

**THE ROLE OF HUMAN ACTIVITIES ON
WETLAND DEGRADATION.**

**A CASE STUDY OF MURAMBI WETLAND IN BUTARE
PARISH, NTUNGAMO SUB COUNTY, NTUNGAMO
DISTRICT IN UGANDA**

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15TH JANUARY 2007.

DECLARATION.


I, Ephraim. Boona, hereby declare to the best of my knowledge that this dissertation is my original work. It has never been published or submitted to any university or any other institution of higher learning for any academic purpose. The literature and citations from other people's work has been fully referenced and acknowledged in this dissertation.

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APPROVAL.

This is to certify that dissertation entitled “The role of human activities on wetlands Degradation,” a case study of Murambi wetland in Butare parish, Ntungamo sub-county, Ntungamo district in western Uganda, has been approved.

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Date ...20/09/07

DEDICATION.

I dedicate this dissertation to my beloved parents, who played a very great role in facilitating me throughout my entire education. To my brothers and sisters who also gave me the moral support to pursue my studies up to the University level.

ACKNOWLEDGEMENT.

I sincerely wish to thank my supervisor Ms. Anne Tumushabe for her wonderful guidance throughout my research process. Many thanks also go to my friends and classmates who helped me a lot in the correction of mistakes in my research proposal and report.

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Lastly I owe many thanks to each and every person who in one way or the other assisted me in accomplishing my research.

LIST OF ACRONYMS.

C.B.Os	Community Based Organizations.
E.I.A.	Environmental Impact Assessment.
G.I.S.	Geographical Information System.
MWLE	Ministry of Water Lands and Environment.
N.E.I.C.	National Environment Information Centre.
NEMA	National Environmental Management Authority.
N.G.O	Non Governmental Organizations.
N.R.C.	National Resource Centre.
N.W.P.	National Wetlands Programme.
S.O.E.R.	State of the Environment Report.

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ABSTRACT.

A research study on the role of human activities on wetlands degradation was undertaken on Murambi wetland, Butare parish, Ntungamo sub-county in Ntungamo district of western Uganda.

The objectives of the study were to identify the different human activities being carried out around Murambi wetlands, to find out the effects of human activities on the wetland and to find out what has been done to minimize the impacts of human activities on Murambi wetland. The geographical scope of the study was limited to Murambi wetland.

The methods used included the determination of the sample size, data collection methods and instruments. The sample size was 60 respondents, drawn from the 6 villages which surround the wetland. The data collection methods were: - use of questionnaires and interview guide for the interview of key informants. Secondary data were collected through review of relevant literature.

The study revealed that the main human activities being undertaken in and around Murambi wetland include; crop farming, papyrus harvesting, livestock grazing, tree planting and the establishment of re-creational activities. Crop farming was found to be the most prevalent human activity, followed by papyrus harvesting. Establishment of re-creational activities was found by the study to be the least practiced human activity on the wetland, leading to loss of Bio diversity and soil erosion.

The study revealed that no effort has been done by either the local community or the local leadership or by the conservation agencies. The study therefore recommends a number of ways, which can be used to reduce the effects of the human activities on the wetland. These include; the creation of public awareness and the education on the importance of conserving wetlands, the reallocation of some human activities to areas away from the wetland and the implementation of wetland conservation policies and regulation

CHAPTER ONE.

1.0 INTRODUCTION.

1.1 Background of the study.

Wetlands are unique ecosystems that combine both the terrestrial and aquatic characteristics regardless of their nature and size. Wetlands play vital roles that range from biodiversity conservation, environmental protection to biomass production. In addition, wetlands provide man with a wide range of handicraft and building materials, food and medicinal plants as well as clean sources of water. Fish and some bird species inhabiting wetlands are also cheap sources of protein food to man. Biodiversity and other forms of natural resources found in wetlands vary comparatively from one climatic region to another across the world.

Wetlands are regarded as environmentally sensitive areas, due to their critical dependence on both land and substantial amounts of water. Wetlands are naturally water logged; therefore any drop in water levels would immensely destroy the fragile wetland ecosystem. On the other hand when water levels rise beyond the absorptive capacities of wetlands most of the plant and animal life would be affected.

As human populations in the world continue to grow, current land under cultivation becomes unable to supply the food and other resources necessary to support the rising population. The diminishing available land together with the growing trend of climatic change that brings prolonged drought has reduced crop yields. Man has been forced therefore to encroach on forest and wetland ecosystems. Human activities emerge as the most important impact on wetlands today. The increasing scale of human activities induced by the rising human population and climatic changes worldwide has prompted a search for various approaches to minimize wetland degradation.

It is upon these backgrounds therefore, that the researcher has been inspired to carry out a study in Murambi wetland, Butare parish, Ntungamo district.

1.2 Statement of the problem.

Wetland degradation has increased rapidly in this century. The degradation of wetlands often have adverse and unforeseen long-term costs to the government, although extraction industries and local communities exploiting wetland resources often at unsustainable levels realize short term socio-economic benefits. Wetland degradation does not only result into threats to the species' habitats but also to human beings. The pollution of wetlands through agro-chemicals, the compaction of wetland soils and removal of wetland vegetation largely results into poisoning of wetland fauna and flora as well as the disabling of the wetland water purification and retention capacities. The poor quality water can also pre-dispose human beings to a wide range of waterborne diseases.

Murambi wetland in Butare parish, Ntungamo sub-county in Ntungamo district where the study was based, portrays most of the characteristics of a degraded wetland. The quality of water is not as good as it used to be many years ago. The wetland vegetation has been adversely removed and the abundance of wildlife in this wetland has been reduced significantly. This is a challenge that needs an immediate attention from the local community and the Ntungamo Sub-county council. This attention should focus on the need to find reliable wetland management strategies so as to reduce the level of degradation the wetland.

1.3 Objectives of the study.

- (a) To identify the different human activities being carried out around Murambi wetland.
- (b) To find out the effects of human activities on Murambi wetland.
- (c) To find out what has been done to minimize the impacts of human activities on Murambi wetland.

1.4 Research question

- What are the different human activities being carried out around Murambi Wetland?

- What are the effects of human activities on Murambi Wetland?
- What are the some of the measures which have been undertaken to minimize the degradation of Murambi Wetland?

1.5 Scope of the study.

The geographical scope of this study was confined to Murambi wetland in Butare parish, Ntungamo sub-county in Ntungamo district of Uganda.

The study primarily focused on the identification of the various human activities around Murambi wetland, their impacts to the wetland as well as local efforts to curb the problem. The study then advanced further measures to control the degradation of Murambi wetland.

1.6 Significance of the study.

The study was of great significance to the various stakeholders. These stakeholders were the wetland conservation agencies, the local community, environmentalists and the National Environmental Management Authority (NEMA). The study was of particular importance to the decision making and implementation of sound wetland conservation strategies. Basing on the study findings, the local community can also be able to acknowledge the level of impacts of which their various activities have had on Murambi wetland. This way, they can be influenced to control their activities, hence minimize impacts on the wetland, for their good as well as that of their future generations.

CHAPTER TWO.

