries, different governmental and non- governmental institutions and offices.

3.5. Data Collection Instruments

Data were collected using a questionnaire which was divided into two parts and one additional check list form. The first part of the questionnaire was answered by villagers, and the second part by the District and Sectors' water and sanitation officials. Additionally, a check list form was filled in when recoding observations related to water, sanitation projects.

3.6. Data Processing and Analysis

The collected data were edited, coded and processed by using Statistical Packages for Social Sciences (SPSS) Version 21.0. Under this, codes were developed and templates created (That is, variables were designed and given labels). Editing and coding of the questionnaires was done and data were entered following the developed codes. Data analysis was done using Statistical Package for Social Science (SPSS) Version 21.0 whereas presentations have been done using percentage, tables, graphs and charts.

3.7. Ethical Considerations

Names of respondents involved in the studies have been kept confidential. They were provided a complete explanation showing the introduction letter on the purpose of the study. They volunteered to participate in the studies and answered questions that they wanted or were comfortable to answer.

3.8. Limitations of the Study

Several limitations were encountered in the course of this study as follows:

- i. Some respondents were not ready to expose some of the data concerning their activities due to fear of being charged for environmental destruction.
- ii. Data collection in the three villages was done during the rainy season in most of the parts of Musanze District which made it difficult to meet some of the targeted respondents as many of them were in their farms during day hours
- iii. Another limitation was the time allocated for the fieldwork and financial constraints, which however did not reduce the number of respondents that were aimed to be interviewed.

4. RESULTS INTERPRETATION AND DISCUSSION

4.0 Introduction

This chapter describes the findings of the study. The study uses community participation for sustainability of rural water and sanitation schemes. A comparative approach was undertaken to compare data obtained from three public water and sanitation projects in Gataraga, Gitega and Rwinuma villages of Musanze. The findings are based on research objectives and questions which were used to guide the investigation.

4.1 General Respondents

Total of 192 participants responded to the questionnaires of whom 189 were water and sanitation schemes beneficiaries from three selected villages. In addition, 3 officials dealing with the water and sanitation projects at the Sector and District level were interviewed. Moreover, some beneficiaries were also interviewed after filling in questionnaires, particularly when the researcher felt that some respondents might have further useful information. The data from the respondents in this study are presented in descriptions, and charts and table form. However, the charts contain only the findings from project beneficiaries' totaling 189 respondents. The information obtained from officials' responses was presented in descriptive form to clarify issues. Figure 4.1 shows the distribution of respondents among the three communities.

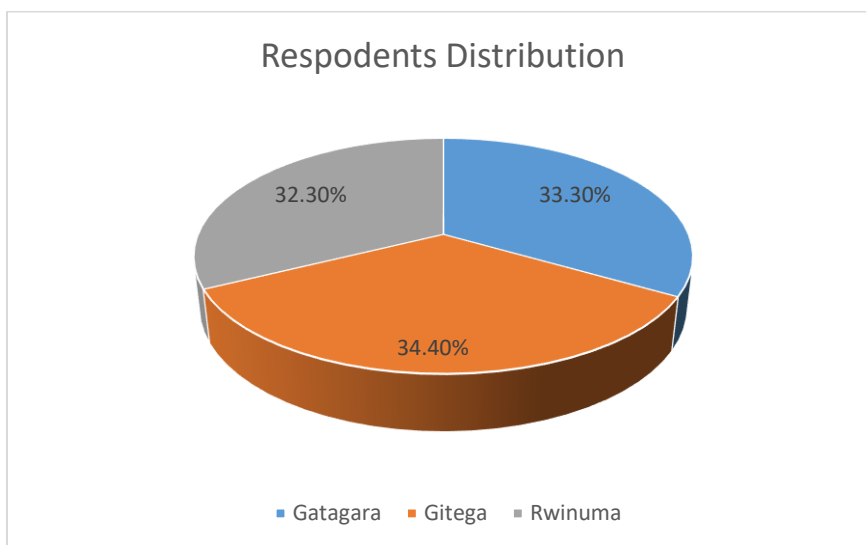


Figure 4.1 Respondents distribution in projects sites

4.2. Socio-Demographic Characteristics of Respondents

4.2.1. Gender of the respondents

Respondents from this study were both men and women. Men formed 56.6% and women 43.4% of the total respondents (Table 4.1). Men and women were considered due to the fact that they are both involved in the different socio economic activities that need water and sanitation facilities and are required to support water and sanitation schemes for their sustainability; also for the purpose of providing clear picture of their participation in water and sanitation schemes. On the other hand women were taken into consideration due to the fact that they are the most affected by water and sanitation related problems in their areas.

Table 4.1 Gender of Respondents (n=189)

Gender	Frequency	Percentage
Male	107	56.6
Female	82	43.4
Total	189	100.0

4.2.2. Educational level

The findings of the study shows that majority (36.5%) of the respondents presented in (Figure 4.2) had reached secondary school level (Twelve Years Basic Education). Another good number of respondents (33.9%) had attained primary school education, 26.5% had not been to school while only 3.2% had been in university. Based on the findings, most people who participated in this study have basic knowledge on writing and reading, therefore the knowledge transfer may be facilitated once they are being trained on water and sanitation projects management.

