IMPACT OF IMPLEMENTATION OF COMMUNITY-BASED WETLAND MANAGEMENT PLAN ON THE CONSERVATION OF LAKE MULEHE WETLAND IN KISORO, UGANDA

BY

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A RESEARCH REPORT SUBMITTED TO THE DIRECTORATE OF RESEARCH AND GRADUATE TRAINING IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN CONSERVATION AND NATURAL RESOURCES MANAGEMENT OF KYAMBOGO UNIVERSITY

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DECLARATION

I Birungi.K. Joan, declare that the work presented in this thesis is original emanating from the research work I personally carried out and has never been presented in any University for awarding a degree.

Signature.....Birungi Joan..... **Date**.....20th/09/2022

APPROVAL

This dissertation has been submitted with the approval of the following supervisors:

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DEDICATION

This piece of writing is dedicated to the Almighty Lord for the utmost protection; mercy and care that has enabled me to realize my dreams. I also dedicate this work to my beloved husband, Mr. Orishaba Peter, my dear children, Mark, Dean and Amy and my dear parents, Constante Kabasharira (R.I.P) and Fausta Kabasharira (R.I.P).

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ACRONYMS

CBMS:	Community Based Management System
CBWMP:	Community Based Wetland Management Plan
CBNRM	Community Based Natural Resource Management
CBO:	Community Based Organization
CP	Community Participation
DWO:	District Water Office
LC1:	Local Council One
LG:	Local Government
MDG:	Millennium development Goals
MWE:	Ministry of Water and Environment
NGO:	Non-Governmental Organization
PRA	Participatory Rural Appraisal
RUGs	Resource User Groups
UNDP	United Nations Development Program

ABSTRACT

Increased encroachment, mismanagement and degradation of wetland resources such as Lake Mulele in Uganda has called for continuous involvement of surrounding people into their management. The Ugandan government and other conservation agencies such as IUCN, Wetland Management Department have encouraged the implementation of CBWMPs since 1992. This study's objective was therefore to determine the impact of Community Based Wetland Management Plan on conservation of Lake Mulehe wetland in Kisoro, South Western Uganda. The study ascertained land cover changes in Lake Mulehe wetland, examined impacts of CBWMP on community perceptions and practices towards wetland conservation and established the emerging threats to the conservation of L. Mulehe wetland. The study undertook both qualitative and quantitative research designs that included observational survey methods, household interview, FDGs and Key informant interviews. Land cover analysis identified seven (7) key land cover types (Built up, forest, tea plantation, woodland, bush land, and subsistence farming). A small increment of 0.07% in wetland land cover between 2004 and 2018 with subsistence and bushland taking a front case with 64.04% and 11.20% respectively was also observed. L. Mulehe CBWMP positively influenced the conservation perceptions and practices of the surrounding communities thus 68% respondent agreed that there was improvement in vegetation, water and soils although the imagery analysis revealed otherwise. A 86.7% correlation between age of respondents and participation in conservation activities also confirm a positive impact of CBWMP on the wetland. The CBWMP has also boosted the conservation status of L. Mulehe. In addition, CBWMP has influenced conservation of L. Mulehe wetland through perception change. Such positive impacts of CBWMP in Mulele can be used by both NEMA and Ministry of water and environment in enhancing conservation of wetlands in other areas among different community members.

CHAPTER ONE: INTRODUCTION

1.1Background

World over, community involvement in wetland restoration has been an effective approach to conservation of natural resources (Mainstone et al., 2016). Its contribution to local livelihoods and natural resource conservation cannot be underestimated in communities where it has been properly implemented (Andrew and Shava, 2010). This basically involves engaging local communities to plan and decide on how to effectively utilize their surrounding wetland resources as well as ensuring their sustainable conservation. The process involves draft of community based wetland conservation strategies as well as planning for local community engagement and participation in wetland conservation and protection. In Africa, Community Based Wetland Management Plans (CBWMPs) have been a source of hope to many communities ranging from improvement of social infrastructure such as schools, health centers, and self-help initiatives such as soft loan schemes, provision of wetland goods to sustain livelihoods, to gender mainstreaming, awareness building and publicity of communities to the rest of the world (Cherry, 2011). This has greatly enhanced change of community perceptions that are largely inclined towards sustainable use of wetland resources (MWE, 2013). In Africa CBWMPs have been implemented in Tohoua region in Niger, coastal catchment communities of Cameroon, northern Gambia, Lake Tanganyika catchment in the United Republic of Tanzania and central Madagascar (IFAD, 2010).

In Uganda, the concept of CBWMP was initiated during the second phase of the National Wetland Programme in 1992. This phase aimed at more attention to practical wetland management at community level. The reasons for decentralizing natural resource management to local levels are many and well documented, such practice is legally supported by Uganda's Local Government Act (1997), that only roles central government to monitor compliance to national legislation and provide general technical support to the districts. The CBWMP initiatives have had a wide application in Uganda mainly in the Awoja wetland area in eastern Uganda where its impacts have been positively felt (MWE, 2020). In Awoja particularly the CBWMP have positively enhanced the attitudes of surrounding community members towards the wetland which has seen increased participation of locals into its conservation and retarded encroachment hence increase in its coverage and components such

as birds and plant species. However, this model of wetland management is relatively new on the south western part of Uganda inclusive of Lake Mulehe wetland and its efficiency in such areas is less studied. Population increase, immigration and poverty have led to degradation of L.Mulehe wetland with less impact of CBWMP. Amanda (2011) reported that CBWMP initiatives to the people's livelihoods and wetland conservation cannot be undermined. Through CBWMPs communities have been able to sustainably exploit wetland resources that are useful to them, incomes of communities have been enhanced, household productivity has been boosted, and human capacity on conservation issues is greatly enhanced in the local communities (Awii, 2015).

According to UNDP, (2012) mere formation of CBWMP organizations does not guarantee sustainable utilization of wetland resources for the benefit of all community members. Some elements of exclusion could be implied within the terms and conditions of membership, methods of resource sharing and approaches of transparency that may not be clear to all community members (Child, 2009 and Kabii 2015). As such technical assistance based on researched information is needed from natural resource experts to guide and direct the operations of CBWMP organizations (Ssegawa and Kasenene, 2007). The expert guidance should however respect the goals and objectives for which the CBWMP organizations were formed given that such goals and objectives represent the wishes and dreams of local communities.

CBWMP initiatives have been credited for their impact on community perceptions and practices towards wetland conservation (Amanda, 2011). These initiatives have the ability to turn around the feelings of communities towards wetlands conservation. Wherever these initiatives have been formed the views of the local stakeholders towards drainage of wetlands have drastically changed (Gruber, 2010). The sense of ownership is built when the communities are involved in management of the wetlands and no single individual wishes to own wetlands for their own benefit (Fabricius, 2004). On the other hand, Dixon and Wood, (2003) argued that exclusion of some sections of the community form wetland management roles makes them more negative towards their conservation. Such feelings of resentment could make them to sabotage efforts of the CBWMP initiatives and undermine their impact on wetland conservation. This calls for frequent review and guidance to prevent such practices

(Armitage, 2005). This study therefore focused on establishing the impact of Lake Mulehe CBWMP on conservation of L. Mulehe wetland.

1.2 Statement of the Research Problem

Lake Mulehe wetland is increasingly facing degradation due to encroachment by water harvesters, grass harvesters, papyrus grass harvesters, cultivators, livestock keepers, potters'/clay harvesters, charcoal and firewood harvesters, fishermen/women and boat operators. However, Government and other conservation agencies such as IUCN, Wetland Management Department encourage implementation of CBWMPs. These CBWMPs have not been active in most wetlands of Uganda. Most wetland conservation and restoration procedures such as the JICA manual for preparation of wetland management plans and the guidelines to determination of status of wetland resources are still more on paper than on the ground. Before L.Mulehe CBWMP implementation in Lake Mulehe wetland,the area was facing intense degradation and the surrounding communities were negative about its existence.

According to Kisoro district development plan, many communities adjacent to wetland ecosystems do not understand the benefits of CBWMP. As their key aim is to obtain agricultural land whose demand is powered by increased population, poverty and immigration in the surrounding areas. This has led to intensive cultivation of the wetland, indiscriminate resource harvesting, wetland burning and wetland drainage that were eating up the wetland at a very high rate. This was projected to worsen in the following decades after preparation of L.Mulehe CBWMP unless proposed interventions were implemented. Related studies such as Amanda, (2011) focused on the administrative dynamics and revenue sharing from tourism and not the contribution of CBWMPs to wetland conservation, negative land cover change management, improvement of perceptions and practices of communities surrounding wetlands; yet such information would be vital to guide relevant authorities in planning the necessary policy and funding interventions in the wetland sector. This study sought to fill this information gap by assessing the contribution of CBWMP initiative on conservation of wetlands.

1.3 Objectives of the study

1.3.1 Main objective

The objective of the study was to investigate the impact of community-based wetland management plan (CBWMP) implementation on L. Mulehe wetland in Kisoro district, South Western, Uganda.

1.3.2 Specific objectives

1. To ascertain the land cover changes in L. Mulehe Wetland, Kisoro district, South Western Uganda just before implementation of the CBWMP (2004) and years after (2018).
2. To examine the impact of CBWMP on community perceptions and practices towards L. Mulehe wetland conservation in Kisoro district, South Western, Uganda
3. To investigate the current biodiversity conservation status, threats and physical resource components of L. Mulehe wetland in Kisoro district, South Western, Uganda

1.3.3 Research Questions

1. What land cover changes have occurred in Lake Mulehe Wetland, Kisoro district, South Western Uganda?
2. How has CBWMP impacted on community perceptions and practices towards Lake Mulehe wetland conservation in Kisoro district, South Western Uganda?
3. What conservation threats have emerged in L.Mulehe wetland ecosystem in Kisoro district, South Western Uganda?

1.4 Justification of the study

Tibihika et al., (2016) observed an increase in the land use pressures on Lake Mulehe wetland. This is feared to have an indirect and/or cumulative impact on the entire ecosystem of Lake Mulehe wetland. The increasing pressures are certainly due to the increasing human populations in Kisoro that is growing at 5.5 percent resulting in increased cultivation of the catchments and the shores (UBOS, 2014). Lake Mulehe wetland has also witnessed an increase in recreation facilities and the demand for resources from the wetland could have more than doubled from 2004 when the first resource assessment was conducted that resulted in a CBWMP.According to Amanda, (2011), while CBWMP efforts have been reported to succeed in conservation and promotion of local livelihoods in some sectors such as wildlife

and forestry sector, studies are limited on the extent to which CBWMP initiatives have impacted on land use cover, community perceptions and practices towards wetland conservation in line with the goals and objectives for their formation. Without such studies, there is a high possibility that current strategies will not prevent further degradation of Lake Mulehe wetland unless they are informed by this study.

Rural ecosystems, particularly communal resources of interest are prone to encroachment (Natumanya *et al*, 2011). Previous studies have revealed several changes in land use patterns attributed to a range of anthropogenic activities. These include poor farming practices, growing developments in the Lake Ecosystem and catchments and siltation. (World Vision, 2018). This could make communally accessible lakes such as L. Mulehe wetland unusable in the long run thus disadvantaging thousands of livelihood opportunities that depend on them (Haruna et. al., 2005). Lake Mulehe wetland like other lakes is a good source of water for domestic and other purposes. It is for this very reason that it should be protected from any kind of encroachment.

Studies like Tibihika et al., (2016) andAmanda, (2011) on wetland ecosystems in Uganda have not fully exhausted the impact of community-based wetland management plans on conservation of wetlands, impacts of CBWMP on perceptions and practices of local beneficiaries and emerging threats to the wetlands aimed at validating the effectiveness of CBWMP. Such information would be very vital to come up with practical and informed conservation strategies. Without such a study, there is a high possibility that current strategies will not prevent further degradation of Lake Mulehe wetland unless they are informed by this study.

1.5 Significance of the study

This study contributes data to aid the periodic monitoring as recommended by the National Wetlands Policy. The findings of this study will not only benefit Lake Mulehe community through effective and sustainable resource use due to wetland conservation but will also be useful to conservation agencies of government, planning authorities, conservationists, local authorities (District Wetland and Natural Resource Officers), academicians, researchers and local residents. Conservation agencies of government will use the information generated from

the study to enrich their wetland conservation strategies thus contributing to the goal of mitigating wetland degradation. The recommendations of the study will also inform authorities in planning the necessary improvements and resource allocation to support CBWMP initiatives. This information will also be useful in review and development of strategic plans and policies aimed at wetland conservation. The study will also inform local authorities (District Wetland and Natural Resource Officers) on the workable strategies to be adapted to achieve better results. The information generated by the study will be vital for future studies on CBWMPs in and outside Uganda by different researchers and academicians including those who formed the viva voce examination of this work. During the study, local leaders and the residents around Lake Mulehe wetland will get information about wetland conservation and the benefits associated with it. The findings will generate new recommendations for wetland management planning necessary to improve the livelihoods of local communities alongside conservation of Lake Mulehe wetland. In the long run all this is expected to contribute to the overall aim of promoting the conservation of Uganda's wetlands in order to sustain their ecological and socio-economic functions for the present and future well-being of the people.