2.0 Literature Review.

2.1 Introduction

It is prudent to note that research studies of this nature have been undertaken by other scholars around the World. This chapter therefore, deals with the review of other related information about wetlands, human impacts on them and policy measures that have been put in place to control such human induced impacts on wetlands.

The growth of the human population and our economic activities has brought us face to face with the limits set by the natural environment. The danger of permanent environmental damage has successively increased.

2.2 The value for wetlands.

A 1981 study of the large wetlands around Long Point, Lake Erie, Ontario, used contingent valuation to measure the annual net recreation benefits received by Canadians who use these wetlands (Kreutzwiser, 1981). Contingent valuation measures what people are willing to pay over and above expenditures made by recreational users of the wetlands.

The study found that recreational users spent US.\$119,000 (CDN.\$215,906 in 1999), in total to receive wetland benefits that were estimated to have a contingent value of US.\$213,000 (CDN.\$386,000 in 1999), per year. This implies that, for every dollar users spent they received US. \$1.79 in benefits-a net return of 179%.

This case shows that expenditures are not measures of economic value, but rather of the cost of attaining certain benefits. The study also illustrates that using expenditures as a proxy for estimating benefits can lead to a gross underestimation of these benefits.

Recreational use of the Long Point wetlands represents just one of the many benefits of these wetlands. Other benefits include wildlife production, nutrient retention, ground water recharge/ discharge, etc.

Lake Chad is a shallow lake that expands dramatically with seasonal floods, providing a vital refuge for birds migrating between the Pale-arctic and Afro-tropical realms and for resident animals. Up to 1 million water birds congregate on the lake especially during the pale-arctic winter period. An estimated 20 million people rely on this lake for their economic activities, a figure that is projected to rise to 35 million people by the year 2020 (World Bank, 2000). In terms of bio-diversity features, this eco-region has a high biological importance for the large numbers of migrant birds that use the area, especially the ducks and waders that spend the pale-arctic winter period in Africa. Seventeen species of water fowls and 49 other wetland bird species are recorded, and abundance varies in different years with the size of the lake and wetlands conditions elsewhere in West Africa (Roux and Jarry, 1984). The most abundant bird is the wader ruff (*philomachus pugnax*), with more than 61 million seen on the lake at one time (Keith and Plowes 1997). In the Hadejia-Nguru wetlands of lake Chad, according to Scott and Rose, (1996), the most common water birds are the white-faced whistling duck (*Dendrocygna viduata*), northern pintail (*Anas acuta*), and ruff (*philomachus pugnax*).

Wetland margins and especially the margins of seasonal wetlands have long been used for crop cultivation in times of drought and/or hardship. However, there remains a large untapped potential for sustainable agricultural production in Uganda when the wetlands are cultivated without drainage. Cultivation without drainage not only helps to ensure the conservation of soil moisture, quality and structure but also maintains the underlying wetland services described in the next section.

Some seasonal wetland margins have been used traditionally for grazing of livestock in addition to arable crop production and for water supply. However, these traditional uses will

become unsustainable as the number of people involved in these practices increases; what was once sustainable becomes destructive as population continues to increase while land resources remain constant.

If wetland margins are used wisely without drainage, they are capable of supplying us with water, food and raw materials for many decades to come.

Two crops in particular are currently hot issues in wetland management-rice and yams. Both are tolerant of waterlogged conditions and grow well in wetlands without the need for significant drainage.

Obviously the natural vegetation is destroyed in the areas cultivated but so long as the entire wetland is not converted to these crops then, in principle, they are not bad for wetlands. But, the suitability of cultivating these crops should be assessed on a wetland by wetland basis; they will not be a wise use in all wetlands. The present cultivation of yams in the highly polluted water of Nakivubo wetland is a case in point. The wholesale carpeting of some wetland valleys in Pallisa is also inappropriate since little or not natural wetland remains in direct contravention of the wetland policy

The grazing of cattle in seasonal wetlands during the dry season is a traditional communal use of these areas and occurs widely in Uganda but especially in Sembabule, Nakasongola districts and the Teso areas. Grazing can have both positive and negative effects on the services or indirect benefits of wetlands. On the one hand light grazing can increase grass production and help fertilise the soils; in contrast, overgrazing can lead to soil erosion by trampling and removal of the vegetation cover; it also leads to the replacement of palatable grass species by unpalatable species making further grazing impossible.

Excessive numbers of cattle also produce well defined and deep trails or gullies and depends them further. This loss of water from the wetland results in drying of the wetland and its unintentional conversion of dry land.

While many pastoralists graze their animals directly on the lush vegetation of wetland margins other cattle owners harvest fodder for stall-fed livestock or zero-grazing. Forage materials include leaves, seeds, seed pods and fruits and occasionally bark from trees.

Wetland forage is an important economic resource when one considers the shortage of dry land grazing areas in some parts of the country and the importance of cattle to some communities and ethnic groups especially during dry years and dry seasons. These wetlands provide refuge, forage and water year round and act like desert oases for pastoralists and their livestock.

Wetland fishing provides a plentiful supply of catfish (*Clarias emmale*) and lungfish (*Protopterus mamba*) and an abundance of smaller *Haplochromis* (Nkegye). The importance and potential of wetlands as a valuable fisheries resource must not be underestimated. Wetlands not only provide fish in the wetlands themselves, but also contribute substantially to the production of fish biomass in open water areas of adjoining lakes and rivers. This is because they are important breeding and nursery grounds for a majority of commercially important fish species including tilapia (*Oreochromis niloticus*) and Nile perch (*Lates niloticus*).

As long as enough fish are left to grow and breed to replace the ones that are eaten, this source of protein will remain for today and for our future generations. This is sustainable harvesting and is a good example of the 'wise-use' of wetland natural resources. Excessive fishing and the use of nets or traps which capture small or juvenile fish will result in the collapse of the fishery and economic loss to those responsible for the over fishing. This has happened in lake Mutanda and Muhele in Kisoro.

Fishing resources also decline when shallow water areas used by fish for breeding and nursery grounds are lost when the shoreline is converted to agriculture. We need to ask, "Are the benefits gained by conversion greater than those derived from the fishery destroyed?" often the answer is not known or the question never asked.

Wetland fisheries provide, free of charge, an important supply of food to those who would be unable to afford animal protein from other sources. Obviously the drainage of wetlands will reduce the available fish stocks. Even without drainage rice cultivation in the seasonal wetlands of Pallisa has reduced the catches of lungfish and catfish much to the concern of local people.

Fishponds are artificial or constructed wetlands. It seems natural to assume that wetlands are a good place to construct fishponds- fish normally live there and there is plenty of water.

However, wetlands are not ideal sites for fish ponds since the ponds may be subject to flooding, they cannot be drained to assist in harvesting or pond hygiene, and predators from the wetland can become problem e.g. otters, herons and pelicans. Fishponds are best sited above the normal flood level of a wetland and supplied with spring water flowing from the surrounding catchments. The arrangement allows a continuous flow of water through the pond and for drainage of the pond to harvest fish and control disease. With water control a rotation of fish and arable crops can be cultivated in the same pond area and the yields of both crops increased. A further fish production option is the cage culture of fish in the open waters of larger permanent wetlands but there is no experience of this technique here in Uganda yet.