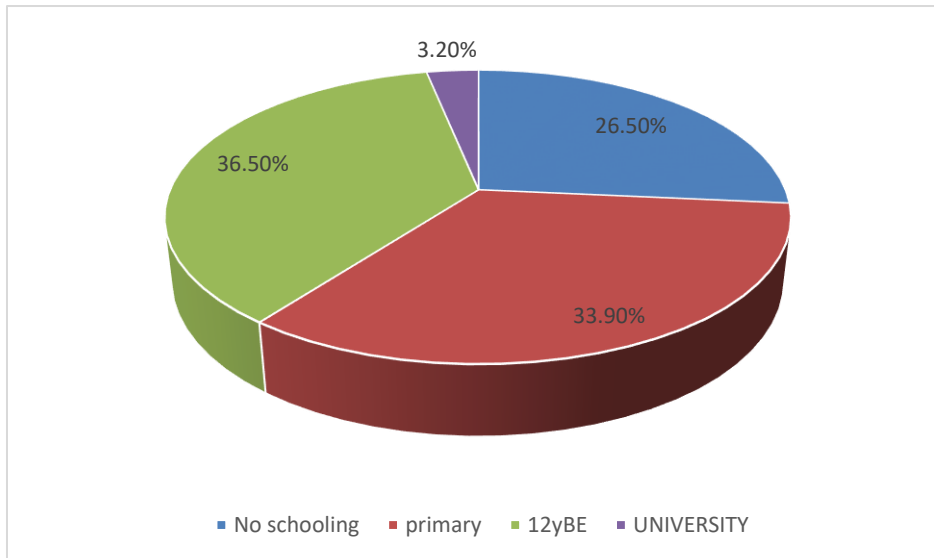


Figure 4.2 : Level of education of respondents (n=189)

4.2.3. Economic activities of the respondents

Table 4.2 shows distribution of respondents according to economic activities. The major economic activity carried out in the study area is on farming (29.1%). Farming enables the farmers to get food as well as earn an income for their households. Other economic activities include small scale businesses carried out by 10.6% of the respondents and students who make 24.3% of the respondents as well as 1.1% who said to occupy officer works like accountancy, etc. The rest of the respondents (34.9) which is the majority revealed being unemployed, others said doing daily household activities. It should be highlighted that the collection of data was conducted in areas surrounding the water and sanitation facilities, which might explain the percentages of respondents' occupations.

Table 4.2 Distribution of Respondents According to Economic Activities (n=189)

Economic activity	Frequency	Percent
Business	20	10.6
Farmer	55	29.1
None	66	34.9
Office work	2	1.1
Student	46	24.3
Total	189	100.0

4.3. Analysis and Discussion of Major Findings

In establishing a linkage between the participatory approaches for the sustainability of water and sanitation project services, the researcher examined the planning procedures as well as the management and implementation strategies applied in the three projects in Gatagara, Gitega and Rwinuma villages. More specifically this entailed examining the methodologies used for people’s participation, respondents’ knowledge about the projects and the extent of people’s participation. Other issues examined were, the existing WC, people’s participation in public meetings and finally, the people’s participation in covering operational and maintenance costs.

4.3.1. How sustainability of water and sanitation projects is addressed at their initial stage

The literature suggested that the design of projects should include elements of sustainability at initial stages, to ensure their later sustainability. Within the National Water Policy objective of ensuring affordable rural water supply services and sustainable functionality of rural water supply infrastructure, a highlight is put on some factors that affect sustainability and that should

be considered in project implementation guidelines. Those include the choice of technology, the quality of design and execution, adequate user involvement (ownership), and the sustainable use of water resources (Government of Rwanda(GOR), 2016). The question on addressing sustainability was asked to districts and sectors water and sanitation officials, it was revealed that the measures put in place to ensure community involvement come first to address the issue of sustainability. The measures include, the step of community mobilization during project initial planning to ensure that the people understand and accept the project while committing to safeguard it. It was as well highlighted that however much this step is not fully followed with the community, it stays one important strategy to ensure sustainability.

Another measure to ensure project sustainability is the network set up to follow up project operations and maintenance activities. According to the structure in the policy(Government of Rwanda(GOR), 2016), the Districts play an important role as asset managers and contract managers of water projects. They handle scheme extensions and major repairs/rehabilitations, and also handle the funds set aside for this purpose. Districts act as the contracting party for management contracts with private operators and ensure day-to-day supervision of contract compliance. Each District has a District Water Board in charge of those tasks and act as the same time as the contact point for water user committees, as the consumers' voice, as well as for reports and complaints received at village to sector level. However, when the respondents in the community were asked if there is any water or sanitation user committee in the villages, only 38% answered that they know about the committee and 62% of them did not know about user committees. Furthermore, among those who admitted to know of user committees, they were asked if the committees work effectively and according to their responses, 11% believed the committees work effectively, 21% did not think that the committees are working well while 58% did not have any idea of how the user committees work.

To understand the level of sustainability of the visited projects, the research has asked the respondents who use the water facilities if the quantity of water has remained the same as when the project started. Among those who confirmed to have experienced the very beginning of the projects, 96.5% said that the quantity of water at the public water pipes has reduced with time and that there were several times when water is completely off. Furthermore, the respondents on the public sanitation facilities were asked if the facilities still work effectively as when the project started. Among those who use the facilities from their first establishment, 86% said that the facilities are no longer as effective as they were, due to poor maintenance.