1.6 Scope of the study

This study focused on establishing the impact of CBWMPs on conservation of Lake Mulehe wetland in western Uganda. The specific areas of study included land cover changes between 2004 and 2018 around Lake Mulehe wetland, community perceptions and practices towards wetland conservation attributed to the CBWMP and conservation status, threats and resources of L. Mulehe wetland. The data was collected for three months between June and September 2019

1.7 Conceptual Framework showing relationship between variables

The conceptual framework below (Figure 1) shows how different components of the study interact for instance the CWMPs, local perceptions, wetland current components and regulations do influence the existent land cover, wetland components and products, status and the income of the surrounding communities. Its theorised that once community members are involved in drafting the management plans of different ecosystems such as forests and

wetlands, their sense of ownership of the plans is enhanced which in turn positively improves their perception towards this resources and thus their enhanced conservation. However, this interaction is greatly influenced by the available mitigation strategies for the outcome implications, monitoring sensitization and management of Lake Mulehe wetland.

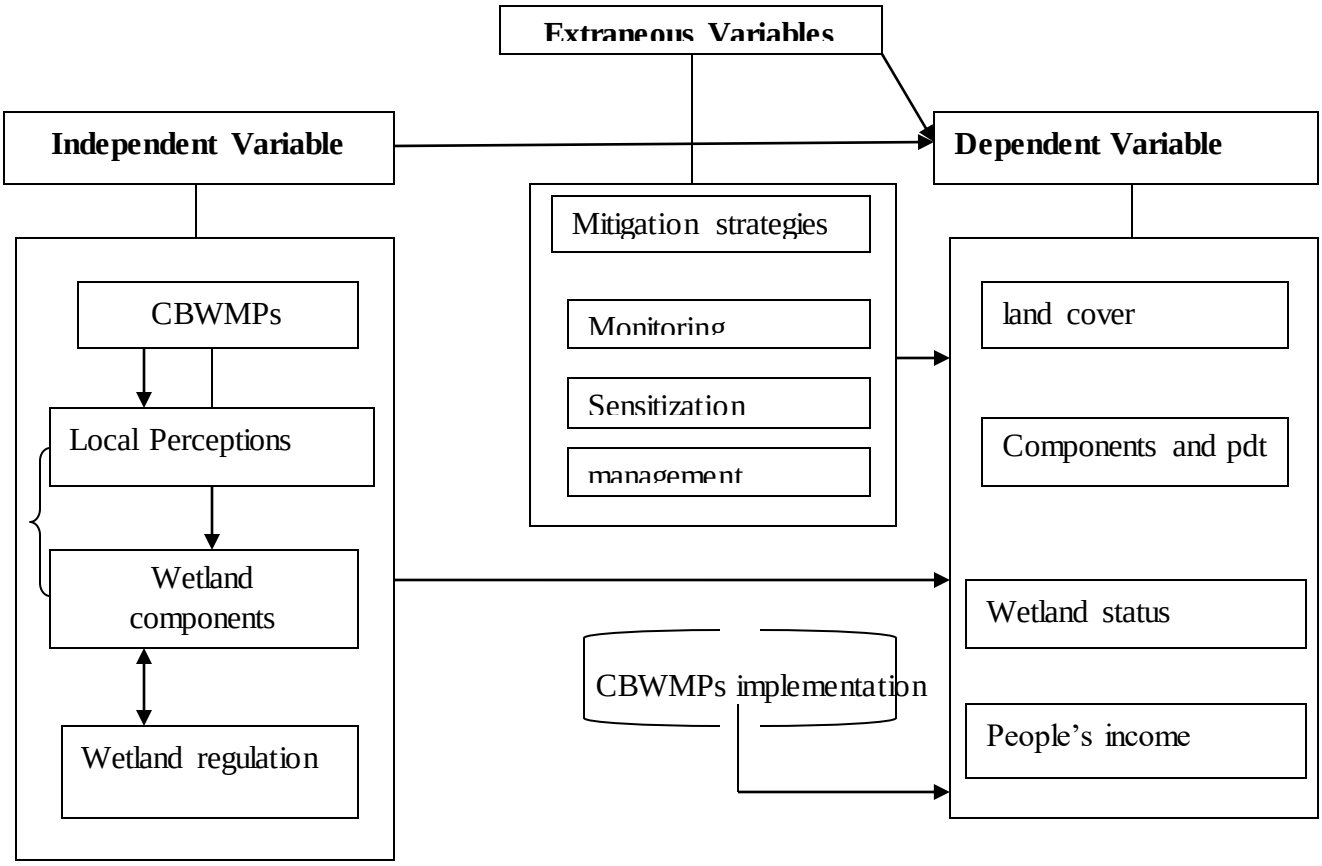


Figure 1: Conceptual framework for the study

CHAPTER TWO: LITERATURE REVIEW

2.1 Wetlands

While a variety of definitions of the term wetland have been suggested, according to Ramsar Convention (1971)Article 1.1, wetlands are defined as areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres. Burton & Tiner (2009) noted that there are five general types of wetlands recognized by most countries and these include bogs, fens, swamps, marshes, and shallow water wetlands. These wetland types can be lamped into four categories that is bogs and fens, marshes, frested swamps and shrub dominated wetlands. FAO, (1996) contend that wetlands occur globally in every country, in every climate, and on every continent. Mironga (2005) reported that the common wetlands are open coasts, flood plains, fresh water swamps, lakes, peat lands and swamp forests.

Mainstone *et al.*, (2016) provide in-depth analysis on the occurrence of wetlands and depicts that wetlands often occur as ecotones (transition zones) between dryland and a water body, Low-lying lands that are frequently flooded during high-water periods while other are found in isolated depressions on the land where water collects.

Wetlands in Uganda play critical roles in the ecology. The wetlands are home to several rare species of birds most of which are migratory. Wetlands sequester carbon, and mitigate climate change impacts (Fennessy & Lei., 2018). National and international visitors seek out wetlands as tourist attractions and educational opportunities to learn about their unique animals and plants (NEMA, 2010). They supply families with basic needs such as water, construction material, and fuel. Furthermore, they act as filters for pollutants and regulators of water flows.

2.2 Wetland Land cover change

Land cover is the any physically observable matter on the surface both natural and anthropogenic features (Hone et al., 2013). Land use refers to the manner in which man plans

and allocates developments/activities on land (Jiao et al., 2015). There is a close relationship between land cover and land use (Robel, 2004). This means that the more the activities are carried out on the land, the lesser the land cover gets. However, land cover observation does not automatically mean land-use definition because land cover and land-use, though interrelated, are not the same, although to some extent they can be similar (Muggaga, 2011). This means that the extent of land use can influence land cover even though land has got its natural mechanisms of restoring itself.

Fractional tree cover has been mapped through global data to further understand the global distribution of forest cover (DeFries, 2000) Natural resoueces in Africa are diverse and inact in some areas although the world is beginning to witness massive destruction of these natural resources (DeGrandi, 2000; Saatchi, 2000; Mayaux et al., 2002). This means that land cover/use changes are also likely to double in the next 22 years as the population doubles. This population growth will exacerbate existing problems with provision of safe water and health services (Saatchi, 2000).

Comparative land cover/use dynamic models are used to help improve our understanding of land cover that arises from human decision-making from household level to national level. These models are supported by surveys and interviews of decision makers. Focus should emphasize development of empirical diagnostic models based on aerial and satellite observations of spatial and temporal land-cover changes (Chen et al., 2013).

In Uganda, the combined effect of high economic growth and population growth has had and will continue to have drastic impacts on the natural land cover (Pratt and Chang, 2012). The decline in natural land cover in highland areas of South Western Uganda is majorly attributed to intensive agricultural activities primarily triggered by high population growth rates. The population growth rate in the highland areas of south western Uganda is about 3% per year (UBOS, 2002).

2.3 Wetland conservation actions

According to IFAD (2010), CBWMP is one of the most practical wetland conservation actions. This is pre-conditioned on its ability to alter local behavior and practices in ways that conform to the attainment of pre-determined conservation and community development goals.

Local people are however, assumed to be interested and ready to shake off their values and norms in preference for new behavioral norms (Armitage, 2005). When beliefs are unbalanced, stress is created and there is pressure to change perceptions. The two main factors affecting balance are the sentiment (e.g., liking, approving, admiring) and unity (e.g., similarity, proximity, membership) qualities of beliefs (Boggs, 2004). CBWMP institutions are thought to provide sentiments as a result of promises of better livelihood and unity due to collective actions. There is therefore need to assess the extent to which these lead to changes in perceptions and practices of the community within and around the CBWMP operation area (Kiwanuka, 2008). In some communities where CBWMP has been implemented, there is still unsustainable utilization of natural resources despite the fact that they have access to these resources for their livelihood benefit (Amanda, 2011). According to Gruber, (2010) the capacity of the CBWMP institutions to influence the perception and behavior of the community from degraders to conservationists, most especially as a result of the livelihood benefits derived therefore needs to be investigated.

2.4 Environmental Conservation Perceptions

Environmental perceptions are related to environmental problems. Environmental perceptions have been defined as the collection of beliefs, affect, and behavioral intentions a person holds regarding environmentally related activities or issues. As this definition of environmental perceptions indicates, two types of environmental perceptions have been used in previous literature: perceptions toward the environment, and perceptions towards ecological behaviour (Kulasekera, 2012).

According to Ogunjinmi (2012), it is believed that an individual‘s personal evaluations are more revealing of the person‘s perception than what he or she claims to do. Perceptions are favourable or unfavourable feelings toward a characteristic of the physical environment or toward a related problem and are therefore directly related to behavioural change. Behavioural change which is paramount in addressing environmental challenges is a function of change in behavioural intentions. As a result, people make evaluative judgments about a wide variety of targets based on perceptions (Ogunjinmi, 2012).

Understanding the basis of environmental perceptions to facilitate environmental behaviour is advantageous, since a clear goal of environmental education is to change behaviour. For educators the question should become not only how much do wetlands users know about environment but also what are their perceptions towards environmental quality (Woodgate, 2012).

The study of environmental perceptions helps reveal local and informal knowledge. It also helps in identifying environmental problems which have not been noticed by formal scientific study and deciding on which problems should be tackled first. Perceptions are much about the public‘s perception of these problems as about their scientific and economic consequences. This means that any government environmental policy is much more likely to be effective if it works together with public perceptions and opinion (Erol and Gezer, 2006).

Reviews of behaviour change consistently highlight the complexity involved in determining and changing behaviour. Action is influenced by multiple conscious and unconscious processes. Pro-environmental action in particular is a product of both internal (psychological) and external (socio economic, physical etc.) factors (Gautreau et al, 2012).

2.5 Community Based Wetland Management Planning (CBWMP 12-13)

To ensure that our use of land and natural resources is sustainable for present and future generations, we need to plan how we will manage them. Lack of planning can result in poor decision making and declining sustainability as social, economic and ecological influences such as rainfall, plants and animals, markets and operating costs interact, often without harmony. The purpose of the management plan is therefore to have a common goal, management objectives and interventions by all stakeholders for conservation and management of wetland resources (Nature Uganda, 2014). Planning processes operate at state, regional, local government, sub-catchment and property levels. Property management plans have been promoted by a number of producer and regional organisations and many landholders have implemented them (Convention on Wetlands 2002). Management plans specifically for wetlands, at any scale, can ensure the best outcomes for sustaining the values and benefits of wetlands to landholders and the wider community. Planning for wetlands is best done as part of broader planning processes where the specific features and unique values

of wetlands can be recognised within the broader context of the business, property or sub-catchment.

2.6 Impacts of Development and Conversion to Wetland conservation

Over half of the world's wetlands have disappeared since 1900. Development and conversion continue to pose major threats to wetlands, despite their value and importance (WWF, 2018). Conversion of wetlands for commercial development, drainage schemes, extraction of minerals and peat, overfishing, tourism, siltation, pesticide discharges from intensive agriculture, toxic pollutants from industrial waste, and the construction of dams and dikes, often in an attempt at flood protection, are major threats to wetlands everywhere (WWF, 2018).

A major threat is the draining of wetlands for commercial development, including tourism facilities, or agricultural land. In addition, unwise use of freshwater to feed these developments poses a further threat (Xiao et al., 2006). In all too many places, the amount of water being taken from nature's underground aquifer is far outstripping its ability to replenish itself. The result is that as the water level drops, millions of trees and plants are dying because they are deprived of their life-sustaining supplies (MWE, 2017).