Wetlands provide varied habitats for a wide range of animals and plants. Wildlife species, including sitatunga, water bucks, hippopotamus and birds, are hunted for their meat, skin, horns or feathers, while other animals produce resources that are gathered e.g. honey from bees, eggs and feathers from birds. Like all harvested resources they have a commercial value but are also consumed or used directly by the household, e.g. wild meat, honey, and eggs. As with most wetlands products the real economic value of the annual harvest of wildlife resources in wetlands should be conserved and wisely exploited to retain the economic and environmental benefits to local people. Over-harvesting will benefit no one in the long run. The hunting of wetland animals continues in Uganda despite legal restrictions. However, limited hunting using methods that are not destructive to the habitat would be a wise use of wetlands if properly legalized, controlled and regulated.

It should not be forgotten that the wildlife resources of wetlands have economic potential in the tourism industry –though this potential for tourism should not be overestimated in wetland areas that are outside the existing national parks and other reserves. It takes more than one sitatunga or crowned crane to support a thriving tourism industry. Wildlife resources also enhance the biodiversity and genetic resources of Uganda.

Some wetlands contain potential energy sources for human use, mainly in the form of fuel for

cooking. Wetland woody vegetation is used mostly for fuel but papyrus is also used in some areas. Elsewhere in the world peat is a major source of heat.

Peat is the remains of dead plants that have failed to decay. This failure is due to environmental conditions occurring in some wetlands especially where there is high acidity, low nutrient levels and anaerobic conditions. The microbes that normally oxidize the plant material cannot survive so the plant remains accumulate and over time are transformed into peat. Peat formation is very slow and its exploitation is not sustainable and causes considerable damage to the environment and to the services wetlands provide. The burning of peat releases much carbon dioxide into the atmosphere and this will contribute to global warming. It is estimated that Uganda has about 1.4 million hectares of peat land and although utilizing this resource for fuel would temporarily alleviate pressure on fuel wood in some areas, the environmental and economic impacts would be substantial and probably not cost effective.

There is now a rising scarcity of fuel wood countrywide and some families are reducing the number of meals per day while others are reduced to using sorghum stalks for cooking for example in Kabaale areas of Uganda.

2.3 Human activities and wetland degradation.

During the 1950s to the mid 1970s, an average of 550,000 acres of wetlands globally was lost each year (Office of Technology Assessment, 1984). Agriculture accounted for more than 80% of these losses (Frayer, 1983). Since the 1970s, though, there has been increasing scientific awareness that wetlands are valuable areas that provide important environmental functions and are the most productive ecosystems in the world comparable to rainforests and coral reefs. They are critical to the ecology of watersheds, improve water quality and reduce floods.

The US. Geographical survey made a research on the variety of common names of wetlands-marshes, swamps, potholes, bogs, fen, and pocosions. Wetlands are found in almost all the continents except the Antarctica. These wetlands fall into general categories such as; the

coastal (tidal) and the inland (non-tidal).

The lower 48 states of the US converted an estimated 103.3 million acres of wetlands in the mid 1980s-an area almost the size of California (Dahl and Johnson, 1991). This compares to 220 million acres of wetland found in the same area in the 1600s. Thus over half of the US original wetlands have been converted since then. At least six of the states lost 85% of their wetlands while 22 states lost 50%. (Dahl, 1996). In addition to more wetlands that have been completely lost, others have just been degraded by chemical contamination and excessive nutrients, fertilizers and sediments flowing into them. The increase in flood damages, drought damages and the declining bird populations are in part the results of wetland degradation and destruction (Roberta Y.H, 1998).

In Nigeria, conflicts arise between resource developers and conservationists due to a lack of standardization, inadequate legislation, non-enforcement of legal provision where they exist, plain ignorance or disregard for other users, as well as myopic planning of projects (Dore, 1983). For instance, apart from the creation of ecological imbalance, the Kainji Lake project submerged old Bussa and neighboring communities, displacing about 44,000 people while Tiga Dam displaced 12,000, Bakolori 14,000 and Goronyo 20,000. Moreover, Daddy (1987), in his review, confirmed that while other politically more powerful, inhabitants displaced by the Kainji dam were residentially and professionally taken care of, the nomads were not considered, thus the subsequent increased value of land resulted in constant conflicts between land users, which in some cases resulted in deaths. For instance, with ever increasing effort to restrict cattle movement into the Kainji Reserved Areas, more arrests is made each year because the traditional routes and grazing areas of the nomads have been taken up by the development of the hydro-electric power project. Thus the herders are always prepared to take the risk and infiltrate into the reserved areas for the survival of their animals. The wetland areas are the most affected by these herders.

The construction of dams forces deprives the downstream floodplain of the annual flooding and that forces farmers onto marginal lands, and in some cases causes nomads to graze their

animals on smaller areas of floodplain pasture, leading in turn to overgrazing, rising livestock mortality and emigration of many herding communities into surrounding arid rangelands where the degradation continues (Dugan, 1989). Under these circumstances conservation activities are usually limited. To resolve this problem, there is need to precisely analyze and identify impacts of these man-induced hydrological perturbations and address them accordingly.

The conflicts highlighted above are resolvable when conservation efforts are linked to the overall development of the available resources. To achieve this, however, the conservation community will need to broaden its perspective and sustainable utilization of Nigerian aquatic resources, thus helping to maintain these ecosystems for both people and other bio-communities that depend on them.

Ugandan wetlands are under stress. As the population increase, people's expectations also increase the pressure on wetlands and their resources. Where there is poverty, meeting short-term, immediate personal needs (such as food, shelter, school fees), many priority over protecting attributes that provide long-term, indirect, general benefits such as water storage and recharge, micro climate regulation, biodiversity conservation. Where there is greed, temptations to exploit the development potential of the wetlands may prove too strong even where they entail degradation.

In urban areas particularly in Kampala, wetlands are the last free or cheap areas for infrastructure development. Many sections have been converted to industrial use or they have gradually been taken over by semi-slum residential housing and associated uses such as cultivation, waste disposal and 'jua kali commerce'. In rural areas, small but continuous nibbling at the edges has reduced wetland areas, but this is mainly restricted by seasonal wetlands.

In Eastern Uganda, almost all the seasonal wetlands valley bottoms fit for rice cultivation,

have been converted to that use, and in some parts of S. Western, large areas of wetlands have been converted to pasture for grazing and cultivation (MWLE, 2005). Never the less, the damage to permanent wetlands in rural areas is probably still relatively limited. Some natural protection from encroachment and whole sale drainage is afforded by inaccessibility and lack of sustainable drainage technology.