4.3.2. Community involvement in project planning

According to this research paper, this entails consultation with the community before the water projects are implemented and also involvement of the community in decision making in terms of designing the project, location of water standpoints and so on. During interviews with the Districts' water official, they were asked how the community participates in the planning processes of the water and sanitation projects. It was indicated that for each water or sanitation project to be implemented in the District, a planning meeting between different stakeholders is recommended at the District level. The initial meeting is to be held between the District representatives, sector, cell, and village representatives along with the contractor in charge of conducting the study as well the donor in case the project is funded by a Non-government organization or the private sector instead of the District. At the sectors' level, the information obtained from the sectors land managers' officers indicated that before the establishment of any water or sanitation project, a meeting should be held in order to gather ideas of the people and incorporate them in the project but this step in almost never followed. In all the three villages, it was found that the totality of the respondents in the three villages did not participate in the initial stages of water supply and sanitation projects planning including design. However, when the respondents were asked if they think community participation in planning, implementation and management of water project can lead to the effective and sustainable of water and sanitation services, 98% responded positively.

4.3.3. Community involvement in project implementation

The Districts have the lead in planning and implementing the smaller projects of the rural water supply programme according to the National Water Policy. By applying their regular procurement, contract management, and financial and reporting procedures, the overall coordination at the District level are ensured by the District Water, Sanitation and Hygiene Boards (DWASHB). Water supply performance indicators are incorporated in the Districts' performance contracts. With its ambitious goal of achieving 100 per cent coverage in a short time, a significant, coordinated effort is needed to mobilize the required funds by both the Government of Rwanda and its development partners. According to the National Water Supply Policy, based on the types of projects identified, the funding needs are allocated to WASAC

(for large projects) and the Districts (for smaller projects). Funding for the district projects are partly provided through earmarked budget allocations or through Local Administrative Entities Development Agency (LODA). Donor funds are channeled through parallel, coordinated projects with harmonized implementation procedures. Financial management, implementation and reporting follow the same government procedures, irrespective of the source of funding. Decentralized funding shall be linked to appropriate arrangements for technical support and monitoring.

In sanitation, the objective is to raise and sustain household sanitation coverage to 100 per cent by 2020 according to (MININFRA, 2016). Individual on-site systems are the sanitary solution for the large majority of Rwandan households. In order to reach to the objective, the National Sanitation Policy suggests that the modern individual sanitation should be designed and made available and affordable to the households and operated by them in order to provide affordable and high standings of services, in particular the development of the modern individual sanitation shall as well take into account disabled people. The repartition of roles for the development of individual sanitation projects in elaborated in Figure4.3. The collaboration between the Government of Rwanda, the private sector and households is at the center of adequate sanitation.

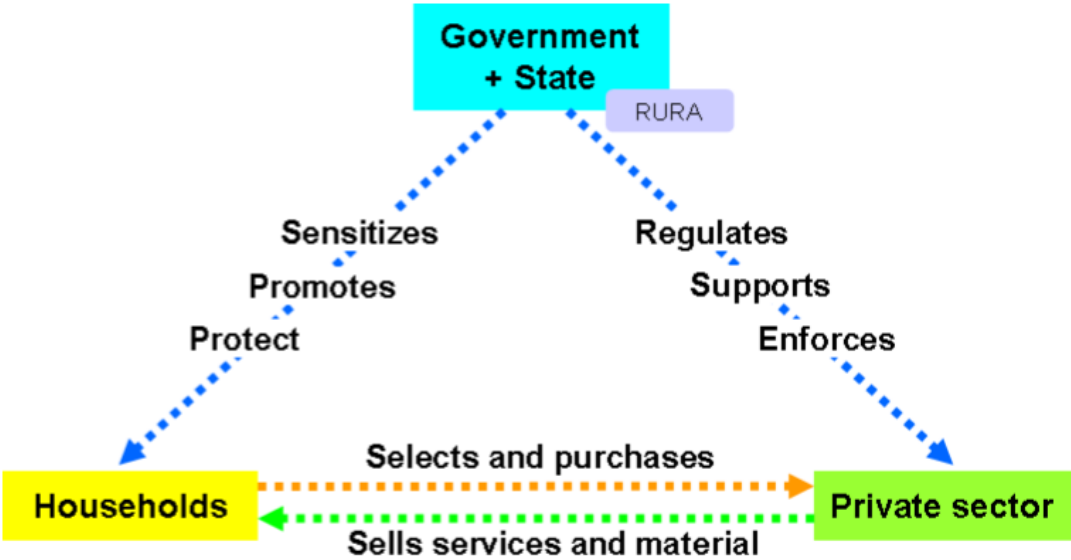


Figure 4.3 : The repartition of roles for the development of individual sanitation projects

Source: (MININFRA, 2016)

In this study, respondents from the three different villages were asked about their participation in the construction of public water and sanitation projects visited. Only 3,4% of the respondents affirmed having participated in the construction, the rest did not take part of the work. Those who participated were temporarily hired by the construction companies to help with labor during the construction works.

4.3.4. Community involvement in project management

Rural water supply and sanitation service areas is clustered by Districts to ensure that economies of scale professionalize service delivery, trigger private investment in scheme improvements and extensions, and result in better monitoring and regulation. According to the National Water Supply Policy, (Government of Rwanda(GOR), 2016) Rwanda has introduced PPP arrangement in WSS management and the percentage of rural water supply schemes operated through delegated management has reached 63.8% by 2016. The delegated management model is based on management contracts with private operators. Interested operators have to demonstrate their technical and managerial capacities to acquire a license and to participate in competition, contract is established between districts and operators including agreed performance indicators and targets to be monitored. For very large and inter-district schemes, WASAC directly acts as an operator instead of contracting a private operator. RURA has developed ‘Regulations on Minimum Required Service Level for Water Service Provision’ (2013), which is basis for licensing, monitoring and benchmarking water service providers.