Hundreds of thousands of hectares of wetlands have been drained for Agriculture. Globally, agriculture accounts for 65% of the total water withdrawal on Earth. Agriculture and other industries such as paper making are often very wasteful and inefficient with water (Zhang et al., 2009).Alien invasive species have had severe impacts on local aquatic flora and fauna, and can upset the natural balance of an ecosystem. For example, the introduction of Nile perch to Lake Victoria has pushed many of the lake's native cichlid species to extinction (MWE, 2017).

Pollution in wetlands is a growing concern, affecting drinking water sources and biological diversity. Drainage and run-off from fertilized crops and pesticides used in industry introduce nitrogen and phosphorous nutrients and other toxins like mercury to water sources. These chemicals can affect the health and reproduction of species, posing a serious threat to biological diversity (Yu et al., 2010).

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter presents the research design of the study undertaken, description of the study area and the methods used to collect data needed to achieve the stated objectives. In addition, it highlights the key characteristics of the target population, study participants, sample size and selection criteria. Furthermore, it presents the data collection procedures, threat identification and data analysis tools used to manage data collected to achieve the set objectives and answer research questions.

3.2Study Design

The study undertook both qualitative and quantitative research designs as applied by Amanda, (2011), in a case study of Bigodi Wetland Sanctuary in Fort Portal as a community driven Community-Based Natural Resource Management initiative that was also maintaining livelihoods and wetland health. The approaches yielded substantive information that supported restoration of Bigodi wetland. This gave the current researcher a basis and confidence to adapt them too.

3.3 Study area

L. Mulehe wetland (Figure 2) is located in two sub counties of Nyundo and Nyakabande, cutting across the four parishes of Rwingwe, Gisorora (Nyakabande S/C), Nyundo and Bubuye (Nyundo S/C) (Figure 1). Nearest villages are Kijina and Musezero and the nearby trading centre is Mutolere. Lake Mulehe lies at latitude 1°13’5’’S and longitude 29°43’17’’E. It is accessible on footpaths from Mutolere hospital. In Nyundo Sub-County, Nyundo Parish is the one that touches the wetland while in Nyakabande it is Gisorora Parish that touches the wetland. The area receives a temperate oceanic climate with two peak rainfall peaks that gradually merge into one as the year progresses.

This study considered Nyundo parish for the study because of the larger part of Lake Mulehe is in Nyundo parish which gave the study a chance to gather more information from a wider area. In this parish the villages that touch Lake Mulehe include Musezero, Rurembo, Gatare and Bugara. Lake Mulehe wetland is one of the largest water resources in Kisoro which is supported by Rugyegye wetland and Gitundwe wetland. The project area has several extractive uses of Lake Mulehe wetland such as water harvesting, crafts harvesting, fishing

and tree and plant harvesting/growing. Agricultural practices are also common in this area and these are characterised by pesticide use, fertilizer application, Waste management, use of soil embankments, diversion of water to fields, management of animal and human excreta and soil erosion. The area also hosts recreation facilities such as Mulehe resort and Rurembo lake view lodge.

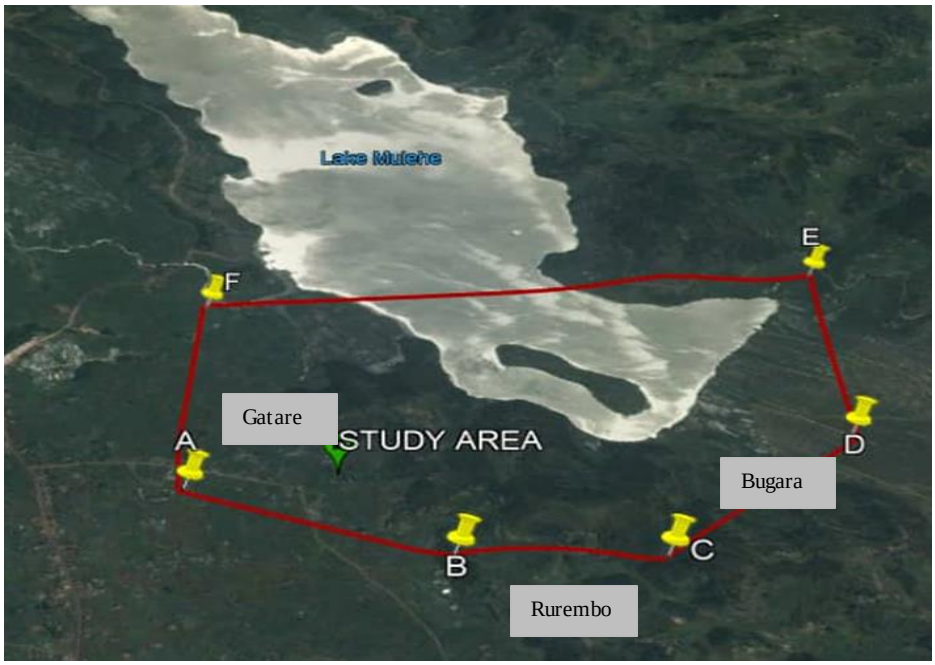


Figure 2: The Google earth view of the study area-Nyundo Parish covering Rurembo, Gatare and Bugara

Figure 3: A distant view of the study area (Lake Mulehe Wetland) This is a seasonal flooding wetland

3.4 Target Population

The study targeted Resource User Groups (RUGs) with a total of 534 people. These included water harvesters (103), grass harvesters (70), papyrus grass harvesters (27), cultivators (130), and livestock keepers (100), potters/clay harvesters (17), charcoal and firewood harvesters

(37), fishermen/women (33) and boat operators (17). These were chosen because of their daily interaction with the resources in L. Mulehe. People around this area are mainly Bakiga in tribe who mainly do cultivation and cattle keeping as a major source of income. These people mainly depend on the wetland banks for cultivation due to available fertile soils and nearest availability of water around the wetland. Majority of the people around the wetland achieved a primary level of education and depend on farming and cattle keeping as a source of living. In addition, they are prominently recognized as the key RUGs in Lake Mulehe community wetland management plan.

3.5 Study participants

Study participants are the specific individuals/categories of people who are targeted and or actually approached/interacted with during the study. In this study, participants included household heads undertaking different activities around the wetland. The number of household heads interviewed were 160 determined using Slovin's formula shown below:

$n = N/(1+Ne^2)$

where n is the sample size, N = 267 is the total number of households in the selected villages around lake Mulehe wetland as obtained from the Local Chair person's records of households and e is the level of precision which is 0.05 at a 95% confidence. The participants were interviewed in relation to their specialised activities around the wetland that is to say Water harvesters (31), grass harvesters (21), papyrus grass harvesters (8), cultivators (39), livestock keepers (30), potters/clay harvesters (5), charcoal and firewood harvesters (11), fishermen/women (10) and boat operators (5). This selection was informed by the level of interaction/involvement/dependence on Lake Mulehe wetland resources. These numbers are based on the Kisoro DDP and the Lake Mulehe wetland management committee led by the area LC leaders who provided the overall estimates per category in the study area.

3.6 Sample Selection and sample size

Stratified random sampling was used to select the participants since the Resource User Groups (RUGs) were already selected. The RUGs formed the strata. The study was conducted on a representative sample of 160 respondents who were randomly selected from the RUGs. Each participant was selected randomly based on the number per group. Based on Amin, (2005)

approach, 30% was selected from each group upon establishing the number of RUGs per category since this was believed to be a good representation of the total surrounding population. The parishes and villages were purposively selected based on those that touch the lake as specified in the Lake Mulehe wetland management plan.

3.7 Research instruments

The data collection tools used during this study included; questionnaires, interview guides, Observation checklists and document analysis checklists.

3.7.1 Questionnaire

A pre tested questionnaire was used to collect qualitative data for the study (Appendix 2). This is because they give an opportunity to respondents to freely express themselves without fear of the outcome. The reliability and validity of the questionnaire was tested using the Test-Retest method. In this tool, questions asked were designed to elicit the interests, demographics, opinions, perceptions and behaviours of different respondents around Lake Mulehe wetland. The questionnaire required the participants to enlist community perceptions and practices towards wetland conservation. More specifically, the questionnaire captured community interest towards wetland conservation, perception towards wetland conservation Campaigns, perception towards wetland drainage, perception on wetland ownership and participation in wetland conservation initiatives. The questionnaire had 10 specific questions. The questions covered 1) feelings of respondents towards wetlands conservation, 2) whether presence of Mulehe CBWMP had improved the respondents' perception towards wetland conservation, 3) opinion about effectiveness of wetland conservation campaigns and reasons for and against (depending on the opinion), 4) views on stopping people from draining wetlands and the possibilities, 5) opinions on ownership of wetlands, 6) reasons for reclaiming wetlands, 7) participation in wetland conservation, 8) activities participated in, 9) major challenges faced while carrying out the activities, 10) effect of the CBWMP on the perceptions of the respondents and opinions on who should own wetlands.

3.7.2 Interview Guide

A pre-tested interview guide was also used to gather supplementary information regarding the state of L. Mulehe wetland visa vi implementation of the CBWMP from key informants through a 5 to 10 minutes one on one interview at the respective office or home location of the respective key informant (Appendix 3). This was majorly directed to technical personnel's in regards to L. Mulehe wetland so as to achieve their views on the performance of the wetland under a functional CBWMP. This was in relation to Kennedy (2006) who observed an interview guide as a data collection plan. The interview guide had questions related to land cover changes in Lake Mulehe Wetland, community perceptions and practices towards wetland conservation, emerging threats to the conservation of Lake Mulehe wetland and mitigation measures to the emerging threats. The interview guide had a range of questions that were put before the key informants. The response of key informants per question was directly recorded against each specific question in the interview guide and later subjected to in depth analysis.

3.7.3 Document analysis Checklist

A document analysis checklist was developed (Appendix 1). This was adopted with modifications from Amanda, (2011). The guide focused on wetland conservation and restoration. The specific guiding principles and the aspects of focus during literature review were provided in the review guide. In this literature review key interest was on obtaining information on land cover changes, community perceptions and practices towards wetland conservation, threats to the conservation of wetlands and mitigation measures to the emerging threats. The information from the documents was used to discuss the results of the study, refine the methodology and draw feasible conclusions that led to developing practical recommendations on the subject matter.

3.7.4 Observation Checklist

This checklist was adopted with modifications from a study by Gruber, 2010 which focused on key principles of community-based natural resource management. The enumerators were required to fill these checklists during the visits to the study area especially to the wetland.

They did this by ticking the key parameters/indicators of wetland health such as water, soil, biodiversity and human activities. The observation checklists cover aspects of wetland resources such as papyrus, palms, grass, wood and medicinal plants. The checklist was also used to gather information on fauna in the wetland including sitatunga, monkeys, baboons, snakes, birds and fish. For water, the checklist captured observable features such as colour, water levels, speed of flow, impurities, debris and observable aquatic species.

3.8 Research/data collection Procedures

3.8.1 Training of enumerators and Pre-test of tools

Data enumerators (Interviewers) who had experience in conducting social research, experience in working in the field and are familiar with the community and fluent in English, Rufumbira languages were recruited and trained. Prior to data collection, the research team underwent a 1-day training focusing on data collection tools and process. The purpose of the training ensured that quality data is collected. The training focused on: background of the research and its objectives, expected outputs and methods to be used in data collection, reading and interpreting the questions in the tools, interview approach, route charts, target groups, ethical practices, field pre-test and feedback among others.

A Pre-test was carried out to test the tools and ensure that they capture the intended information. The pre-test established the suitability of the tools.The study tools were pre-tested on Gisorora community in another parish that touches Lake Mulehe wetland but was not supplied for the main study. The field pre-testing of data collection tools was done by the enumerators to familiarize them with the field.

3.8.2 Ascertaining the land cover changes in Lake Mulehe wetland coverage

The data collection targeted the following variables: size of cultivated area, size of natural land cover, settled/built-up area and cover of the water, permanent and seasonal areas of the wetland, drainage channels and vegetation cover.

Geo processing techniques were used to define and quantify the spatial distribution of the variables. I obtained sets of multi-temporal, moderately cloudy (6.6%) and ortho-rectified Landsat TM/ETM+ and Landsat 8 (30 m) imagery of both 2004 and 2018; (Path / Row - 173/

60 - PCS WGS 1984 UTM, zone 36N) to define and quantify the spatial distribution of land use in the study area. The images were pre-processed using a 3 x 3 majority filtering method prior to classification (McDonnell, 1981; Cleve *et al.,* 2008). The pre-processed images were classified following a hybrid of supervised (Maximum Likelihood) and unsupervised classification procedures because the land use practices to be mapped are anticipated to have a Gaussian distribution (Dewan and Yamaguchi, 2009) in the catchment. A pixel differential identification was carried out between the images because of the short image classification period. The classification algorithms were computed using Erdas Image software 2013 and ArcGIS 10.1.