2.4 Sustainability and development of wetlands.

The U.S government and a wildlife conservation organization already have made a compact to undertake the actions called for in the UNEP report. The National Audubon Society and the U.S Army Corps of Engineers announced in march that they will work together to protect , restore and manage habitat that benefits birds and other wildlife. The Corps operations around the country include land and water resources vital to the birds and wildlife. This private non-profit group , with a more than 100-year history of conservation, will join with the Army Corps of Engineers to; encourage water management measures that benefit migratory and resident native birds, foster wetland protection and restoration, promote nonstructural flood protection to restore and maintain natural ecosystem functions and cooperate in public information and education efforts.

Achievement in the area of wetland protection or what has been done to minimize the human activities of wetland degradation.

In Uganda the national wetlands conservation and management programme was launched in 1989, to assist government in developing long term policy and necessary capacity to implement the policy (the wetlands policy 1995).

The long term- goal is conservation of Uganda wetlands and maintenance of their socio economic functions as well as ecological and biological values.

A study was commissioned in 1990 to determine the values of wetlands in addition to the assessment of the environmental and social impacts of previous wetland developments. At the launching of the wetland policy (1995), it was recommended that among other aspects that a comprehensive land policy at national level be formulated. In addition, this policy must be coordinated with other broad national policies such the national urban planning policy. At least eight pilot districts have been selected as the starting points to implement policy objectives on wetlands conservation. These are Tororo, Kabale, Bushenyi, Iganga, Kampala, Masaka, and Mpigi districts.

A number of seminars for wetland resource have been carried out for local communities, to make them aware of wetlands values and functions, and to introduce the “wise use” concept ,in some cases ,an action plan for the area would be developed .This was the case for Kitanga in Kibale and Kyojja in Masaka.in 1995,where the focus was on eco- tourism (SOER for Uganda 1984).

Also the national environment information centre (NEIC) and the national biomass project (NBP) are involved in the Uganda national wetlands inventory .The inventory included mapping the country’s wetland resources at 1:50,000 and making the information available in the geographical information systems (GIS) format (SOER for Uganda 1996)

The land act in clause 45(1) defines the “ownership” of wetlands by restating the contents of the constitutional article 237(2b) as quoted above. In clause 44, the land act clearly states how a land owner (with title) or occupiers must use the land or wetland as follows; “A person who owns or occupies land shall manage and utilize the land in accordance with the forest act, the mining act, the national environmental statute, 1995, the water statute 1995 and any other law”.

Environmental impact assessment .Anyone wishing to “develop” or modify a wetland is required to undertake an environmental impact assessment (EIA) if the area to be developed exceeds 0.25 hectares (50 by 50 meters).

An EIA aims to identify all environmental ,social and economic impacts are considered .An evaluation against the benefits of the existing situations ,the process is referred to as “cost benefit analysis” (National wetland programme 2001).

The Natural Resource Conservation scientists strongly recommend restoration as a means of wetland conservation. Restoration means returning an ecosystem to a close approximation of its condition prior to its disturbance. Accomplishing restoration means ensuring that ecosystem structures and functions are created or repaired and that natural dynamic ecosystem processes are operating effectively again (NRC, 19992). The N.R.C. scientists went on to say that restoration differs from creation (construction of a type of an ecosystem that is new to the site) and also from reclamation (modifying a natural ecosystem to a human use).

Restoration and creation of new wetlands can help to maintain the quality of wetlands and their surrounding ecosystems, while at the same time accommodating the human need for development. Although indications are that some replacement can be successful, full functional replacement has not yet been demonstrated. The more complex the hydrology and ecology of the ecosystem, the more difficult it is to restore. Complete restoration may indeed be impossible in some ecosystems such as bog and fens, due to their development for thousands of years (Kusler and Kentula, 1990). In general restoration is more likely to be successful than creation. Chances are that a restored wetland will persist longer than the created ones and due to the number of natural functions that must be manipulated in order to succeed.

CHAPTER THREE.

3.0 Study and research methodology

3.1 Study area

3.2 Location of study area.

The study was carried out in Murambi wetland, Butare parish Ntungamo sub-county, Ntungamo district in western part of Uganda.

Murambi wetland is approximately seven kilometers long and one kilometer wide. It is bordered by Ihunga sub-county to the west and Butare parish to the north.

3.1.2 Topography.

Murambi wetland is surrounded by six villages. These are Kadunga, Nyarujije, Kyamajumba all in Thunga parish and Kiziko, Munisa and Kyaracyerere in Butare parish.

Murambi wetland is flat but the bordering villages of Thunha parish are gently sloping. The northern side of the wetland (Butare parish) is hilly. There are rivers streams from the villages that end up in the wetland.

3.1.3 Ownership of land.

The people around the Murambi wetland own their land through freehold land ownership systems. However, the wetland itself is owned by the government under the department of the national wetland conservation.

3.1.4 Water sources.

The major sources of water to Murambi wetland and streams from the different villages Muriisa valley has a big stream which has a lot of water entering the wetland. There is also another stream flowing from Kiziko cell which enter the wetland in the middle of it. Other sources of water include: water from springs, wells and rain water, rainwater normally during the heavy rains increases the level of the water in Murambi wetland.

3.1.5 Vegetation and climate.

The area receives a fairly distributed rainfall that averages 1200 millimetres for year. Most parts of Ntungamo district have temperatures which range between 20°C-30°C.

The vegetation of the study area, is evergreen and are composed of wetland grasses, papyrus and phoenix palms. There are also alien species of trees such as eucalyptus crops such as maize, arrow roots and bananas can also be seen in and around the wetland, where the local community have encouraged.

3.2 Research Methodology.

3.2.1 Sample size and sample determination.

A sample of sixty respondents was selected. There are six villages surrounding Murambi wetland, Ten respondents were chosen per village.

Random sampling technique was used to determine the sample. In each village, a samples was made after 6 households and the youth, women and men were targeted equally. across the six villages.

Key respondents such as environmental field officers, local leaders and heads of NGOs and C.B.Os were interviewed as well as using interview guide. Focus groups composed of 15 people (Men and Women were also interviewed).

3.2.2 Data collection methods and instruments

3.2.2.1 Data collection methods

The study collected the primary and secondary data. The primary data was collected through the questionnaires respondents conducting interviews from key respondents as well as the researchers own observation. Photography also used to capture primary data.

Secondary data was collected through review of relevant information on the area of the study.

3.2.2.2 Data collection instruments

- **Questionnaires**

The questionnaires contained variables that it (questionnaires) has. They were distributed to selected respondents and the researcher administered these questionnaires to respondents for data analysis.

- **Photography**

A camera was used to capture special features of the study. The photographs were then used to support the primary data of the study.

- **Interview guide.**

An interview guide containing few questions to supplement on the questionnaire questions were used in the focus groups.

3.3 Data Analysis.

After the collection of all the primary and secondary data, analysis of data was done by use of qualitative and quantitative methods. Analyzed data was presented in the tabulation, pie charts and percentages as well as through distribution.

3.4 Anticipated problems.

The study is met a number of limitations which include; the unwillingness of the respondents to disseminate relevant information to the researcher. Some local people considered it unimportant and a waste of time. There was also the problem of finance. Money was not sufficient to buy the required materials as well as the transportation of the researcher between the area of study and to the different areas to meet respondents or collect secondary data.

CHAPTER FOUR.