According to the National Sanitation Policy of Rwanda (MININFRA, 2016), in order to ensure cost recovery and financial sustainability; operation and maintenance costs of sanitation infrastructure shall be borne by the users. In addition, affordability shall be addressed by the choice of appropriate technologies and by enhancing efficiency, not only by granting subsidies. However, the polluter-pays and user-pays principles are to be applied in sewerage and waste management.

Among the respondents, 19% revealed to have at least contributed to the maintenance of the projects, through labor work volunteerism or through collective community labor works “umuganda” which take place once every month. Moreover, in order to ensure cost recovery and financial sustainability; operation and maintenance costs of the water and sanitation infrastructure that were visited, the respondents affirmed that they pay a fee in order to use

the services. For the public water station; a fee of 25 Rwandan Francs (approximately USD0.027) per 20 liters of water is paid, while for the public toilets a fee 50 Rwandan Francs (approximately USD 0.055) is paid to use the facility. The fee is collected by a member of the village who has a contract with the operator. Apart from collecting the user fees, the person also communicates to the operator in case of any unusual water shortage or pipe failure.

In general, the findings of the study show that the contribution of the community in the operation and maintenance of water and sanitation projects visited in the three villages, is limited to the paid user fees that contribute to the project cost recovery. This can show that the water or sanitation users' committees are not active in this matter.

In addition, the study sought to understand how the community is empowered to allow them to have the capacity to contribute in the management of the projects. According to Districts and Sectors' water and sanitation officers, only one capacity building workshop had been conducted for the last 6 months in the sectors for water board members and water users' committee members in order to have them understand their roles and responsibilities in helping to manage community water and sanitation projects. Furthermore, the study has investigated on how often the issues of water and sanitation are discussed at community meetings. It was found that 24% of the respondents regularly attend monthly community meetings and they stated that water and sanitation issues are among the issues discussed in the meetings. However they revealed that the decisions on water and sanitation issues are usually a one way information to the community as they are not engaged in discussions that allow them to contribute to solutions.

Moreover, in order to understand how satisfied the respondents are with the management of the projects, the researcher asked the respondents how satisfied they are with the services. The findings show that only 21.8% of the respondents said that they get enough water for their households from the water projects in the three villages, while for 78.2% of the respondents do not get enough water for their households from the projects. Among the reasons they gave included temporal water shortages, delays in maintenance in case of system failure, alternatives of free water sources, etc. Regarding sanitation facilities, 34, 7% of respondents said they were satisfied with the public sanitation facilities while 65.3% were not satisfied; the main reason was that the public toilets are no longer well maintained, therefore they are usually not clean.

5. CONCLUSIONS AND RECOMMENDATIONS

5.0. Introduction

This chapter presents observation and conclusion based on research questions, interviews, and observations and finally recommendations are highlighted. The purpose of this study was to assess the influence of community participation on sustainability of water and sanitation projects in the District of Musanze located in the Northern Province of Rwanda. The study focused on water and sanitation projects of Gatagara, Gitega and Rwinuma villages. The projects visited are public water taps and public latrines or toilets. The specific objectives of this study were to evaluate the way sustainability of water and sanitation projects is being addressed at the initial stage of the projects, to assess community involvement in project planning, project implementation and project management and to make necessary recommendations to ensure sustainability of the projects.

5.1. Conclusions

The literature review and case studies have revealed that the failure of many development projects including that of water and sanitation is due to ineffective participation of key stakeholders including users, low capacity of the communities in operation and maintenance of water and sanitation systems as well as management of the resources. In addition, the literature review has showed that user centered projects were more sustained than supply centered projects. It has also highlighted that participation must take place at all stages of implementation of the water and sanitation schemes, from the planning stage, to implementation and management. This research set out to answer research questions, aiming at assessing community participation as a management approach in order to improve the sustainability of water and sanitation schemes in the three selected villages.

Therefore, this study concluded that sustainability issues were inadequately addressed during initial stage of projects. The sustainability of water and sanitary services was not promising due to regular water systems breakdown which were caused by technical flaws in the designs and implementation, low technical capacities of water attendants and uncleanness of the public toilets due to poor designs and maintenance. The case study projects indicate that they are not sustainable and might cease to operate within short period of time. The literature suggested that

for the water and sanitation to be sustainable the community should have a sense of ownership, there should be promotion of participation and sharing costs. All the above actions were not adequately addressed well in advance and hence sustainability is at risk. Communities have no capacity to maintain the water and sanitation systems but also they don't have a sense of ownership; the local people treat the facilities as if they belong to the government. In addition, it was concluded that little attention was given to the community involvement in different stages of projects implementation including design, construction as well as operations and maintenance. Hence community participation management approach was not effectively used in the case study of all the three projects.

Many researchers have previously worked on sustainability of water and sanitation projects in various parts of Africa, Asia, Europe, etc., and have highlighted the importance of community involvement at the different stages of water and sanitation projects. This study's literature has elaborated the benefits of community participation at every phase of water and sanitation projects including planning, implementation and management, which has established that the various aspects of community participation influence sustainability of the projects with different magnitudes. However the findings in this study have also shown that ensuring with attention the community involvement in every step of the project is key because sustainability improves with greater community participation throughout the project cycle. Particularly, this study has assessed how community participation and sustainability are tackled by the Rwandan policies of water and sanitation and compared it with the level of implementation in District case study. It was concluded that Rwanda has achieved one milestone by addressing sustainability and community participation in the water and sanitation policies, however much work is still needed to put that into effect.