A field-based classification system of land use in Lake Mulehe planning area/Catchment was developed. The classes were developed basing on ground truthed data. The classified images were validated with the use of ground truthed data for accuracy assessment using an observation checklist and collecting GPS coordinates of the land uses. The re-definition of each spectral class into flood zones were based on the results obtained from ground truthed data. Google Earth images were used as reference in the re-classification of land use types.

3.8.3 Impact of Mulehe CBWMP on community perceptions and practices towards wetland conservation

A Participatory Rural Appraisal (PRA) approach mixed with RUGs members interviews (Amanda, 2011) was adapted for this fieldwork. Prior to the interviews, a questionnaire was pre-tested on similar respondents to ascertain the practicality and applicability of the questions on the respondents. While on ground, I met leaders of the Resource User Groups who gave me lists of their group members. Upon obtaining these lists, I randomly sampled out the 30% representatives of each Resource User Group to avoid bias in selection. This gave me a total of 160 members to interview.

Sorted Resource User group members were obtained from the respective group leaders. Each traced selected member was visited and interviewed at his/her household for about 10 to 15 minutes. In case a member was unavailable either due to death or absenteeism, he/she was replaced randomly from the respective RUGs members register. Before interview, consent of

respondents to be interviewed was first sought. The respondents who accepted to be interviewed were then asked questions as indicated in the questionnaire. Each response given by the respondents in the questionnaire was circled and records of extra responses against the respective question in the questionnaire were taken. For future close check, the interview was recorded using a tape recorder. This was majorly done with consent from the interviewee.

In order to gather supplementary data regarding the state of L. Mulehe wetland visa vi implementation of the CBWMP. After the RUGs interviews, a total of 15 key informants were purposively selected from people that are either directly involved in management of L. Mulehe wetland or are either directly or indirectly affected by its state and presence. These mainly included technical personnel and opinion leaders. These were interviewed from their either workplaces or homes using questions from the interview guide after sought consent. In addition, information obtained from these key stakeholders helped to triangulate that obtained from review of documents about management of L. Mulehe wetland.

3.8.4 Establishing the current biodiversity status, threats and resource components of L. Mulehe

3.8.4.1Document Review

An off-site desk review of all relevant documents was undertaken focusing on legal and administrative requirement for fishing. Specific reference was made to related work that has been done in the project area or on similar projects, the impacts that have previously been identified, and mitigation measures and where necessary the Environmental and Social Management Plans that have been prepared for similar activities. Among the key documents that were reviewed were the Wetland Management Guidelines, the National ESIA of 2020, the Environmental Audit Regulations of 2020, relevant legislations such the NEA 2019, several relevant reports/Audits that have been conducted in the same sector among other relevant literature as was determined by the researcher.

3.8.4.2 Threat Identification and Analysis

Threats were identified based on a checklist. Identification of probable biophysical impacts were based on observation, professional judgment and reference to existing literature especially the Lake Mulehe wetland community based management plan.

Economic valuation of Threat of the activities on *critical environmental resources (fish in this case) was* undertaken utilizing standard methodologies as described in respective section. Checklists guided field observations where they were used to guide what particular aspect related to Lake Mulehe wetland conservation was vital to study and it's state at the time of observation evaluated based on the impact scale below. Furthermore, different stakeholders around Lake Mulehe wetland were interviewed for their perceptions about the seasonal variation of magnitude of different impacts of different Lake Mulehe conservation parameters.

The criteria for determining impact significance were based on an impact scale of high, medium and mild. Each of these had a set of descriptors that defined it. The descriptors were: Duration, Extent, Magnitude, Irreversibility and Significancy. (ESIA regulations,2020)

3.9 Data analysis

Data collected to answer the set research questions through interviews and key informants were sorted and coded for entry. Data from RUGs questionnaires were entered into Microsoft excel, checked for errors and then exported to Statistical Package of Social Sciences (SPSS) version 23 for rigorous analysis using cross tabulations, and chi-square test. Through an exploratory approach, frequency distributions and descriptive statistics were generated and presented in tables. To establish relationships between study variables, cross-tabulations were used.

Transcription of key informant interviews was done manually. Content analysis of statements made by key informants following themes based on research questions was applied to generate perceptions of respondents on the conservation status of L. Mulehe wetland. The process of identifying perceptions was done iteratively to establish descriptive and interpretive statements.

Quantitative data was analyzed using SPSS version 23 software using cross tabulations, chi square tests and content analysis based on the themes above. Qualitative data was analyzed manually through relating each qualitative parameter to the quantitative statistics obtained under each theme.

Quotes were highlighted and compared between various social categories of the key informants. Both the direct and interpretive meanings from quotes were considered in the analysis. Similarly, descriptive statements about the state of L. Mulehe wetland were identified from the different actors that participated in the study Binominal regression and chi-square test was used to compare the relationship between perceptions towards L. Mulehe wetland conservation campaigns and different attributes of residents such as age, sex, marital status, income level, employment and major source of income around the wetland.

3.10 Ethical considerations

Before a community member participated in this study, his/her written consent was sought and proper explanation of the rationale and need for research and the role of the participants was explained before getting involved in the study. Participants were also informed of the benefits and risks involved in the study and were given the freedom to continue with the study or with draw at any time they wished to. In addition, I explained to the participants that I was not a politician and needed their participation for only academic purposes. Upon acceptance, the participant in question was then interviewed. To ensure the confidentiality and anonymity of the participants, no name of the participant was requested or noted. The questionnaires given to the participants were coded in respect to the respondents interviewed for easy identification during data analysis. It was agreed with respondents for data sheets or questionnaires to be stored for over a period of six months after the + period before being discarded so as to enable appropriate reference incase needed.

3.11 Limitations of the study

The timely and efficient completion of this study was majorly retarded by the untimely death and the key supervisor of the project. May his soul rest in eternal peace. In addition, the key encroachers and some inhabitants of the wetland area more so farmers and fishers were hesitant at participating in the study since most of them thought that we were planning their forceful eviction. On the other hand, some key informants moreso local area leaders had no idea of what we were talking about since their involvement in the plan draft process was overseen. In addition, the availability of limited funds to run the field activities limited the scope of the area in the project site and the number of participants to be involved. This was so because most participants require money as refreshment and fuel refund to give out views

about the project. Furthermore, the terrain of the was not such suitable for a person of my life style who is mostly used to flat terrains.

CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter presents the results of the study. The data are summarised in tables and Figures (maps) according to the stated objectives.

4.2 Land cover changes in Lake Mulehe wetland between 2004 and 2018

4.2.1 Land cover classes around Lake Mulehe

The land cover results for the years 2004 and 2018 of Lake Mulehe wetland are summarized in table 2 and Figure 3. There was a greater shift to agricultural land than other land covers in 2018 compared to 2004. From table 2, it can be seen that activities around Lake Mulehe wetland have resulted in a reduction in the forest area (-10.86%), woodland (-1.79%) with more boosts to the bush land (+1.77%), the subsistence agricultural land (+14.38) and a silent increase in wetland area (+0.07). The forest land use is the greatly affected land use over this study period of time.

Table 2: Areas and proportions of each land use and land cover

LAND COVER/USE	2018 (ha)	Percentage cover (%)	2004 (ha)	Percentage cover (%)	2004-2018 (Change) (ha)	Percentage change (%)
Built up	14.06	3.43	24.31	5.93	-10.25	-2.50
Forest	28.45	6.94	72.98	17.80	-44.53	-10.86
Tea Plantation	26.28	6.41	30.71	7.49	-4.43	-1.08
Woodland	17.06	4.16	24.35	5.94	-7.29	-1.79
Wetland	15.66	3.82	15.38	3.75	+0.28	+0.07
Bush-land	45.92	11.20	38.66	9.43	+7.26	+1.77
Subsistence farming	262.56	64.04	203.61	49.66	+58.95	+14.38
Total	**410**	**100**	**410**	**100**	**-0.01**	**-0.0024**

The Built up, forest, woodland, and tea plantation land coverage reduced from 2004 to 2018, with an increase in wetland, bushland and subsistence farming coverage of Lake Mulehe wetland (Figure 4). This shows that the communities around Lake Mulehe have increasingly encroached the area for subsistence farming mainly through forest degradation. The decrease of the built up space was greatly attributed to the increased eviction of the wetland encroachers either voluntarily or by force as stipulated by the management plan.

In addition, the satellite images (Figure 4) show a reduction in the wetland from 2004 to 2018 more so in the North direction. This has been considerably eaten up by bush land. Furthermore, the woodland in the southeast of Lake Mulehe wetland in 2004 has been fully reduced to a degraded forest mainly as a result of subsistence agricultural pressure. The wetland has also extended to some areas of this degraded woodland by 2018.

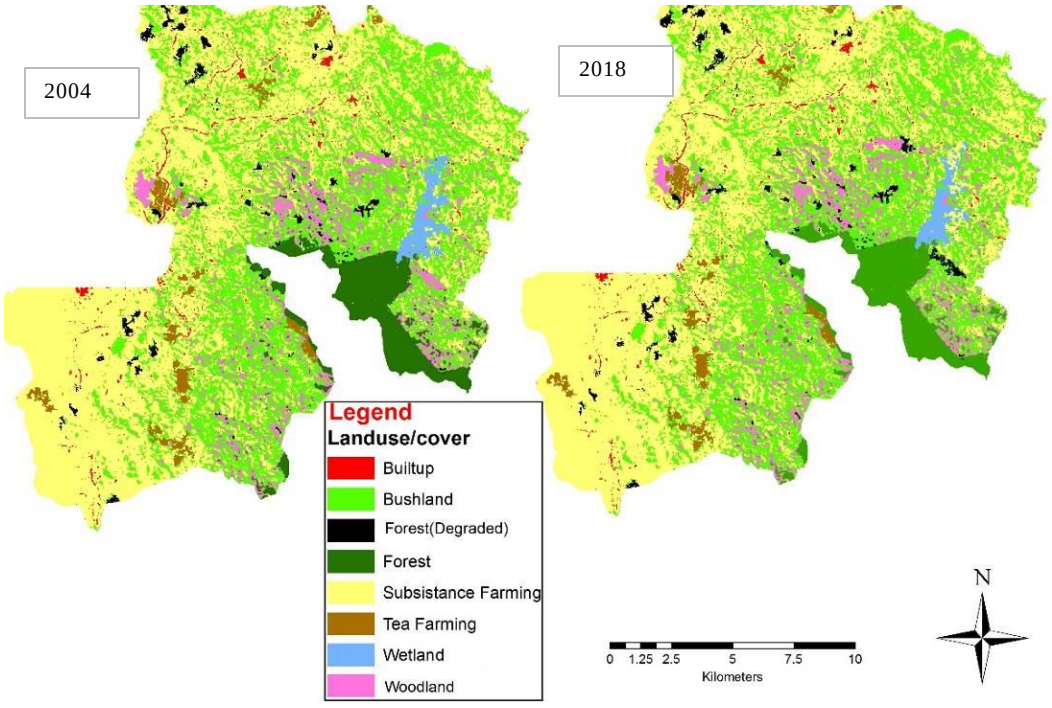


Figure 4: Land use/cover change in and around lake Mulehe wetland (2004-2018) Source; Wetland Management Department for 2004 land cover map and physical GIS data collected by researcher for 2018 map)

4.2.2 Accuracy of classified land use-cover classes

Table 3 and 4 show the accuracy assessment results of each of the land cover types for 2004 and 2018. The overall accuracy achieved for 2004 and 2018 maps were 86.47% and 83.64% with Koppa coefficient of 0.83 and 0.78 respectively. In 2004 (Table 3), the land cover type was majorly of a wetland, however the woodland was the least cover and subsistence farming was growing at a very high rate taking over other land uses in the area. Tea plantation had also occupied a great percentage of the area. If we compare Table 3 and 4, the producer's accuracy for the wetland under study is higher than the user's accuracy in both years studied. For instance, in 2004, the producer's accuracy for wetland is 92% compared to the user's

accuracy of 65.33% (Table 3). This means that even though 92% of the reference wetland have been correctly identified as ‘’wetland’’, only 65.33% of the areas identified as ‘’wetland’’ in the classification were actually wetlands. The same interpretation covers table 4 for 2018 maps where the producer’s accuracy for wetland was 96.2% compared to the user’s accuracy of 86.33% (Table 3). This means that even though 96.2% of the reference wetland have been correctly identified as ‘’wetland’’, only 86.33% of the areas identified as ‘’wetland’’ in the classification were actually wetlands. It can be concluded that the Koppa coefficient of 2004 land cover maps is greater than that of 2018maps. This means that the classification process of 2004 avoided 83% of the errors that a completely random classification would generate compared to that of 78% in 2018.