PRESENTATION AND DISCUSSION OF RESEARCH FINDINGS

4.1 Introduction.

This chapter presents the findings of the study. The findings presented and discussed in this chapter includes; the various human activities undertaken around Murambi wetland and the effects which these activities have on the wetland. Analysis of data is based on the research objectives and the research questions are answered by these findings.

4.2 Main human activities in Murambi wetland

Identifying the different human activities being undertaken in Murambi wetland was one of the objectives of the study.

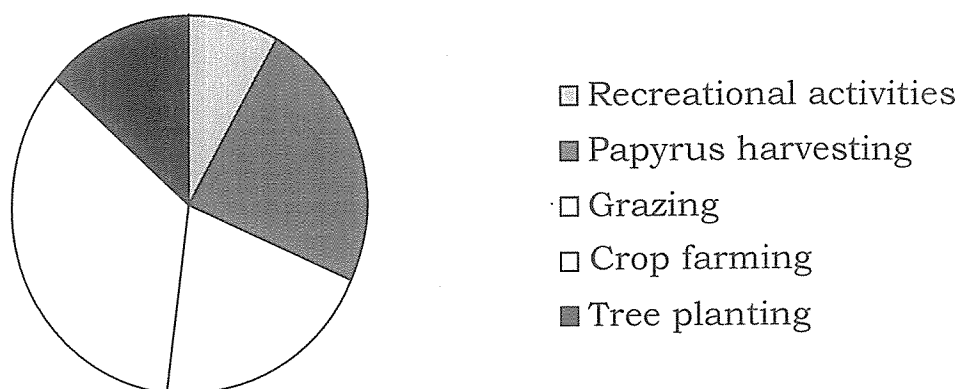
Through the questionnaire respondents, the views of those interviewed and the researcher's own observation, the study found out that, the main human activities being undertaken in the area of study are; papyrus harvesting, tree planting, crop farming, recreational activities and grazing livestock.

Table 1: Main human activities

Human activity	No. of respondents	Percentage (%)	Rank
Papyrus harvesting	14	23.3%	2
Grazing	12	20%	3
Crop farming	21	35%	1
Tree planting	8	13.4%	4
Re-creational activities	5	8.3	5
TOTAL	60	100%	

Source: From the field by researcher.

Figure a: Pie chart representation of table 1.



4.2.1 Papyrus harvesting

23.3% of the questionnaire respondents said the papyrus harvesting is a main human activity being undertaken in Murambi wetland.

Papyrus is a dominant vegetation type of the wetland and the local community, harvest the mature stalks for their domestic and commercial purposes. They are used for making handicrafts such as mats and also as building materials. The harvesting of papyrus is usually done by cutting them on the base and the top is removed. The sticky stems are the piled up and are left to dry before being used. They are harvested usually during the drier seasons when the wetland water level is low.

The sale of papyrus stems to handicraft makers, usually general sources of income to the local people.

Plate (I): Harvesting of papyrus reeds



Source: From the by the researcher.

Plate (i) above shows a section of Murambi wetland where papyrus harvesting has been undertaken. In the foreground is a pile of papyrus wastes left over by the harvesting process and this creates unpleasant sight as well as it destroys the ecological and hydrological functions of the wetland.

4.2.2 Grazing

The local people surrounding the area of study keep large numbers of livestock especially cattle. The local people of this area are traditionally cattle keepers. They usually graze them on the farms, but during the dry

seasons, they graze them on the wetlands where the vegetation is relatively green.

20% of the respondents to the research questionnaires said that grazing of livestock on the Murambi wetland is a main human activity in the area of study. Those interviewed by the researcher also said that grazing is one of the main activities on the wetland. Through the observation by the researcher, it was also established that the local people clear parts of the wetland bushes especially where the wetland shrubs are scattered, so that palatable grass for the animals can be allowed to grow. Animals are then grazed on these open areas although the animals can also encroach on the rest of the wetland especially as they look for water. The photograph below shows an area of Murambi wetland which has been cleared for livestock grazing.

Plate (ii) Clearing for Grazing in Murambi wetland.



Source : From the field by the researcher.

4.2.3 Crop farming.

According to 35% of the questionnaire respondents, crop farming is the main human activity being undertaken by the local community on Murambi wetland. Crop farming in the wetland is more prevalent compared to papyrus harvesting and livestock grazing, which form 23.3% and 20% respectively, according to the views of the respondents. Those interviewed such as the local leaders also hold the same view that crop farming is the major human activity in the wetland. Local people clear areas of the wetland

especially where the soil is not highly saturated with water and then plant crops. These crops include maize, millet, sorghum, matooke, beans, sweet potatoes and yams. Although individual members of the local community open up small areas of the wetland for crop farming, all these small farms cover a large portion of the wetland in combination

Mr. Kagaba Ambrose is the current local council (LC II) chairman of Butare parish. According to him, the practice of cultivating crops on the wetland has been going on for a long time and that more members of the local community are gradually expanding these farms on the wetland or opening up new areas in the wetland. Sometimes, it entails the drainage of wetlands to make it suitable for the growing of crops. It is usually the people whose plots border the wetland that are mostly responsible for encroaching on the wetland for crop farming. The photography below show a section of the wetland where crops have been planted. There are millet and maize crops on this wetland area.

Plate (iii): Crop farming in Murambi wetland.



Source: From the field by the researcher.

4.2.4 Re-creational activities

There were 8.3% of the respondents to the research questionnaires who said that re-creational activities are a main human activity in Murambi wetland.

The areas surrounding the wetland are hilly. These sloppy areas do not enable re-creational activities such as football playing to be done. Therefore, the local people mostly the youth, have encroached on the wetland which is fairly flat, to create pitches for football, volley ball and grounds for other

From interviewing, the District Environmental Officer for Ntungamo Mr. Tusubira Justus said that the trend of people encroaching on the wetland in order to set up playing grounds has been increasing over the last ten years. These play grounds are also used as grazing grounds for animals by the local people.

It was also clear that through observation by the researcher that playing grounds set up in Murambi wetland are existing as the photography below shows. It was taken on one of the many sections of the wetland where play grounds especially football pitches have been established.

Plate (iv) A football pitch in Murambi wetland.



Source: From the field by the researcher.

Source: From the field by the researcher.

4.2.5 Tree planting

13.4% of the respondents to the research questionnaires observed that planting of trees in Murambi wetland is the main human activity being carried out in the wetland. Those interviewed said that planting of alien species of trees is one of the human activities carried out in the area of study. These alien species of trees are usually the eucalyptus trees. The local people prefer this type of trees because of their fast maturity and their tolerance of highly hydrated soil such as those on the margins of wetlands. Once mature, these trees provide timber, fencing posts, building poles and fire wood for the local people. Eucalyptus trees grow tall and shield off the wetland vegetation from direct sunlight, thereby causing it (wetland) vegetation to disappear gradually. Their roots are also adapted to taking in a lot of water especially during the drier seasons. This lowers the quantity of wetland water, further causing the disappearance of the original vegetation of the wetland through lack of sufficient water. The fauna and flora habitats are invariably destroyed in this process. The photography below shows a section of Murambi wetland, where eucalyptus trees have been planted.