5.2 Recommendations

The following recommendations are drawn from the findings of the study. As it was seen that little attention was given to community involvement in different stages of the water and sanitation projects, hence the approach of community participation tackled by several key water and sanitation policy documents was ineffective. Therefore, community members' participation in all stages of water and sanitation projects implementation and use of local

knowledge in design, implementation and management of water and sanitation projects should be considered, as this would highly contribute to the sustainability of the projects.

- Key indicators of sustainability should be identified and clearly discussed with all stakeholders.
- The projects management strategy should be designed in such a way that it is in every stakeholder group's best interests to fulfil its part of the service delivery. Voluntary roles are unlikely to be sustainable in the long term.
- The planning stage should be given concerted efforts in order to incorporate the user centered design methodology in order to produce interventions that fully solve community problems.
- Observations of water and sanitation use behavior (quantity and quality) in existing systems should be done in order to refine targets and objectives to be set. Specifically, Musanze District should put more efforts in following the existing policies and guidelines for water and sanitation projects implementation which already integrated the users' contribution in the planning design stage.
- People should be mobilized to build interest in sustaining the initiated project services. Community members should be well briefed at the beginning of water and sanitation projects about their responsibilities towards the projects.
- Proper training and technical support at all levels and for all groups engaging in water and sanitation projects implementation and management should be given priority. Arrangements for continuing support of community level organizations should be clearly set out.
- Water and sanitation committees should be given basic technical training to enable them to carry out minor repairs in case of system breakdown.
- More emphasis should be placed on institutional support (re-training, resourcing, and reform) of the local Government (districts and sectors) in order to ensure proper implementation of the policies.
- As well as for the private sector services providers, means should be identified to strengthen them, it is necessary to seek genuine competition and choice for services of quality.

6. BIBLIOGRAPHY

- African Union, African Development Bank, & Economic Commission for Africa. (2009). The Africa Water Vision for 2025: Equitable and Sustainable Use of Water for Socioeconomic Development. *Economic Commission for Africa*, 1–34.
- Andersson, K., Rosemarin, A., Lamizana, B., Kvarnström, E., McConville, J., Seidu, R., ... Trimmer, C. (2016). *Sanitation, Wastewater Management and Sustainability. Sanitation, Wastewater Management and Sustainability*.
- Asian Development Bank. (2006). A Review of Community-driven Development and Its Application to the Asian Development Bank, (September). Retrieved from <http://www.adb.org/Documents/Participation/Review-CDD-Application-ADB.pdf>
- AU, ECA, AfDB, U. (2018). *Africa Sustainable Development Report 2017. Africa Sustainable Development Report 2017*. <https://doi.org/10.18356/3cff8bc0-en>
- Bamberger, M. (1986). The Role of Community Participation Planning and Project Management FILE, (13), 1–50. Retrieved from <http://www.mapsofworld.com/thailand/provinces/krabi-map.html>
- Carr, G., Blöschl, G., & Loucks, D. P. (2012). Evaluating participation in water resource management: A review. *Water Resources Research*, 48(11), 1–17. <https://doi.org/10.1029/2011WR011662>
- Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward new theory. *International Journal of Physical Distribution and Logistics Management*, 38(5), 360–387. <https://doi.org/10.1108/09600030810882816>
- Carter, R. C., Tyrrel, S. F., & Howsam, P. (1999). The impact and sustainability of community water supply and sanitation programmes in developing countries. *Water and Environment Journal*, 13(4), 292–296. <https://doi.org/10.1111/j.1747-6593.1999.tb01050.x>
- Christensen Rand, E., Smets, S., Bevan, J., & Perez, E. (2014). What Influences Open Defecation and Latrine Ownership in Rural Households?: Findings from a Global Review Scaling Up Rural Sanitation, (August), 38.
- FAO. (2017). *Water for Sustainable Food and Agriculture*.
- Geere, J. A., & Cortobius, M. (2017). Who carries the weight of water? Fetching water in rural and urban areas and the implications for water security. *Water Alternatives*, 10(2), 513–540.