Table 3: Accuracy assessment for 2004 land cover classification for Lake Mulehe

LAND COVER/USE	Producer’s accuracy (%)	User’s accuracy (%)	Overall accuracy (%)	Koppa coefficient (K_C)
Built up	85.50	87.50		
Forest	84.11	81.58		
Tea Plantation	87.80	72.47		
Woodland	80.00	69.66	86.47	0.83
Wetland	92.00	65.33		
Bush-land	84.30	87.43		
Subsistence farming	89.30	86.60		

Table 4: Accuracy assessment for 2018 land cover classification for Lake Mulehe

LAND COVER/USE	Producer’s accuracy (%)	User’s accuracy (%)	Overall accuracy (%)	Koppa coefficient (K_C)
Built up	82.33	82.33		
Forest	75.23	77.45		
Tea Plantation	86.12	91.49		
Woodland	70.15	82.57	83.64	0.78
Wetland	96.20	86.33		
Bush-land	76.64	89.43		
Subsistence farming	75.83	79.66		

4.3 Impact of CBWMP on community perceptions and practices towards wetland conservation

4.3.1 Socio-economic characteristics of respondents

From table 5, the average age was found to be 44.7. The males accounted for 54% of the respondents and females were 46%. For Education, majority of the respondents (48.9%) had primary education, 27.1% had secondary education, 17.3% had not education and 6.7% had tertiary education. Regarding marital status, majority (71.8%) were married, 13.5% were widowed, 11.7% were divorced/separated and 3% were single. The average household size was 4.2. Agriculture was the major occupation accounting for 83.7%, followed by trade 9.4%, fishing 5.3%, government employment 1.1%. The average distance from the wetland was 0.91 Kilometers.

Table 5: Socio-economic characteristics of respondents

Category	Parameters	Results
Age		44.7
Sex	Male	54%
	Female	46%
Highest level of Education	None	17.3%
	Primary	48.9%
	Secondary	27.1%
	Tertiary	6.7%
Marital Status	Single	3%
	Married	71.8%
	Divorced/separated	11.7%
	Widowed	13.5%
Household Size in numbers		4.2
Major occupation	Trade	9.4%
	Government employed	1.1%
	Fishing	5.3%
	Agricultural activities	83.7%
	Other	0.5%
Distance from home to the wetland in Kilometers		0.91

4.3.2 Community perceptions towards Wetland Conservation

Different themes were used to analyse perceptions and these included; perceptions towards wetland conservation, perception towards wetland conservation campaigns, perception

towards wetland drainage, perception of wetland ownership and perceptions towards participating in wetland conservation initiatives

In order to assess how CBWMP has impacted on community perceptions and practices towards L. Mulehe wetland conservation, respondents were interviewed to assess their perceptions towards the different components supported by lake Mulehe CBWMP and these perceptions are summarized in Table 5. Sixty-eight (68) percent of the respondents reported that Lake Mulehe CBWMP had improved their perceptions towards wetland conservation and are now more positive towards wetland conservation. About 75.7% of respondents interviewed from communities around Lake Mulehe reported that it is good to conserve Lake Mulehe wetland that was enhanced through the establishment of a CBWMP in 2004. Two respondents reported that the initiatives to conserve Lake Mulehe through a implementation of a CBWMP lead to displacement of some community members however a good number of them (10.2%) observed that this improved the environment in the area.

Table 6: Community perceptions towards Lake Mulehe Conservation through a CBWMP

Perceptions toward Lake Mulehe conservation	Perception Category	Frequency (N=231)	Percent of Cases (%)
Floods reduced in the Area	Positive	16	5.80
Fish and other wetland resources have increased	Positive	6	1.50
Good idea to conserve the wetland species	Positive	142	75.70
Improved better environment	Positive	25	10.20
Deprives community access to farming land	Negative	3	0.60
Our land was grabbed for being part of the lake	Negative	8	1.70
Restricted Access to Resources	Negative	10	2.20
Wetland wastes productive land	Negative	19	7.70
People were displaced	Negative	2	0.40

Overall, the responses provided by the community suggest that L. Mulehe CBWMP has positively impacted on the perceptions of the respondents. The respondents are currently more passionate about wetland conservation than in the past. The respondents do not look at the

conserved space as a wasted land. Participant P12 was positive about the contribution of the CBWMP toward the conservation of the L. Mulehe wetland. This is what he said:

''*I really appreciate the role of the CBWMP so now everybody can see that the wetland resources, such as forests, swamps around the river are no longer drying. Trees are no longer being cut down anyhow and our women have a rich source of fire wood for cooking*. Participant T13 expressed similar sentiments about the importance and role of the CBWMP. This is what she said: *''the women of this area no longer have a big problem of firewood. We can just go out here and pick a few bundles of fire wood which can enable us cook our food very quickly instead of looking for firewood for a long time.''*

Participants further acknowledged that there is more to gain from having the wetland in their neighbourhood and they act as watchdogs to each other to prevent encroachment. This resonated with the responses provided by the key informants who indicated that the community now looks at the wetland as something that belongs to them all. This perception has made the conservation efforts easy. A respondent P24 who is a cultivator in the area said

"I am happy that the channel leading from Rugyegye wetland was restored following the development of the L. Mulehe wetland Community Based Management Plan.

A respondent F13 who is a *fisherman added*

"*the lake was already getting another colour during the rainy season. The colour of water mixed with soil would form on the lake. The water would become impure due to lack of vegetation to filter the dirty water from the mountain. Now when it rains this colour does not come about because the water is purified by the vegetation cover in Rugyegye drainage channel. The chairperson of Musezero village thanked the district and government for putting in place the committee that sensitised and guided them to restore the drainage channel with vegetation cover"*

One fisherman (F10) on the contrary had negative perceptions of the role of the CBWMP; He argued that the CBWMP are an obstacle to our livelihood because they prevent them from fishing indiscriminately. This is what he said:

> '*'My daughter,Iam 62 years old and I want to tell you that these people have brought suffering and poverty to the community around the R. Mulehe Wetland. They have introduced laws that prevent us from catching fish anyhow. You try to go and fish, you are arrested. They are everywhere. Now we don't have a sure source of income. Our children can't go to school because we can't afford to pay their school fees. We can't even buy clothes for our wives. It's really bad now. The CBWMP should be stopped immediately.''*

4.3.3 Perception towards Wetland Conservation Campaigns

The binominal regression ($P<0.05$) of perceptions of wetland conservation campaigns shows that residents that have direct access to Lake Mulehe wetland are more likely to perceive its conservation as important or beneficial compared to those that have no access to it (Table 6). The other variables used in the model have no significant effects on the outcomes of Lake Mulehe wetlands conservation perceptions. This is reflected in the fact that the logit regression model explains 29.4% (Nagelkerke R^2) of variance in Lake Mulehe wetland conservation perception albelt. Statistically significant $\chi^2= 12.1$ $P < 0.001$ and correctly classified 76.7% of the cases. Those who said yes to conservation campaigns indicated that conservation campaigns increase knowledge about the resources in the wetland and how they can be conserved. It also increases the environmental consciousness among the people as well as the vigilance of the community members.

Table 7: Determinants of the perception of L. Mulehe conservation at household level

Variable	B	S.E	Wald	Exp(B)	P-value
Sex (Male)	-0.01	0.498	0	0.99	0.983
Age	0.004	0.018	0.048	0.827	0.827
Marital Status					
Married	0.291	0.915	0.101	1.337	0.751

Single	0.382	0.782	0.256	3.267	0.673
Widow	-10.561	59.189	0.032	0	0.745
Level of income	0	0	2.461	1	0.117
Level of education	0.02	0.061	0.107	1.02	0.744
Form of RUGs membership	-0.506	1.096	0.213	0.603	0.645
Access to wetland (yes)	**-1.536**	**0.745**	**4.257**	**0.215**	**0.039**
Constant	-2.011	1.901	1.119	0.134	0.29

The head of cultivators (P1) in the wetland said

> *"I used to think that government wanted to steal our land and that is why they were demarcating it. I later on was sensitised and I believed that it was not true. They told us that the demarcated land would remain for us to use but sustainably. I now support buffer zone restoration because it is very important.*

A respondent, P16, who is a lady from Rurembo village along Lake Mulehe wetland boundaries said;

> *'' I now confidently support wetland restoration and have learnt how to make biophysical structures such as contour farming blocks and also know what trees are good for the wetland.I did not know all this 50 years back"*

4.3.4 Perception towards Wetland Drainage

Respondents were interviewed for their perception of how introduction of Lake Mulehe CBWMP has influenced wetland drainage in the area ever since it was introduced in the area (Table 7). Eighty-seven (87) percent of the respondents (n=160) reported that there is a great need to drain Lake Mulehe wetlands for its proper functionality and apex service to all the surrounding communities on a sustainable basis.

Table 8: Perceptions towards L. Mulehe wetland drainage

Perception towards wetland drainage	Percent cases
Good for wetland conservation	23.8
Improve wetland health and functioning	44.9
Wastes land	20.9
Denies benefits for local people	26
Should allow access to resources	1.3
Waste of government resources	7.9

Benefit for future generation	1.3
displacement and grabbing of people's land	1.4

Majority of respondents agreed that this could be affected through enactment of efficient bye-laws in supplement with other strategies. In addition, more people also supported the implementation of a community management plan but least members viewed use of force through police as a viable alternative (Figure 5).

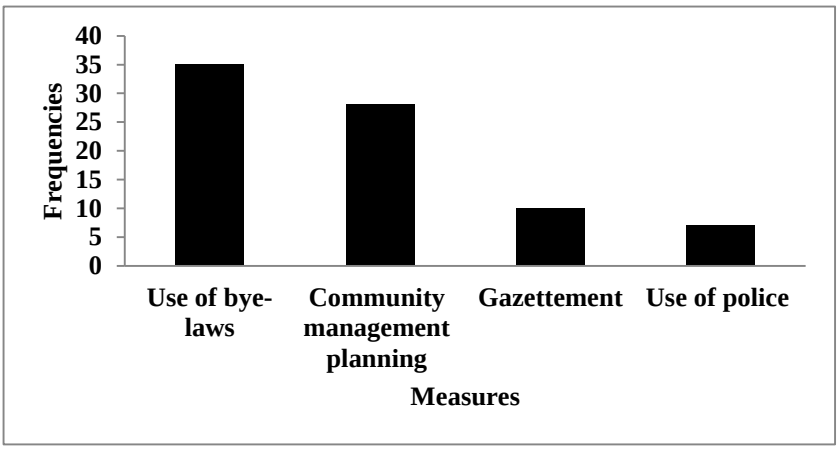


Figure 5: Responses about appropriate Lake Mulehe wetland management strategies

During the interviews respondents indicated that the wetlands aid in rain formation in addition to other benefits such as provision of water and acting as habitats to a range of wild species. Respondents argued that if people are allowed to drain wetlands, they will be gone too soon and the future generation will have nothing left for them. Respondent F42 who is a fisherman from Gatare village said *"People should be stopped from draining wetlands because before wetland was restored, we had stopped getting fish. At least now we can catch something because the mudfish thrives best in the bushy shorelines of water bodies. We can now dig our traps and be sure that we shall catch mad fish at least".* A respondent P9 who is a cultivator within the wetland said *''since the enactment of the CBWMP, farming activities have eased since the area receives more rains and water is readily available in the wetland to irrigate the available water crops''* Respondent C13 who is a grazer in the area said '' *we are finding it hard for us to graze our animals since the CBWMP restricts grazing in the wetland. This makes us graze our animals from far which consumes a lot of energy and effort amidst other family demands*''

4.3.5 Perception on Wetland Ownership

Now on the perceptions of respondents about the ownership of the wetland as a CBWMP efficiency assessment factor among the community households, eighty-four percent of households have perception influenced by the CBWMP that Lake Mulehe wetland should not be a personal owned resource. None of the variables used to run the logistic model had a significant effect or respondent's perceptions of Lake Mulehe Wetlands as a communal resource. The residents see no reason for having individuals to own any part of the wetland and most of them do not aspire or even wish to own a part of it. This could be attributed to the awareness and training given by L. Mulehe CBWMP to those who neighbour the wetland as most of them were members of the RUGs studied. Respondent P6 who is a clay harvester from Bugara said "*Wetlands belong to government and that is what the community knows. It is therefore wrong to own a part of it because one day government will take back the land. This is what we were told during sensitisation campaigns."*

4.3.6 Participation in Wetland Conservation Initiatives

Respondents were interviewed on how the Lake Mulehe CBWMP has influenced their participation in wetland conservation initiatives around the area. These gave response on how they participate in the different wetland conservation initiatives. Their responses are summarized in Table 8. Seventy-three percent of the respondents (n=160) reported that the formulation of Lake Mulehe wetland management plan in 2004 has had a great impact on their participation in conservation initiative around the wetland. Majority of respondents (64.4%) have majorly participated in tree planting on the slopes compared to 0.3% that have formed SACCOs and engaged in fish farming (Table 8).