Plate (v): Eucalyptus trees in the wetland.



Source: From the field by the researcher.

Conclusion.

In conclusion, the study found out that crop farming is the major human activity being undertaken in Murambi wetland by the local people. It is followed by papyrus harvesting, grazing of livestock, tree planting and recreational activities respectively.

All the respondents to the research questionnaires and those interviewed by the researcher observed that most of the local people use the wetland in a variety of ways. Crop farming, uses for re-creational activities and exotic tree planting results into permanent change of the landscape of the wetland while livestock grazing and papyrus harvesting causes temporary changes

which disappear with changes in seasons.

4.3 Effects of human activities on Murambi wetland.

The study established that it is through the various human activities being undertaken in Murambi wetland that a number of effects to the wetland are guaranteed.

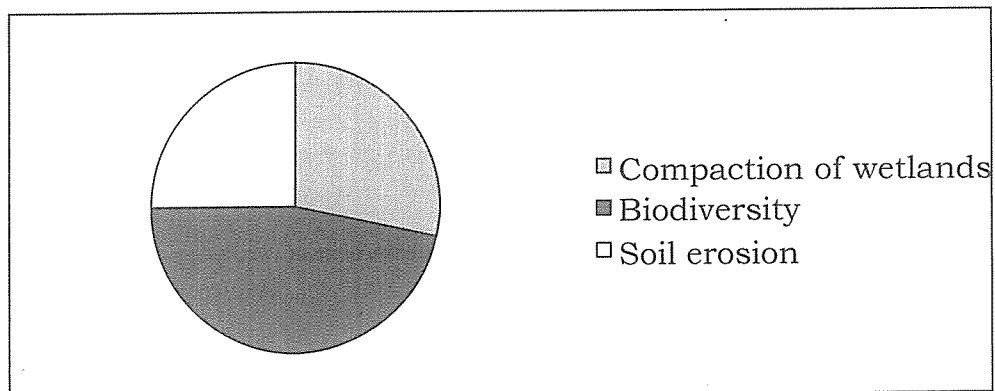
The study found out that the major effects of human activities on the wetland include; biodiversity loss, wetland compaction and soil erosion. The human activities such as those discussed in (4.2) directly or indirectly singly or collectively cause some negative effects to the wetland. The study further established that all the major human activities identified, do not have any positive effects to the ecological functioning of the wetland.

Table 2: Effects of human activities.

Effect	No. of respondents	Percentage (%)	Rank
Compaction of wetland	17	28.4%	2
Biodiversity loss	28	46.6%	1
Soil erosion	15	25%	3
Total	60	100%	

Source: From field by researcher.

Figure (b): Pie-chart representation of table 2.



4.3.1 Compaction of the wetland.

According to 28.4% of the research questionnaire respondents, compaction of Murambi wetland is an effect of the various human activities discussed in (section 4.2). Those interviewed observed that human activities such as livestock grazing on the wetland, papyrus harvesting and the use of wetland sections for purpose of re-creation, leads to the compaction of wetland soils. As the livestock move through the wetland while grazing, they trample on it and make the wetland soils compact hence reducing the water holding capacity of the wetland. On the other hand, people harvesting the papyrus also trample on the wetland and also cause compaction. Likewise, recreational activities such as playing of football as shown in plate (iv), also lead to compaction of the wetland, when those who are playing in the field move around or through the wetland, especially during the drier seasons.

Those interviewed by the researcher, said that the wetland is now discharging less water, compared to how it was several years ago. The volume of the water in the wetland also reduces rapidly, as soon as the dry

seasons appear. Both of these occurrences suggest that the water holding capacity of the wetland has been reduced by compaction and the water discharge from the wetland is almost equivalent to the inlet water.

On observation, the researcher further established the numerous trails of human and animal foot paths in sections of the wetland. Grazing animals and people working in their gardens or harvesting papyrus make these trails. This is also an indication of wetland soil compaction. According to questionnaire respondents, compaction of the wetland is the second most significant impact of human activities in Murambi wetland, after biodiversity loss.

4.3.2 Biodiversity loss.

When asked which human activity causes the most damage to the wetland, most respondents to the questionnaire said that it is crop farming. They went further to point out that crop farming leads to drainage of wetland water, reduction of water volumes, removal of vegetation and loss of wildlife habitats. 46.6% of the respondents observed that crop farming as well as other major human activities leads to the loss of biodiversity of the wetland ecosystem. The variety of the plants and animals has reduced, compared to how it was several years ago. This is according to those who were interviewed, such as the local leaders and the district Environmental officer.

The cultivation of crops in the wetland leads to the clearing of vegetation. The removal of vegetation causes the destruction of habitat for animals, birds and fish which live in the wetland. These animal species migrate or simply die, therefore directly leading to the loss of biodiversity. Plate (iii) in (4.2.3), shows part of the wetland where the local people have established crop cultivation. The original wetland vegetation has been removed in favour

of these crops. The original wetland vegetation has been providing an appropriate habitat for wetland wildlife. The harvesting of papyrus also leads to loss of biodiversity because the process destroys the wetland vegetation. A part from the loss of habitat for animals, the clearing of vegetation through the undertaking of the different human activities in the wetland, also leads to the elimination of a variety of plant species usually found in wetlands. The growing of eucalyptus trees as one of the human activities, leads to the disappearance of smaller types of wetland plants.

According to the district environment officer for Ntungamo district Mr. Tusubira, loss of biodiversity in wetlands is now more rapid due to the increase in the level of human activities in and around wetlands in the district, in which Murambi wetland is included. According to the proportion of the research questionnaire respondents, the views of those interviewed as well as through the researcher's own observation and judgment, biodiversity loss through habitat destruction was ranked the most significant effect of the human activities on Murambi wetland. The research further revealed that all the human activities identified in the study that is; crop farming, papyrus harvesting, livestock grazing, planting of eucalyptus trees as well as establishment of re-creational facilities lead directly to destruction of wildlife habitat hence loss of biodiversity. Compaction of wetland soils, erosion of soil, removal of vegetation from the wetland as well as draining of wetland water which the human activities above cause, make it easier for wetland biodiversity to be lost.

4.3.3 Soil erosion

The study found out that amongst the effects of the human activities on Murambi wetland, is soil erosion. 25% of the questionnaire respondents said that the human activities cause soil erosion. These respondents where

asked in the questionnaire to explain how the water, soil, plants and animals have been affected by the human activities in the wetland. On the soil, as a resource in the wetland they said that the soil is compacted, drained and eroded. However, it was 25% of these respondents who said that soil is affected through erosion.