- Gordon, P., & Burns, K. (2014). Design Thinking For the Poor : A Comparative Content Analysis of Development Challenges in OpenIDEO, 1–63.
- Government of Rwanda(GOR). (2016). National Water Supply Policy, (December), 1–42.
- Greenhouse, E. (2012). Human-centered desing, 1–5. Retrieved from http://www.design.ncsu.edu/cud/about_ud/udhistory.htm.
- GWP. (2011). Dublin-Rio Principles. *Water*, 46(January 1992), 3–6.
- Hacker, M. E., & Kaminsky, J. A. (2017). Cultural preferences for the methods and motivation of sanitation infrastructure development. *Journal of Water Sanitation and Hygiene for Development*, 7(3), 407–415. <https://doi.org/10.2166/washdev.2017.188>
- Haq, M. A., Hassan, S. M., & Ahmad, K. (2014). Community Participation and Sustainability of Water Supply Program in District Faisalabad, Pakistan. *Journal of Quality and Technology Management*, X(September), 125–137. <https://doi.org/10.1182/blood-2014-01-553024>
- Harvey, P. A., & Reed, R. A. (2007). Community-managed water supplies in Africa: Sustainable or dispensable? *Community Development Journal*, 42(3), 365–378. <https://doi.org/10.1093/cdj/bsl001>
- Howard, J., & Wheeler, J. (2015). What community development and citizen participation should contribute to the new global framework for sustainable development. *Community Development Journal*, 50(4), 552–570. <https://doi.org/10.1093/cdj/bsv033>
- IDEO. (2016). HCD Toolkit, 2nd Editio, 188. Retrieved from <http://books.ideo.com>
- IWA. (2015). The Lisbon Charter Guiding the Public Policy and Regulation of Drinking Water Supply, Sanitation and Wastewater Management Services, 16. <https://doi.org/10.1080/1475382492000326116>
- IWMI. (2003). How to establish a Water Users Association ? Practical steps for social mobilizers.
- Jokela, T., Iivari, N., Matero, J., & Karukka, M. (2003). The Standard of User-Centered Design and the Standard Definition of Usability : Analyzing ISO 13407 against ISO. *Latin American Conference on Human-Computer Interaction*, 46, 53–60. <https://doi.org/10.1145/944519.944525>
- Len Abrams, I. P. & T. H. (2011). Sustainability Management Guidelines for Water Supply in Developing Communities, 2013.
- Levinsohn, J. (2003). G-24 Discussion Paper Series UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT The World Bank’s Poverty Reduction Strategy Paper Approach: Good Marketing or Good Policy?, (21). Retrieved from

- <https://g24.org/wp-content/uploads/2014/03/21.pdf>
- Maguire, M. (2001). Methods to support human-centred design. *International Journal of Human Computer Studies*, 55(4), 587–634. <https://doi.org/10.1006/ijhc.2001.0503>
- Mdendemi, P. P. (2013). *COMMUNITY PARTICIPATION FOR SUSTAINABILITY OF RURAL WATER SCHEMES*. [https://doi.org/10.1016/S1473-3099\(17\)30118-4](https://doi.org/10.1016/S1473-3099(17)30118-4)
- MIDIMAR. (2015). The National Risk Atlas of Rwanda The National Risk Atlas of Rwanda.
- MININFRA. (2016). National Sanitation Policy, (December).
- MININFRA. (2017). *Rwanda Overview : Water , Sanitation and Hygiene. Achieving the SDGs targets for water, sanitation and hygiene.*
- Montgomery, M. A., Bartram, J., & Elimelech, M. (2009). Increasing Functional Sustainability of Water and Sanitation Supplies in Rural Sub-Saharan Africa. *Environmental Engineering Science*, 26(5), 1017–1023. <https://doi.org/10.1089/ees.2008.0388>
- Muro, M., & Jeffrey, P. (2008). A critical review of the theory and application of social learning in participatory natural resource management processes. *Journal of Environmental Planning and Management*, 51(3), 325–344. <https://doi.org/10.1080/09640560801977190>
- Murtaza M., A. Muzola, S. James, F. N. (2017). Rural WASH programming : experiences from Rwanda, (July), 0–6.
- Ngirazie, L. A., Bushara, A. I., & Knox, J. W. (2015). Assessing the performance of water user associations in the Gash Irrigation Project, Sudan. *Water International*, 40(4), 635–646. <https://doi.org/10.1080/02508060.2015.1072677>
- NISR. (2013). EICV3 District profile, Musanze, 92.
- NISR. (2014). *Fourth Population and Housing Census, Rwanda, 2012 , Population Projections.*
- Ofuoku, A. U. (2011). Effect of community participation on sustainability of rural water projects in Delta Central agricultural zone of Delta State , Nigeria. *Journal of Agricultural Extension and Rural Development*, 3(7), 130–136.
- Perez, E., Coombes, Y., Devine, J., Grossman, A., Kullmann, C., Kumar, C. A., ... Cardosi, J. (2012). *What does it take to scale up rural sanitation ? Sanitation and Hygiene in Africa: Where do we stand.* <https://doi.org/10.3362/1756-3488.2009.030>
- Rep. of Rwanda. (2012). Rwanda Vision 2020, 1–40. <https://doi.org/10.6620/ZS.2016.55-16>
- SDGC/A. (n.d.). Africa 2030 Sustainable Development Goals three-year reality check. 2019.