Table 9: Participation of respondents in LakeMulehe wetland conservation initiatives

Strategies for enhancement of conservation initiatives	Frequency (N=565	Percent of cases (%)
Tree planting on the slopes	241	64.4
Sensitization of resource user groups on wise wetland use principals	202	54.0
Formation of biophysical structures	6	1.6
Demarcation of the wetland boundaries	72	19.2
Formation of bye-laws	5	1.3
Formation of SACCOs for RUGs and financial support	1	0.3
Fish farming	1	0.3

Cook stove production	14	3.7
Setting up of demonstration centers for good agricultural practices	14	3.7
Restoration of inlet swamps like Rugyegye	9	2.4
Eviction of encroachers	2	0.5

Discussions with key informants and the local residents indicated that everyone in the community acts as a watchman to each other. The local residents pointed out that if they see a fellow member misusing the wetland resources, they will be the first ones to report. This demonstrates the level of commitment of local residents to monitoring their local resources. Respondent P2 said *the plan opened our eyes about our role in the management of our wetland, before the CBWMP we thought that it was government's property and role to protect it but now we know how beneficial it is to us and this has stimulated our effort to protect it more*.'' Respondent C17 said *I think our local leaders are not doing enough in ensuring that we protect our resource, I think government should pattern with them to see that they engage all local leaders in protecting Lake Mulehe*

4.4 Status and emerging threats of Lake Mulehe wetland

4.4.1 Status of L. Mulehe Wetland resources before and after CBWMP

Our findings indicated that implementation of lake Mulehe wetland management plan has boosted all components of wetland ranging from plant resources in the area including papyrus and wood plants, animals and water quality that were previously deteriorating at a very high rate before (Table 9). According to interviewed respondents, this was majorly due to degradation activities such as cultivation, indiscriminate resource harvesting, wetland burning and wetland drainage that were eating up the wetland at a very high rate. Respondents from the community indicated that Lake Mulehe CBWMP checked critical degradation activities.

Table 10: Perceived status of wetland resources in L. Mulehe wetland before and after implementation of the CBWMP

Status of Wetland Resources	Coverage/population Before Intervention(2004)	Current coverage/population (2018)	Perceived Reason for the majority
Plants			
Papyrus	High (24%) Low (76%)	High (82%) Low (11%) Reducing (7%)	Restricted harvesting, byelaws

Status of Wetland Resources	Coverage/population Before Intervention(2004)	Current coverage/population (2018)	Perceived Reason for the majority
Palms	High (29%)	High (71%)	Increase in water levels, reduced harvesting
	Low (9%)	Low (14%)	
	Reducing (62%)	Reducing (15%)	
Grass	High (11%)	High (66%)	Controlled harvesting, increase in water
	Low (31%)	Low (21%)	
	Reducing (58%)	Reducing (13%)	
Wood	High (9%)	High (84%)	Restricted access, awareness
	Low (91%)	Low (14%)	
		Reducing (2%)	
Medicinal herbs	High (41%)	High (72%)	Controlled harvesting, introduction of alternatives
	Low (59%)	Low (17%)	
		Reducing (11%)	
Animals			
Sitatunga	High (45%)	High (40%)	Rarely observed in the wetland
	Low (55%)	Low (57%)	
		Reducing (3%)	
Monkeys	High (20%)	High (90%)	Increase in vegetation, reduced encroachment
	Low (33%)	Low (9%)	
	Reducing (47%)	Reducing (1%)	
Baboons	High (31%)	High (74%)	Increased thickets
	Low (9%)	Low (19%)	
	Reducing (60%)	Reducing (3%)	
Snakes	High (32%)	High (65%)	Increased thickets and water
	Low (20%)	Low (22%)	
	Reducing (48%)	Reducing (13%)	
Birds	High (13%)	High (63%)	Increased vegetation and water, awareness
	Low (34%)	Low (31%)	
	Reducing (53%)	Reducing (6%)	
Fish	High (49%)	High (35%)	Mudfish very common, fish do not survive well in wetlands
	Low (51%)	Low (44%)	
		Reducing (21%)	
Water			
Water quality	High (29%)	High (11%)	Increased purification capacity, presence of buffer zones
	Low (71%)	Low (63%)	

Status of Wetland Resources	Coverage/population Before Intervention(2004)	Current coverage/population (2018)	Perceived Reason for the majority
		Reducing (26%)	
Water levels	High (27)	High (75%)	Reduced wetland drainage
	Low (56)	Low (11%)	
	Reducing (17)	Reducing (14%)	

Respondent P18 a cultivator from Musezero village narrated that "*We used to cut vegetation and formed gardens in the wetland to grow crops during the dry season. This involved cutting down big trees and clearing the thickets that surrounded them. The quantity of water as well as the quality was low due to erosion of soil into the water. Most of the big trees were being cut down for timber while the branches were used for either firewood or charcoal. In some stretches one could see through the wetland because the thicket had reduced*"

However, despite the existence of L. Mulehe CBWMP some degradation activities are still going on in the wetland. In some parts gardens were observed in the wetland, there is still burning of papyrus by unknown members of the community and some parts have eucalyptus trees growing in the wetland yet these are known to drain wetlands and displace native vegetation species.

The community reported that before the intervention of L. Mulehe CBWMP, crop raiding incidents were high. Following its formation, these are currently low due to stepping up of monitoring by Kisoro LG. In the past the monkeys and baboons were being killed by the farmers to prevent them from destroying the crops that were planted near the wetland. Though no count of animal species has ever been undertaken, the community reported that the majority of wetland animals in the area particularly monkeys, baboons, birds and snakes have tremendously increased. According to them this is indicated by the encounters they have with for example monkeys and baboons which come to their gardens on a daily basis. A respondent F19 who is a fisher man from Rurembo village thus commented:

> *"Before the formation of L. Mulehe CBWMP these monkeys and baboons had reduced and we no longer had to guard every day. We would have few incidences of isolated destruction. The monkeys and baboons were too few to destroy the gardens like it is*

today. This is why we are convinced that the animals in this wetland have increased and their population is now high

4.4.2 Emerging threats to the conservation of Lake Mulehe wetland

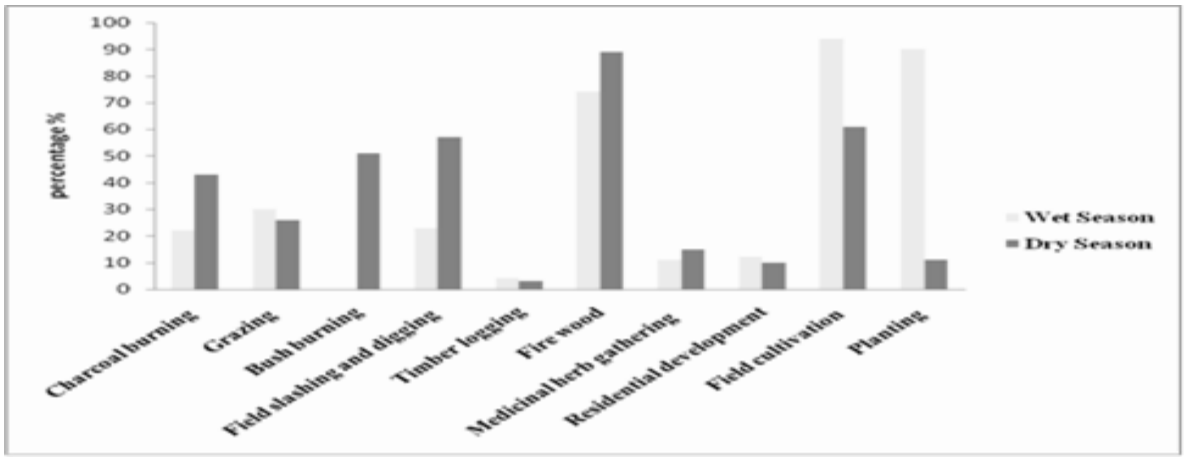
The major type of land degradation that was identified in the field is soil erosion. It was high. Deforestation was second to soil erosion. This was attributed to the booming trade of firewood for using in the tea factories and the domestic energy needs of the households. The sedimentation and siltation was observed in the valleys although it was mild (Table 10).

Table 11: Major types of land degradation identified from Imagery analysis

Observed types of degradation	Status
Soil erosion	High
Siltation	Mild
Deforestation	Medium
Soil nutrient depletion	Mild

High= Wide spread and reversible over a long time; Medium= Noticeable effects on the environment which are reversible over the long term; Mild = Noticeable effect on the environment, but returning naturally to original state in the medium term

Lake Mulehe wetland is mostly threatened in the wet season compared to the dry season. This is mostly through field cultivation and planting that increase encroachment on the boundaries. These mostly intensify in the wet season. However, activities like firewood collection, bush burning and field slashing and digging also cause a significant threat during the dry season in the area (Figure 6). In addition, results from the observation checklist about the drivers of land



cover change also indicated that poor terracing practices, heavy runoff, landslides and deforestation also drive land cover change. The poor terracing practices were especially observed in Nyundo Parish. Landslides and damage from heavy runoff was observed in Gisorora Parish. Deforestation was observed in almost every parish studied.

Figure 6: Major threats to lake Mulehe wetland

CHAPTER 5: DISCUSSION

5.1 Extent of land cover changes between 2004 and 2018

These study findings presented in chapter four show that most of Lake Mulehe wetland has been eaten up by subsistence farming and bush land. Forest, woodland, and tea accounted for the rest of the land cover. The dominancy of agriculture and bush land is also evident from the classified images. It can be realized that generally land use activities are increasing while the land cover is reducing. According to Kanza and Vitale (2015), agriculture is the major source of livelihood in many developing countries. Uganda is not exceptional and its' rural areas are investing a lot in farming. This explains why agriculture was the major dominant land use in areas within Lake Mulehe wetland. The results obtained in the study corroborate to the findings of Kiggundu et al., (2018) who observed that farming was a major land cover in the Murchision Bay catchment of Lake Victoria Basin in Uganda. Similarly, Hone et al., (2013) had similar observations in Treng-Wen reservoir in Scotland where farming had dominated all land cover in the area.

From these findings, the increasing changes in land cover in and around Lake Mulehe are mostly attributed to poor farming practices and population increase that has resulted in land shortage in the study area. According to Kiwanuka, (2008), communities around most wetlands resort to subsistence farming within the wetlands to fulfill their food demand which is not a much different case from inhabitants of Lake Mulehe wetland. This has resulted in clearance of vegetation cover and the land cover/use has since been changing. Immigration of big groups into an area results into land cover change and this creates stress on land cover/use in the areas where the people are resettled (Mugagga, 2011).

From the analysis of imagery, most households were surrounded by cultivated fields. Ground truthed data indicated that the communities were involved in slash and burn methods, which result into loss of vegetation. There is limited agro-forestry conducted in the communities. In addition, there was no agriculture extension services in the areas studied. This points towards lack of awareness about the proper agricultural practices in the communities. Additionally, the agricultural practices do not follow the required system of terracing that is recommended for hilly areas. Most farmers start cultivation without making proper terraces. This has led to

soil erosion problems in the communities. The soil erosion has given rise to silting of Lake Mulehe. This has resulted in low water quality.

Use of wood fuel for cooking in the highlands of south western Uganda is also contributing to reduction of land cover/use. This leaves the slopes bare and susceptible to soil erosion. Erosion has increased sediment flow. This is leading to siltation of the open water sources resulting in pollution of the water sources. This agrees with the findings of (Yanda, 2007). Use of wood fuel in households leaves the land surfaces bare and increase the vulnerability of open water resources to pollution due to increased sediment flow. When this happens, the communities who depend on the water are the ones most at risk. This is responsible for the increasing incidents of water borne diseases in the highlands of south western Uganda.

5.2 Impact of Lake Mulehe CBWMP on community perceptions and practices towards wetland conservation

Findings suggest that L. Mulehe CBWMP has positively impacted on the perceptions of the respondents. The respondents are currently more passionate about wetland conservation than in the past. The respondents do not look at the conserved space as a wasted land. They acknowledge that there is more to gain from having the wetland in their neighbourhood and they act as watchdogs to each other to prevent encroachment. This resonated with the responses provided by the key informants who indicated that the community now looks at the wetland as something that belongs to them all. This perception has made the conservation efforts easy. Kaggwa*et al.*, (2017) further affirmed that community based initiatives are good for creating enthusiasm and passion towards proper resource management and provide the best approach to conservation of resources in the communities. Conservation campaigns are important tools in changing the perceptions of the communities towards conservation (IUCN, 2015).

The high response to yes for stopping the people from draining wetlands demonstrated that the community was positive towards conservation. The arguments above are in agreement with the findings of Sophie, (2007) who recommended that wetland conservation strategies should be aimed at stopping encroachment for the benefit of the future generation. Respondents cited out use of bye-laws and community management planning as the most

efficient strategies for ensuring Lake Mulehe Wetland conservation. This is in line with NEMA, 2014 also proposes similar measures (policing, community involvement and use of bye-laws) to stop encroachment of wetlands while MWE, 2015 also emphasizes gazzetement in addition to the existing measures.