The people who were interviewed also said that soil erosion is one of the major effects of human activities on Murambi wetland. They linked crop farming, harvesting of papyrus and livestock grazing to the soil erosion which is occurring in Murambi wetland. The researcher also clearly observed that large areas of the wetland have been cleared for cultivation of crops. Other areas of the wetland have been cleared through harvesting of papyrus and other handicraft materials from the wetland. The grazing of livestock on the wetland also makes the soil loose and therefore makes it easy for soil erosion to occur. Animal trails were observed in several sections of the wetland and as these animal trails become enlarged by run-off water, more soil erosion continues to occur. The removal of wetland vegetation for crop farming exposes the wetland soils to erosion. The researcher observed that the outlet channels of water from the wetland have a lot of silt. This means that the wetland soils have been eroded. Although soil erosion as an effect of human activities on Murambi wetland was ranked the lowest compared to wetland compaction and loss of biodiversity, it is still a significant effect, which has destroyed the ecological components as well as the landscape of the wetland.

Conclusion.

Through the answers given by respondents in the research questionnaires, the responses of those interviewed as well as the researcher's own observation, it can be concluded that the loss of biodiversity (46.6% of questionnaire respondents) is the major effect of the different human activities on Murambi wetland. It is followed by compaction of the wetland

and soil erosion. This is 28.4% and 25% of the questionnaire respondents respectively. However, all these effects are significant as far as the degradation of the wetland is concerned.

It was also found that all the human activities identified in the study lead to the degradation of the wetland, although the level at which they generate negative effects on the wetland vary. Crop farming was observed to cause more damaging effects to the wetland, where human activities such as recreational activities have less damaging effects to the wetland comparatively.

4.4. Solutions to the wetland degradation.

The respondents to research questionnaires as well as those interviewed were asked if they thought that using the wetland in the way it is currently being used is good. All of them said that it is not good. They supported their responses by observing that the current ways in which the local people are using Murambi wetland causes more damage to it. This means that most of the local people are aware that their activities have negative effects on the wetland.

The study also found out that there have been no local efforts by the community to control the effects of their activities on the wetland. The local authorities as well as other conservation agencies, have not interviewed according to the respondents of the study.

However, the respondents of the study suggest that the effects of the human activities on the wetland should be controlled. They said this can be achieved through creation of environmental awareness among the local community as well as enforcement of wetland conservation laws and regulation. They observed that if the various conservation agencies such as

the national wetland programme, implement the conservation policies, sustainable utilization of Murambi wetland can be achieved.

Conclusion

It can be concluded that most of the local people are aware of the effects which their activities have on Murambi wetland. The only problem in finding solutions to control these effects therefore is the lack of proper co-ordination among the local community and the various conservation or environmental agencies. The local people will also need to be given alternatives for farm land and grazing wetland without a lot of pressure from human activities.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion.

The topic of this research was, “The role of Human Activities on wetland Degradation”. Murambi wetland in Butare parish in Ntungamo district of Uganda was taken as a case study. This study had three research questions, which were; what are the different human activities being carried out around Murambi wetland? What are the effects of human activities on Murambi wetland? And what are some of the measures, which have been undertaken to minimize the degradation of Murambi wetland? These research questions were based on the research objectives and they helped the researcher to become more focused on the specific areas of the study. According to the findings of the study, all the research questions were answered.

5.1.1 Human activities in Murambi wetland

According to the findings of this study, it can be concluded that the major types of human activities which are being undertaken in an around Murambi wetland are; Grazing of livestock, harvesting of papyrus, crop farming, tree planting especially eucalyptus trees and establishment of recreational facilities such as football pitches. Crop farming was found out to be the most practiced human activity, followed by harvesting of papyrus, grazing of livestock and planting of trees. The use of the wetland for recreational purposes was found to be the least practiced human activity in Murambi wetland.

5.1.2 Effects of human activities on Murambi wetland

All the human activities, which were identified in the study, were found to

have various effects on Murambi wetland. These effects are compaction of the wetland, biodiversity loss and soil erosion. The loss of biodiversity in the wetland was found to be most severe effect of the human activities on the wetland, followed by compaction of the wetland soil and then soil erosion in the wetland as well as around the wetland. It can be concluded that all these effects on the wetland are attributed to particular human activities in some cases and a combination of different human activities in other cases.

5.1.3 Solutions to the wetland degradation

It can be concluded that the local people and the local agencies have made little efforts, to control the effects of the human activities on Murambi wetland.

5.2 Recommendations.

Considering the findings of the study on the types of human activities in Murambi wetland, the effects of those activities on the wetland as well as the local measures that have been undertaken to control the effects of human activities on the wetland; the researcher recommended the following measures.

5.2.1 Reducing the level of human activities on Murambi wetland.

It was found out in the study that all the human activities carried out in Murambi wetland (as discussed in chapter four) directly lead to negative effects on the on the wetland. The level at which those human activities are being carried out has been rising. This is because the human population of the area has also been increasing.

The researcher therefore recommends that those human activities should be minimized. This can be done through creation of awareness and public

education. This will help to make the local people to understand properly the negative effects, which their different activities have on the wetland. By doing this, the local people will be encouraged to reduce or abandon some of their activities in the wetland especially those activities which have more damage to the wetland; such as cultivation of crops in the wetland. The local leaders as well as the local government should help the local people to find an alternative land where local people can cultivate their crops. Livestock grazing which is the third most practiced human activity in Murambi wetland according to the research findings should be minimized by encouraging the local people to plant fodder crops in their farms. They will use such fodder crops to feed their livestock especially during the dry seasons, therefore having little need of taking them to graze on the wetland. This will help to minimize the level of grazing on the wetland.

However, human activities such as papyrus harvesting have few or no alternatives outside the wetland. This human activity can be minimized by encouraging the local people to harvest the papyrus orderly and not wantonly as it is now. The local people should be educated on different sustainable ways of harvesting the papyrus. Both re-creational facilities and the planting of trees on the wetland should be relocated to some places away from the wetland.

5.2.2 Minimizing the effects of human activities on Murambi wetland.

As the study found out, the main effects of human activities on Murambi wetland are; biodiversity loss, compaction of the wetland and soil erosion. These effects of human activities can be minimized through a number of ways. One of the ways of minimizing the effects of human activities on the wetland is the application of soil and water conservation measures. Conservation agencies and environmental field officers should educate the

local people on the different ways of soil and water conservation. When these measures are implemented, negative impacts such as soil erosion and compaction of wetland soils will be minimized. Loss of biodiversity, which is the major impact of human activities on Murambi wetland, according to the study, occurs through the destruction of species' habitats. Therefore, in order to control the loss of biodiversity in the wetland, the destruction of plant and animal habitats should be avoided. To avoid the destruction of wild life habitats, the local community should be encouraged to undertake their activities away from the wetland, especially the most damaging activities.

Public awareness and education on wetland conservation and sustainable use should be accompanied by the implementation of national wetland programme and N.E.M.A wetland conservation policies. Such policies and regulations once implemented will ensure that the local community do not misuse the wetland but use it sustainably.

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APPENDIX I QUESTIONNAIRE FORMAT:

KAMPALA INTERNATIONAL UNIVERSITY

FACULTY OF SOCIAL SCIENCE

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Research Topic: “The Role of Human Activities on Wetland Degradation”

A Case Study of Murambi Wetland, Butare Parish, Ntungamo sub-county,
Ntungamo District-Uganda.

Personal Information.

Village of respondent.....

Parish.....

Sub-county.....