- Starkl, M., Brunner, N., & Stenström, T. A. (2013). Why do water and sanitation systems for the poor still fail? Policy analysis in economically advanced developing countries. *Environmental Science and Technology*, 47(12), 6102–6110.
<https://doi.org/10.1021/es3048416>
- SuSanA. (2008). Towards more sustainable sanitation solutions, 2(February).
- UN-Water. (2018a). *SDG 6 Synthesis Report 2018 on Water and Sanitation*.
<https://doi.org/10.18356/e8fc060b-en>
- UN-Water. (2018b). Sustainable Development Goal 6 Synthesis Report on Water and Sanitation, 195. <https://doi.org/10.1126/science.278.5339.827>
- UN-Water Task Force. (2016). Water and sanitation interlinkages across the 2030 Agenda for Sustainable Development. *Un Water*, 48. Retrieved from
<http://www.unwater.org/publications/water-sanitation-interlinkages-across-2030-agenda-sustainable-development/>
- UN. (1992). Environmentally sound management of solid wastes and sewage-related issues. *United Nations Sustainable Development*, (June), 254–266.
- UN Environment/UNEP. (2018). *Progress on Water-related Ecosystems*.
- UN News Centre. (2015). UN adopts new Global Goals, charting sustainable development for people and planet by 2030. *United Nations Department of Economic and Social Affairs*.
<https://doi.org/10.1080/02513625.2015.1038080>
- UNDP. (2013). User's Guide on Assessing Water Governance, 115.
- UNDP - Global Centre for Public Service Excellence. (2016). Citizen Engagement in Public Service Delivery The Critical Role of Public Officials, 19.
[https://doi.org/http://dx.doi.org/10.1016/S1773-035X\(15\)30076-9](https://doi.org/http://dx.doi.org/10.1016/S1773-035X(15)30076-9)
- UNICEF, W. (2017). JMP launch version July 12 2017. Progress on Drinking Water, Sanitation and Hygiene - 2017 Update and SDG Baselines. *WHO Library Cataloguing-in-Publication Data*. <https://doi.org/10.1007/s12686-011-9397-4>
- Wang, J., Huang, J., Zhang, L., Huang, Q., & Rozelle, S. (2010). Water governance and water use efficiency: The five principles of WUA management and performance in China. *Journal of the American Water Resources Association*, 46(4), 665–685.
<https://doi.org/10.1111/j.1752-1688.2010.00439.x>
- Wanyera, L. A. (2016). Influence of Community Participation on Sustainability of Community Based Projects : A Case of KIAMBIU Water and Sanitation Slum Project , Nairobi County , Kenya by Leah Achieng ' Wanyera.
- Warner, K., Van, P., Brouwer, M., van Bodegom, A. J., Satijn, B., Buit, G. L., ... Buit, G. L.

- (2015). Climate change profile: Rwanda. *Netherlands Ministry of Foreign Affairs*, (July), 16.
- WHO. (2015). Sanitation, drinking-water and hygiene status overview - Country highlights, Rwanda, (2012), 4. <https://doi.org/10.1016/j.yebch.2016.06.017>
- World Bank, (Zong-cheng Lin). (2003). Water User Associations Development in China: Participatory Management Practice under Bank-Supported Projects and Beyond. *Social Development Notes*, (83), 385–412. Retrieved from <http://siteresources.worldbank.org/INTRANETSOCIALDEVELOPMENT/873467-1111666620939/20502171/SD+Note+83+22-Jul-03.pdf>
- Yamane, B. (1967). *Social Science Research Methods* (First Edition). Oxford University Press, Oxford. 592pp

7. APPENDIX

Appendix 1 : Research Authorisation

REPUBLIC OF RWANDA



NORTHERN PROVINCE
MUSANZE DISTRICT
P.O BOX: 03 MUSANZE
E mail: musanzedistrict@musanze.gov.rw
Website: www.musanze.gov.rw
Ref: OSC

Musanze, on. 17th / 03 / 2019

N^o 758 / 07.04.03

Bénigne Ishimwe MUGWANEZA
Pan African University
Institute of Water and Energy Services
Tel +250788589341

Re: Your permission to conduct research project in Musanze District

Dear Bénigne,

Reference is made to your letter dated 24th April 2019 requesting for permission to conduct survey among community members of Musanze District with the main objective to investigate the influence of community participation on the sustainability of water and Sanitation projects in Rural areas;

Following the assessment of your request, I am pleased to inform you that you are granted the permission to collect necessary data for your research project in Musanze District. Moreover, I assure you an ample collaboration in all your project activities.

Yours Sincerely,


HABYARIMANA Jean Damascène
Mayor of Musanze District



Cc:
The Governor of Northern Province

4. How long is the distance you walk to get to the water project?
5. Does the project give you enough water for your household needs? Yes [] No []
6. What are the available sanitation facilities in your community?
7. Do you have access to those facilities? Yes [] No []
8. Are you satisfied with the facilities? Yes [] No []

C. Community Participation and Contribution in the Project

1. Did you participate in the initial stages of water/sanitation project planning Yes [] No []
2. Were you forced to participate? Yes [] No []
3. Did the community contribute in the design of the project? Yes [] No []
4. Did the community contribute in the construction of the project? Yes [] No []
5. Do the community contribute to the maintenance of the project? If yes how Labour [] Cash [] Both []
6. If cash how much per household?

D. Community Project Committees

1. Is there any water/sanitation project committee in this village? Yes [] No []
2. How many members in terms of gender? Women [] Men []
3. Which ways and/or method used to choose the committee members? Democratic election [] Appointment [] None of the above []
4. What are the responsibilities of the Community Water/Sanitation Project Committee?
5. Does the Committee still work effectively? Yes [] No [] No idea []

E. Financial and Physical Resources Management

1. Who are responsible in handling project resources (money, tapes, channels, dams etc) Donor [] Community [] Village government/ community committee

leaders []

2. Where is the project money kept? Bank [] In the Village safe [] Home of one of the project leader [] No idea []
3. Do you know the cost of the project? Yes [] No []
4. Are you aware of the project budget? Yes [] No []
5. Who was responsible with the project budget? The community [] Water committee [] others (specify) []

F. Community Meetings

1. Were there any community meetings? Yes [] No []
2. What were discussed in those meetings? Water and sanitation Project issues []
Non Water and sanitation issues [] No idea []
3. Are you still participating in such meetings? Yes [] No []
4. Is every one free air his/her views in the meeting? Yes [] No []
5. Is everyone free to contribute to the public meetings discussion? Yes [] No []
6. Are opinions of every one heard and respected? Yes [] No []
7. Who has the final say in the public meetings?