5.3 Emerging threats to the conservation of Lake Mulehe wetland

Study findings revealed soil erosion and incremental deforestation as the major emerging threats to Lake Mulehe wetland conservation. These are facilitated by increased field cultivation and firewood gathering during both the wet and dry season within Lake Mulehe wetland. This is worsened by poor terracing practices, heavy runoff, and landslides. The poor terracing practices were especially observed in Nyundo Parish and Landslides and damage from heavy runoff was observed in Gisorora Parish. Deforestation was observed in almost every parish studied. According to DeGrandi et al., (2000); Barasa et al., (2010), unregulated and uncontrolled agricultural practices coupled with ignorance among the farmers result into serious damage on the wetland systems in the community.

Study findings revealed that establishment of L. Mulehe CBWMP has greatly enhanced the plant and animal life plus the quality of water within the wetland area. According to Kathiresan (2010), burning of papyrus, grass, trees and palm plant species can happen even in highly monitored ecosystems. This calls for continuous vigilance across every part of a conservation area if complete compliance is to be attained (Hussain and Badola, 2010). Discussions with some community members revealed that though NEMA and WMD is very strict on monitoring, they cannot be in all the places at the same time and rely on the communities for information. This is why there has been fire outbreaks in the wetland without their knowledge. At times some community members claim ownership in some parts of the wetland and even provide evidence. These are the people who plant eucalyptus trees and grow crops in some parts of the wetland. According to Hema and Indira, 2013 private ownership of wetlands should be an issue at policy management and strict orders should be passed by those with authority to evict the increasing wetland encroachers. They however indicate that if some people have genuine ownership and have properties in the wetland, they should be compensated before they are evicted.

Furthermore, study findings show a reduction in crop raiding incidences by sitatungas when the L. Mulehe CBWMP was established. This is attributed to increased monitoring by Kisoro LG of the wetland during CBWMP implementation. Similar reports were given by Kiwanuka (2008) who found that majority of the animals in the wetland studied increased in numbers following formation of a community based wetland management association. On the other hand, L. Mulehe CBWMP has enhanced water quality and levels. This was indicated by the fact that the water had disappeared into the wetland vegetation and was hardly noticeable by the local residents. This changed after the formation of the wetland management plan. The high quantity and quality of water points to the positive impact of L. Mulehe CBWMP in ensuring that the wetland is conserved.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions were drawn from the study

I. The CBWMP has had a positive impact on L. Mulehe wetland land use. This is evidenced by an increase in the wetland cover. However, other natural land covers such as forests and woodlands around L. Mulehe wetland have greatly reduced.

II. Implementation of L. Mulehe CBWMP has also impacted positively on the perceptions of the communities surrounding L. Mulehe wetland. For instance, currently, most inhabitants are willing to participate in conservation activities especially monitoring and perceive wetland drainage as a bad practice.

III. Soil erosion and increased deforestation are the major emerging threats to the conservation of Lake Mulehe wetland.

6.2 Recommendations

The following recommendations were drawn from the study

1. Deforestation has been revealed by the current study as the most critical cause of land cover changes as this is geared by high rates of subsistence cultivation in the area. Therefore, agroforestry practices are recommended to assist to balance the farming activities and tree coverage in the area. This recommendation responds to the observed land cover changes that is mostly influenced by cultivation.

2. In addition, to further reduce the dependence of the community on the wetland other income generating activities such as coffee growing, tea growing, poultry, piggery and cattle rearing should be introduced in the communities.

3. The study recommends regular sensitisation and community mobilization campaigns to maintain and improve the current perceptions about the CBWMP by the local leaders and government wetland officials.

4. Further research should be undertaken on impacts of agricultural practices such as the use of fertilizers in order to enhance sustainable utilisation of Lake Mulehe wetland

5. In addition, a study should be conducted to investigate the fate of the fauna components within lake Mulehe wetland amidst increased pressures from the surrounding communities

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APPENDICES

APPENDIX 1: DOCUMENT ANALYSIS CHECKLIST

This checklist is intended to review literature related toimpact of community-based wetland management plans on conservation of wetlands in Nyundo and Nyakabande sub-county. The literaturereview will be informed by the following aspects:

1) Are there any limitations/gaps of the theoretical base provided in this literature?
2) Are there developments or limitations in the methodologies used for researching impacts of community based wetland management plans?
3) How will our own research draw on insights from methodologies or make use of methods used by previous studies?
4) How does this current study make reference to findings of previous studies?
5) How will this article being reviewed contribute to the evidence base that I am drawing upon?
6) How will this research draw upon its critique of relevant research, methods, theory, or interpretation of findings?
7) How does this article being reviewed contribute to the general understanding of issues relevant to this research?"
8) Will this study be able to replicate the work or test out an aspect of the research for the befit of this study?
9) Can we build further on this research in a particular way?
10) Can we illustrate a point that we are trying to make about community based wetland management plans
11) How will this literature support or contradict, our own findings or conclusions

APPENDIX 2: QUESTIONNAIRE

A. BACKGROUND INFORMATION

1. Age: …….

2. Sex: (a) Male (b) Female

3. Highest level of Education attained:

(a). None (b). Primary (c). Secondary (d) Tertiary

4. Marital status

(a) Single (b) Married (c) Divorced/separated (d). Widowed

5. Household Size in numbers……..

6. Major Occupation

a) Trade b) Government employed c) Fishing d) Agricultural activities e) Wetland activity. f) Other…….

7. Distance from home to the wetland in Kilometers…….

B. COMMUNITY INTEREST TOWARDS WETLAND CONSERVATION

1. What are your feelings towards wetlands conservation?
(a) Good to conserve (b) Waste of land (c) Denies benefits for local people
(d) Should allow access to resources (e) Other…….
2. Has the presence of L Mulehe CBWMP improved your attitude towards wetland conservation to be more positive than negative?
(a) Yes (b) No
3. Do you think the wetland conservation campaigns are beneficial in any way?
(a) Yes (b) No (c) I do not know
4. If yes, why are wetland conservation campaigns useful?
(a) ……..
(b) ……..
(c)……...
(d)…….

5. If no, why are wetlands conservation campaigns not useful?
(a) ……
(b)…….
(c)…….
(d)……...

6. Do you think people should be stopped from draining wetlands?
(a) Yes (b) No
7. If yes, how do you think people can be stopped from draining wetlands?
a) By-laws b) Community management planning c) Gazzetement
d) Police e) Other……
8. "Wetlands are not and cannot be owned by any person or individual" Do you agree to this statement?
(a) Yes (b) No
9. Why do people reclaim wetlands? (Tick where applicable)

a) Poverty b) Wetlands are fertile c) Drought d) Free land e) Other……
10. Do you participate in wetland conservation measures?
(a) Yes (b) No
11. If, Yes which activity do you participate in?
a) Wetland education b) Monitoring c) resource propagation d) Soil Conservation

e) Other……
12. Which major problem do you face in carrying out this activity?
(a) Lack of funds (b) Uncooperative members
(b) Lack of time (c) Any other Specify……...
33. Does the problem in 32 above affect your feelings on wetland conservation?
(a) Yes (b) No
13. Who should own wetlands?
(a) Government (b) Local government (c) Community (d) Individuals

D. CONSERVATION STATUS OF L. MULEHEWETLAND

1. What is the status of wetland resources in your area?

Status of Wetland Resources	**Coverage/population Before Intervention**	**Current coverage/population**	**Perceived Reason**
	Tick in the box of your choice		
Plants			
Papyrus	High	High	
	Low	Low	
	Reducing	Reducing	
Palms	High	High	
	Low	Low	
	Reducing	Reducing	
Grass	High	High	
	Low	Low	
	Reducing	Reducing	
Wood	High	High	
	Low	Low	
	Reducing	Reducing	
Medicinal herbs	High	High	
	Low	Low	
	Reducing	Reducing	
Animals			
Sitatunga	High	High	
	Low	Low	
	Reducing	Reducing	
Antelopes	High	High	
	Low	Low	
		Reducing	
Monkeys	High	High	
	Low	Low	
	Reducing	Reducing	
Wild pigs	High	High	
	Low	Low	
	Reducing	Reducing	
Snakes	High	High	
	Low	Low	
		Reducing	

Status of Wetland Resources	Coverage/population Before Intervention	Current coverage/population	Perceived Reason
	Tick in the box of your choice		
Birds	High	High	
	Low	Low	
	Reducing	Reducing	
Fish	High	High	
	Low	Low	
	Reducing	Reducing	
Water			
Water quantity	High	High	
	Low	Low	
	Reducing	Reducing	
Water levels	High	High	
	Low	Low	
	Reducing	Reducing	

2. What are the major drivers of degradation in L. Mulehe wetland system?

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3. How can the degradation be reduced?

APPENDIX 3: INTERVIEW GUIDE

Interests towards Conservation

1. Do you think that the presence of L Mulehe CBWMP has improved people's attitude towards wetland conservation to be more positive than negative?
2. Can you gauge the feelings of the communities towards wetland conservation where L Mulehe CBWMP have been implemented?
3. On a scale of 0-100% how would you rate the success of L Mulehe CBWMP on change of attitudes?
4. How do communities perceive being stopped from draining wetlands now days?
5. Do you think people can be stopped from wetland drainage and they take it well?
6. Do communities understand that wetlands cannot be owned by individuals and do they respect this?
7. Do communities willingly participate in wetlands conservation activities?
8. Which activities do they participate in?
9. Which major problem do you face in carrying out behavioral change activities in the communities?
10. What are the negative impacts on the non-participating community members?

Conservation status of L Mulehewetland

What is your comment on the status of the following wetland resources in L Mulehe wetland as compared to the period before L Mulehe CBWMP was implemented? Give comments like Low, high, increasing, not sure among others. Please accompany your comment with reasons why?

Plants

1. Papyrus
2. Palms
3. Grass
4. Wood/trees
5. Medicinal herbs

Animals

1. Sitatunga
2. Antelopes
3. Monkeys
4. Wild pigs
5. Snakes
6. Birds
7. Fish

Water

1. Water quality
2. Water levels

APPENDIX 4: STUDY RESPONDENT CONSENT FORMS

District	Parish	Village	HH No.
Category	**Adult**		

Introduction
Hello Sir/ Madam! My name is……. I am a Researcher from Kyambogo University and I am undertaking research on **IMPACT OF IMPLEMENTATION OF COMMUNITY-BASED WETLAND MANAGEMENT PLAN ON THE CONSERVATION OF L. MULEHE WETLANDS IN KISORO DISTRICT, UGANDA.**

Purpose
The purpose of the study is to examine the impact of community-based wetland management plans (CBWMP) on conservation of L. Mulehe wetlands in Kisoro district, South Western, Uganda. The findings of the study will contribute to conservation of Lake Mulehe Wetland.

Why have you been chosen?
The study respondents are members of the community that lives around Lake Mulehe wetland and you are one of them.

What will happen if you agree to take part?
If you agree to participate you will be asked a number of questions about yourself, and your opinion on several aspects regarding conservation of Lake Mulehe wetland.

Benefits in taking part in the Study
The information obtained from this study will inform future conservation efforts of Lake Mulehe wetland

Risks
There are no anticipated risks to you.

Data Protection (Will my participation be confidential?)
The information you provide will be held in strict confidence and your name will not be recorded on the form containing the information you have provided. The data will only be used for the purpose of this study. Only the research team will have access to your information. All files containing any personal data will be made anonymous during data processing.