G. Sustainability Issues

1. Is the quantity of water the same as the time project started (for water project)? Yes [] No []
2. Do the sanitation facilities still work effectively as the time the project started (for sanitation project)? Yes [] No []
3. Who is responsible to monitor the project after the donor contribution phase out? The community [] Village government [] District council [] Central government []
4. Do you have the capacity to maintain this project especially after sponsors or donors phase out? Yes [] No []
5. If you do not have the capacity where do you get assistance in case there is break down of the system?
6. (i) Does the community contribute any user fees to cover maintenance cost services?

Yes [] No [] If Yes how much?

(ii) Do all people contribute the same amount? Yes [] No []

7. Is the amount collected enough to cover the operations and maintenance services?

Yes [] No [] If no then where do you get money to cover these costs?

H. Problems in Participation of Beneficiaries

1. Are there any problems encountered in participation of the community? Yes []

No [] If yes then what are those problems?

2. Do you think community participation in planning, implementation and management of water project leads to the effective and sustainable of water and sanitation

services? Yes [] No []

Appendix 3: Questionnaire for District’s and sectors’ water and sanitation officials

My name is Bénigne Ishimwe Mugwaneza, I am a Master’s student at The Pan African University Institute of Water and Energy Sciences in Algeria, pursuing Master of Science in Water Policy. The Research general title “**IMPACT OF COMMUNITY PARTICIPATION ON SUSTAINABILITY OF WATER AND SANITATION PROJECTS IN RURAL AREAS, CASE STUDY MUSANZE DISTRICT**”. I am writing to invite you to participate in this research in the form of a questionnaire, which will ask you about your experiences with water and sanitation projects in your sectors. This questionnaire is only for academic purposes, it will approximately take 10 to 20 minutes of your time. The questions herewith can be responded by water and sanitation project officials and local authorities’ leaders as well as beneficiaries. Thanking you in advance for your cooperation.

Bénigne M.

A. Personal Particulars

1. Name of respondent (optional)
2. Education level i. No schooling [] ; iii. 12YBE []
 ii. Primary Education [] ; iv. University []
3. Occupation.....
4. Position
5. Phone and/or Mobile.....
6. Email.....

B. Participation in Project Activities

1. To your understanding, what does “community participation” mean?
2. What steps have been taken by the funding agencies to make sure that the project is understood, accepted and institutionalized?
3. What communication methodologies are employed to communicate with the people during all stages of projects implementation?
4. How do community participate in the planning processes?
5. Are there enough resources to facilitate participatory planning? Explain
6. Are there any problems associated with community participatory planning in water

and sanitation projects?

C. Capacities of Water and Sanitation Projects in the Community

1. Who is responsible to monitor water and sanitation projects after the donor contribution phase out?
2. Who is in charge of the operations of the projects?
3. Who is in charge of the maintenance of the project?

D. Management of Project Funds

1. Who manage the project funds?
2. Is there any Bank account for the projects management?
3. Who are the Bank signatories? Who selects them and what are the Selection criteria?

E. Sustainability of the Project

1. Is sustainability of the projects adequately addressed during the designing stage of the project? How?
2. What strategies in place to ensure sustainability of the projects?
3. Do you think participatory approach alone leads to sustainability of water project?
4. What do you think are the other important factors to achieve sustainability of water and sanitation projects?
5. Are there any resources set aside to monitor the projects performance after the expiry of funding period?

F. Capacity Building

1. Is there any capacity building /training done to the community/ project leaders to enable them sustains project interventions?
2. If yes, what kind of training and who is involved?
3. Do you think the community is empowered enough to carry on the projects' activities? Give reasons.
4. Why some of the development projects fail after the expiry period of funding

Appendix 4: Public Water Supply and Public Toilets in Musanze District



Figure 7.1 : Public water supply and public toilets in Musanze District

Appendix 5: Research Budget

Table 7.1 Research budget

S/NO.	Item	Unit	Quantity	Unit Price	Amount, \$	Link to research activity
A. Material and Supplies						
1	Questionnaires Printing and Photocopy	Page	3040	0.129	392.7	Interviews forms, focus group discussion forms and survey questionnaires for qualitative and quantitative data collection
2	Internet Services	Month	5	100	500	Online Research - Secondary data collection - Interaction with supervisor
B. Equipment						
C. Travel + Visa costs						
1	Tlemcen - Algiers (return)		1		100	Thesis Research - data collection, system design
2	Travel Insurance		1		100	
3	Field transportation during data collection	day	20	44	880	The field dialy transporation will cover picking the researcher from the residence in the Northen Province to the field. Due to the inaccessibility of the villages in the study area and the rainy season that might characherize the research period, this fee will cover renting a motorbike and its driver.
D Special Activities						
1	Data collection and entry assistants	person	2	270.4	540.8	Assistants shall help to finish the research within time frame requested by PAUWES research instructions. Each one shall be paid \$15.90 per day.

According to the agreement of sharing the research findings with stakeholders in Rwanda, Thesis copies will be distributed to the district of Musanze, the Northern Province as well as Ministry of Natural Resources and Ministry of Infrastructures. Thesis publication

	2	Research report printing & binding	book	5	47.3	236.5
	3	Poster and publication			100	100
E						
		Contingences (5%)				150
		TOTAL				
A		Material and Supplies				892.7
B		Equipment				
C		Travel + Visa costs				1080
D		Special Activities				877.3
E		Contingences				150
		Grand Total				3000

Will include Bank transfer fees of the research grant from Algeria to Rwanda