Do you have any questions relating to the study?
0 = No, 1= Yes *[if yes, respond to questions raised].*

If you have further questions, need clarification or have concerns during the research, please contact:

The Main Researcher

Ms Joan Birungi
Student of Kyambogo University
Contact: 0782619492

Do you agree to participate in the study?
0 = No [Thank the person and leave], 1= Yes [Thank the person and continue to the section below]

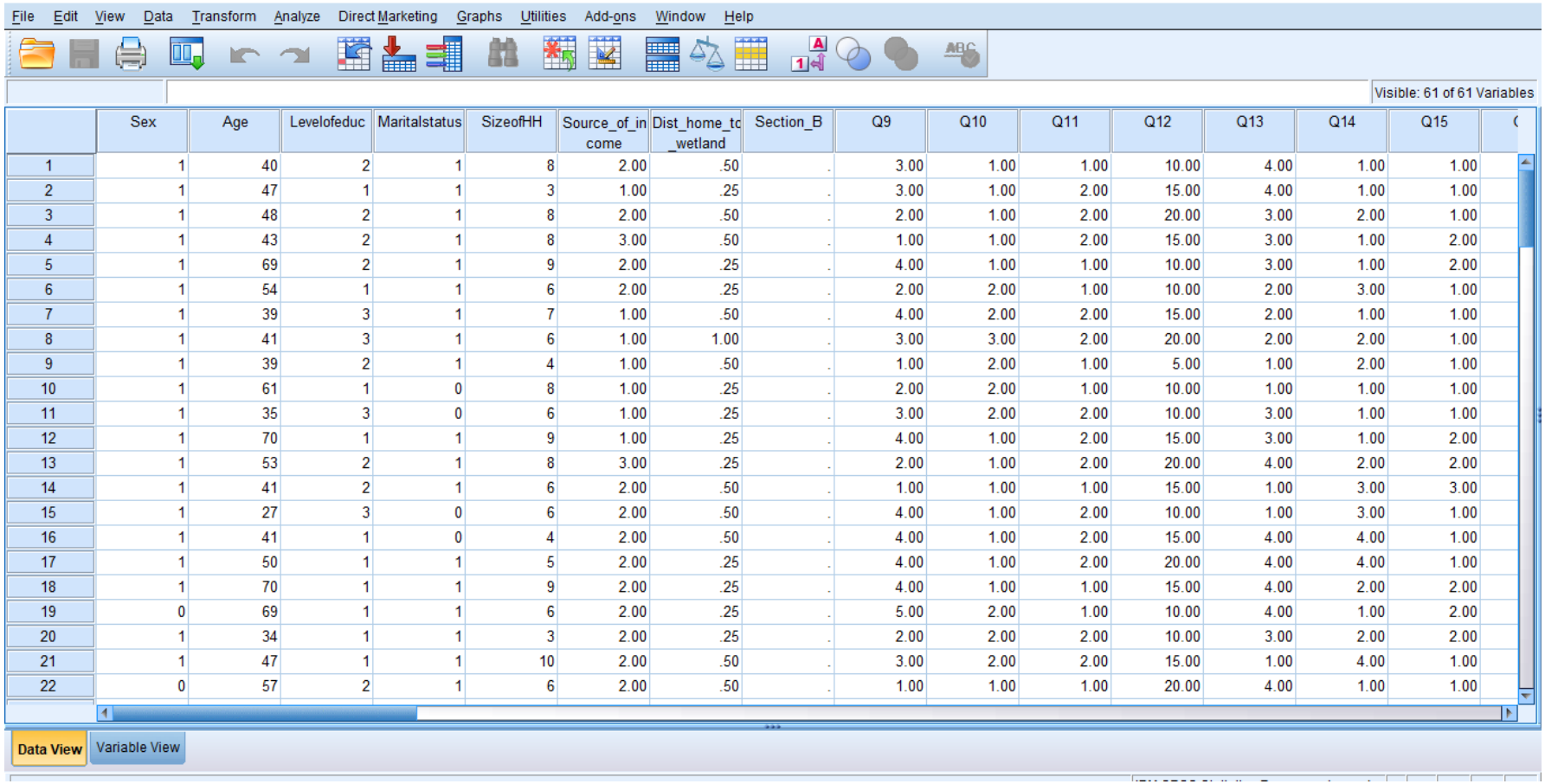
Acceptance. *Please tick the box (es) if you agree with the statement(s):*

I have read /the information has been read to me and I have understood the information sheet and have had the opportunity to ask questions about the study.

I agree to take part in this research project and agree for my data to be used for the purpose of this study

No
Yes

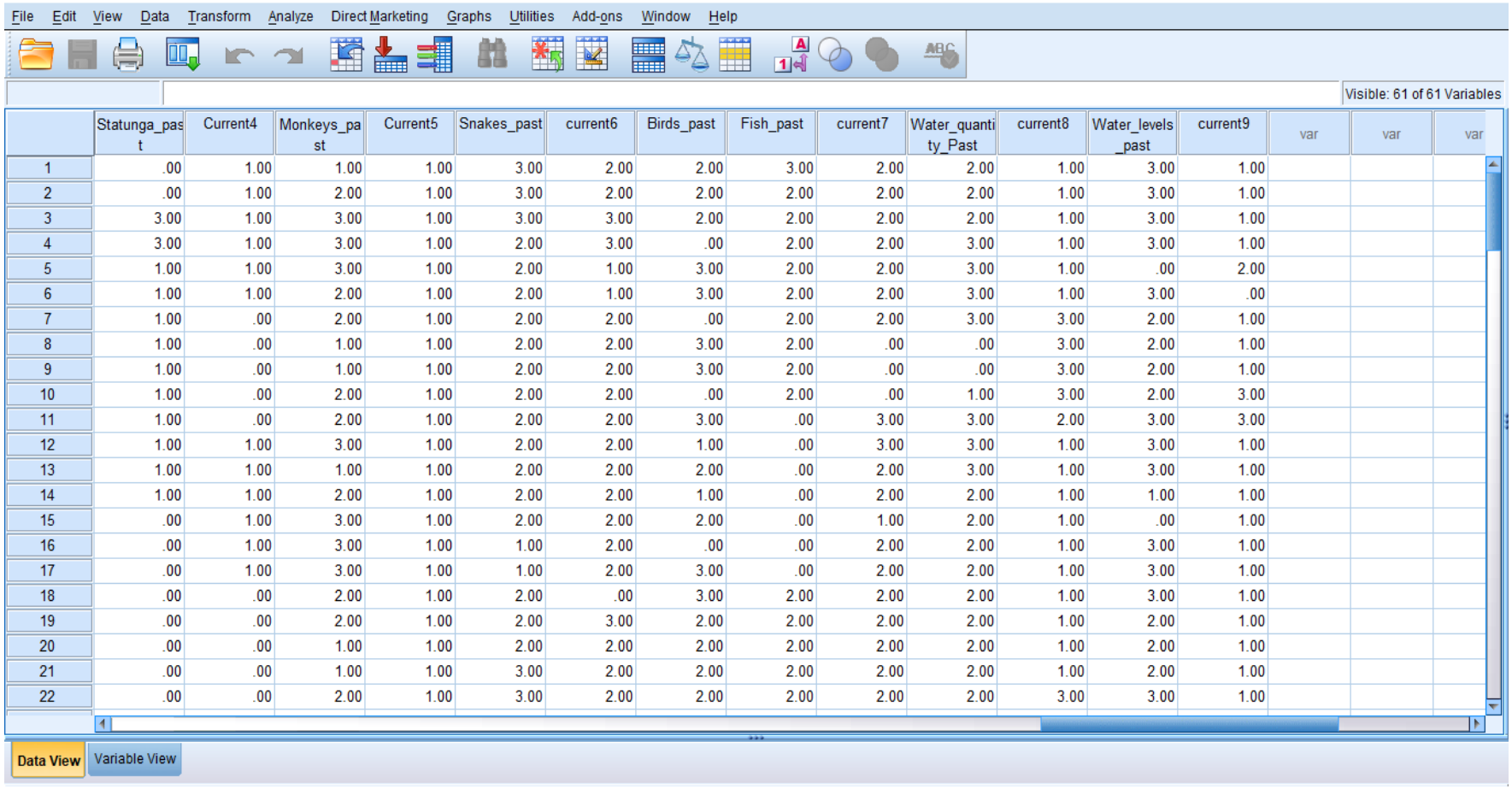
APPENDIX 5: SAMPLE OF THE SPSS DATA


File Edit View Data Transform Analyze Direct Marketing Graphs Utilities Add-ons Window Help

Visible: 61 of 61 Variables

	Sex	Age	Levelofeduc	Maritalstatus	SizeofHH	Source_of_income	Dist_home_to_wetland	Section_B	Q9	Q10	Q11	Q12	Q13	Q14	Q15
1	1	40	2	1	8	2.00	.50	.	3.00	1.00	1.00	10.00	4.00	1.00	1.00
2	1	47	1	1	3	1.00	.25	.	3.00	1.00	2.00	15.00	4.00	1.00	1.00
3	1	48	2	1	8	2.00	.50	.	2.00	1.00	2.00	20.00	3.00	2.00	1.00
4	1	43	2	1	8	3.00	.50	.	1.00	1.00	2.00	15.00	3.00	1.00	2.00
5	1	69	2	1	9	2.00	.25	.	4.00	1.00	1.00	10.00	3.00	1.00	2.00
6	1	54	1	1	6	2.00	.25	.	2.00	2.00	1.00	10.00	2.00	3.00	1.00
7	1	39	3	1	7	1.00	.50	.	4.00	2.00	2.00	15.00	2.00	1.00	1.00
8	1	41	3	1	6	1.00	1.00	.	3.00	3.00	2.00	20.00	2.00	2.00	1.00
9	1	39	2	1	4	1.00	.50	.	1.00	2.00	1.00	5.00	1.00	2.00	1.00
10	1	61	1	0	8	1.00	.25	.	2.00	2.00	1.00	10.00	1.00	1.00	1.00
11	1	35	3	0	6	1.00	.25	.	3.00	2.00	2.00	10.00	3.00	1.00	1.00
12	1	70	1	1	9	1.00	.25	.	4.00	1.00	2.00	15.00	3.00	1.00	2.00
13	1	53	2	1	8	3.00	.25	.	2.00	1.00	2.00	20.00	4.00	2.00	2.00
14	1	41	2	1	6	2.00	.50	.	1.00	1.00	1.00	15.00	1.00	3.00	3.00
15	1	27	3	0	6	2.00	.50	.	4.00	1.00	2.00	10.00	1.00	3.00	1.00
16	1	41	1	0	4	2.00	.50	.	4.00	1.00	2.00	15.00	4.00	4.00	1.00
17	1	50	1	1	5	2.00	.25	.	4.00	1.00	2.00	20.00	4.00	4.00	1.00
18	1	70	1	1	9	2.00	.25	.	4.00	1.00	1.00	15.00	4.00	2.00	2.00
19	0	69	1	1	6	2.00	.25	.	5.00	2.00	1.00	10.00	4.00	1.00	2.00
20	1	34	1	1	3	2.00	.25	.	2.00	2.00	2.00	10.00	3.00	2.00	2.00
21	1	47	1	1	10	2.00	.50	.	3.00	2.00	2.00	15.00	1.00	4.00	1.00
22	0	57	2	1	6	2.00	.50	.	1.00	1.00	1.00	20.00	4.00	1.00	1.00

Data View Variable View



	Statunga_past	Current4	Monkeys_past	Current5	Snakes_past	current6	Birds_past	Fish_past	current7	Water_quantity_Past	current8	Water_levels_past	current9	var	var	var
1	.00	1.00	1.00	1.00	3.00	2.00	2.00	3.00	2.00	2.00	1.00	3.00	1.00			
2	.00	1.00	2.00	1.00	3.00	2.00	2.00	2.00	2.00	2.00	1.00	3.00	1.00			
3	3.00	1.00	3.00	1.00	3.00	3.00	2.00	2.00	2.00	2.00	1.00	3.00	1.00			
4	3.00	1.00	3.00	1.00	2.00	3.00	.00	2.00	2.00	3.00	1.00	3.00	1.00			
5	1.00	1.00	3.00	1.00	2.00	1.00	3.00	2.00	2.00	3.00	1.00	.00	2.00			
6	1.00	1.00	2.00	1.00	2.00	1.00	3.00	2.00	2.00	3.00	1.00	3.00	.00			
7	1.00	.00	2.00	1.00	2.00	2.00	.00	2.00	2.00	3.00	3.00	2.00	1.00			
8	1.00	.00	1.00	1.00	2.00	2.00	3.00	2.00	.00	.00	3.00	2.00	1.00			
9	1.00	.00	1.00	1.00	2.00	2.00	3.00	2.00	.00	.00	3.00	2.00	1.00			
10	1.00	.00	2.00	1.00	2.00	2.00	.00	2.00	.00	1.00	3.00	2.00	3.00			
11	1.00	.00	2.00	1.00	2.00	2.00	3.00	.00	3.00	3.00	2.00	3.00	3.00			
12	1.00	1.00	3.00	1.00	2.00	2.00	1.00	.00	3.00	3.00	1.00	3.00	1.00			
13	1.00	1.00	1.00	1.00	2.00	2.00	2.00	.00	2.00	3.00	1.00	3.00	1.00			
14	1.00	1.00	2.00	1.00	2.00	2.00	1.00	.00	2.00	2.00	1.00	1.00	1.00			
15	.00	1.00	3.00	1.00	2.00	2.00	2.00	.00	1.00	2.00	1.00	.00	1.00			
16	.00	1.00	3.00	1.00	1.00	2.00	.00	.00	2.00	2.00	1.00	3.00	1.00			
17	.00	1.00	3.00	1.00	1.00	2.00	3.00	.00	2.00	2.00	1.00	3.00	1.00			
18	.00	.00	2.00	1.00	2.00	.00	3.00	2.00	2.00	2.00	1.00	3.00	1.00			
19	.00	.00	2.00	1.00	2.00	3.00	2.00	2.00	2.00	2.00	1.00	2.00	1.00			
20	.00	.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	2.00	1.00			
21	.00	.00	1.00	1.00	3.00	2.00	2.00	2.00	2.00	2.00	1.00	2.00	1.00			
22	.00	.00	2.00	1.00	3.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	1.00			