County.....

District.....

Age of respondent.....

Sex.....

Educational level a). Primary school level.....

b). O-level.....

c). A-level.....

d). Tertiary college.....

e). University.....

f). None.....

Occupation of respondent.....

SECTION A: Human activities carried out around Murambi wetland.

1. Do you use Murambi wetland?

Yes/ No

If yes, what do you use it for?.....

If No, why?.....

2. Do your neighbors use this wetland?

Yes/ No

If yes what do they use it for?.....

3. How often do you use this wetland? (Tick where appropriate).

a. Everyday.....

b. Once a week.....

c. Twice a week.....

d. Once a month.....

e. Not often.....

f. Others specify.....

4. How about your neighbors?

.....

.....

5. Who uses wetland most? Women or men?

.....

SECTION B: Effects of human activities in Murambi wetland.

6. Do you think the wetland is still ok or it has been destroyed?

.....

7. If it has been destroyed, how has it been destroyed?

.....

.....

8. Do you think that the work done in the wetland has destroyed it?

Yes _____

No _____

If No, why?

.....
.....
If Yes, how?

.....
.....
9. What activities have done more damage, and why do you say so?

.....
.....
10. How have the following things/ resources found in the wetland been affected?

a). Water.....

.....

b). Soil.....

.....

c). Plants.....

.....

d). Animals.....

.....

e). Others(specify).....

.....

SECTION C: Possible solutions to the wetland degradation.

11. Do you think it is good to use the wetland in the way you use it?

Yes/ No_____

If Yes, why?

.....

.....

If No, why?

.....

.....

12. Has anyone told you on how to use the wetland?

Yes/ No _____

If Yes, why?

.....

If no, why?

.....

13. If answered yes in 12 above, what did they tell you?

.....

.....

14. Have you practiced what you were told?

Yes/ No _____

If Yes, what have you done?

.....

.....

If No, why?

.....

.....

15. Has your neighbor practiced any?

Yes/ No _____

If Yes, which ones?

.....

If No, why?

.....

.....

.....

.....

16. In your view, do you think this wetland can be conserved/ managed?

Yes/ No _____

If Yes, how?

.....
.....

If No, why?

.....
.....
.....

**APPENDIX II: INTEVIEW GUIDE (POLTICAL LEADERS, OPPINION LEADERS
AND ELDERS)**

QUESTIONS FOR INTERVIEWEES.

1.What is your occupation in this area?

.....

2. How long have you been a resident in this area?

.....

3. According to you/your organization, what are the various human activities being undertaken around Murambi wetland?

.....

.....

4. What are the effects of human activities you mentioned in (3) above on the wetland?

.....

.....

5. Which type of human activities has the most damaging impacts on the wetlands?

.....

6. How do the impacts of the type of human activities in (5) above occur?

.....

.....

7. Which type of human activities has the least damaging impacts on the wetlands?

.....

8. How do the impacts of the type of human activities in (7) above occur?

.....

.....

9. According to you/your organization, what have been the local efforts to control the impacts of human activities in Murambi wetland?

.....

.....

10. Have the local efforts in (9) above been effective in controlling such impacts?

.....
.....

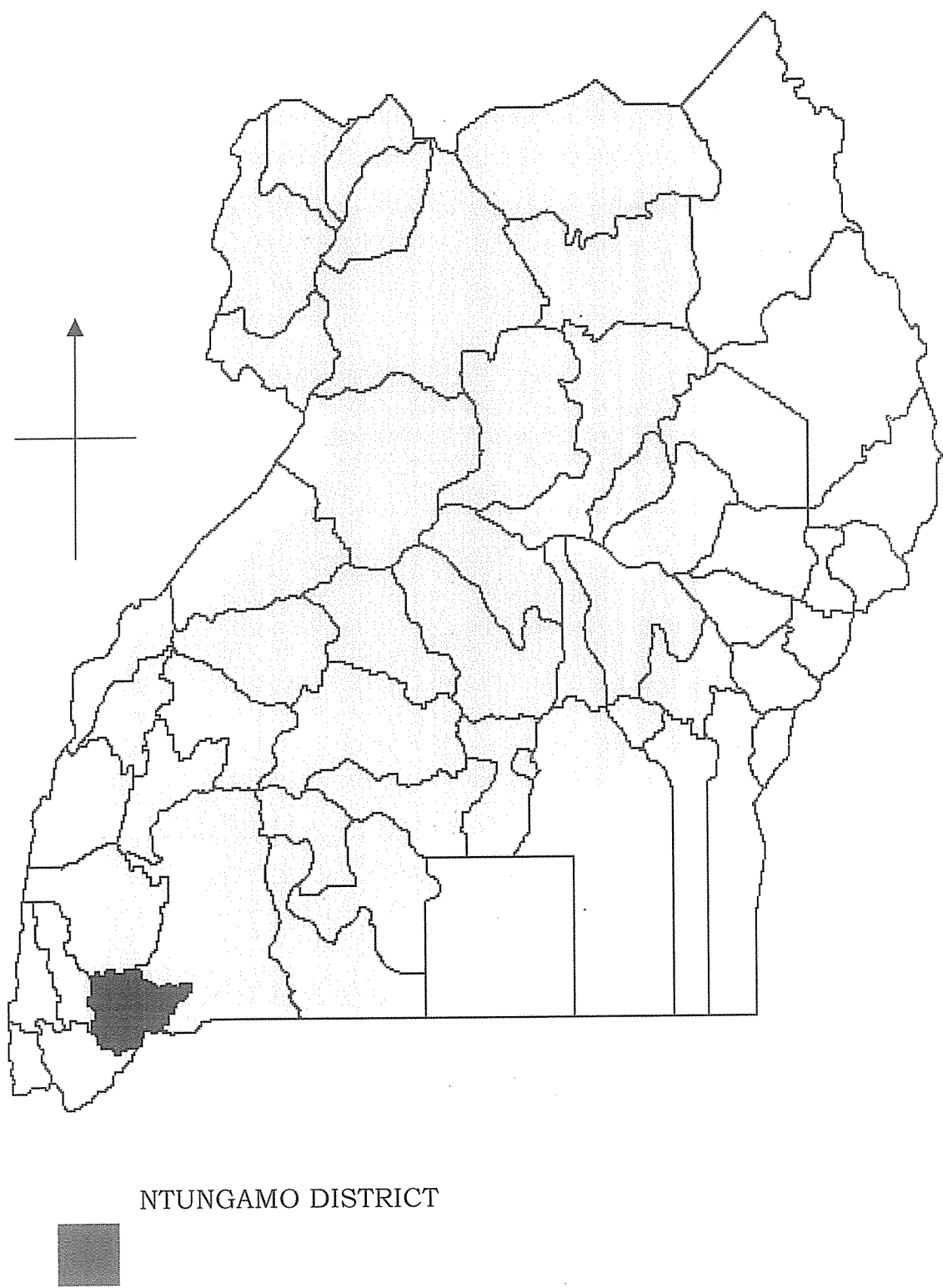
11. If such local efforts have been effective, how can they be enhanced?

.....
.....

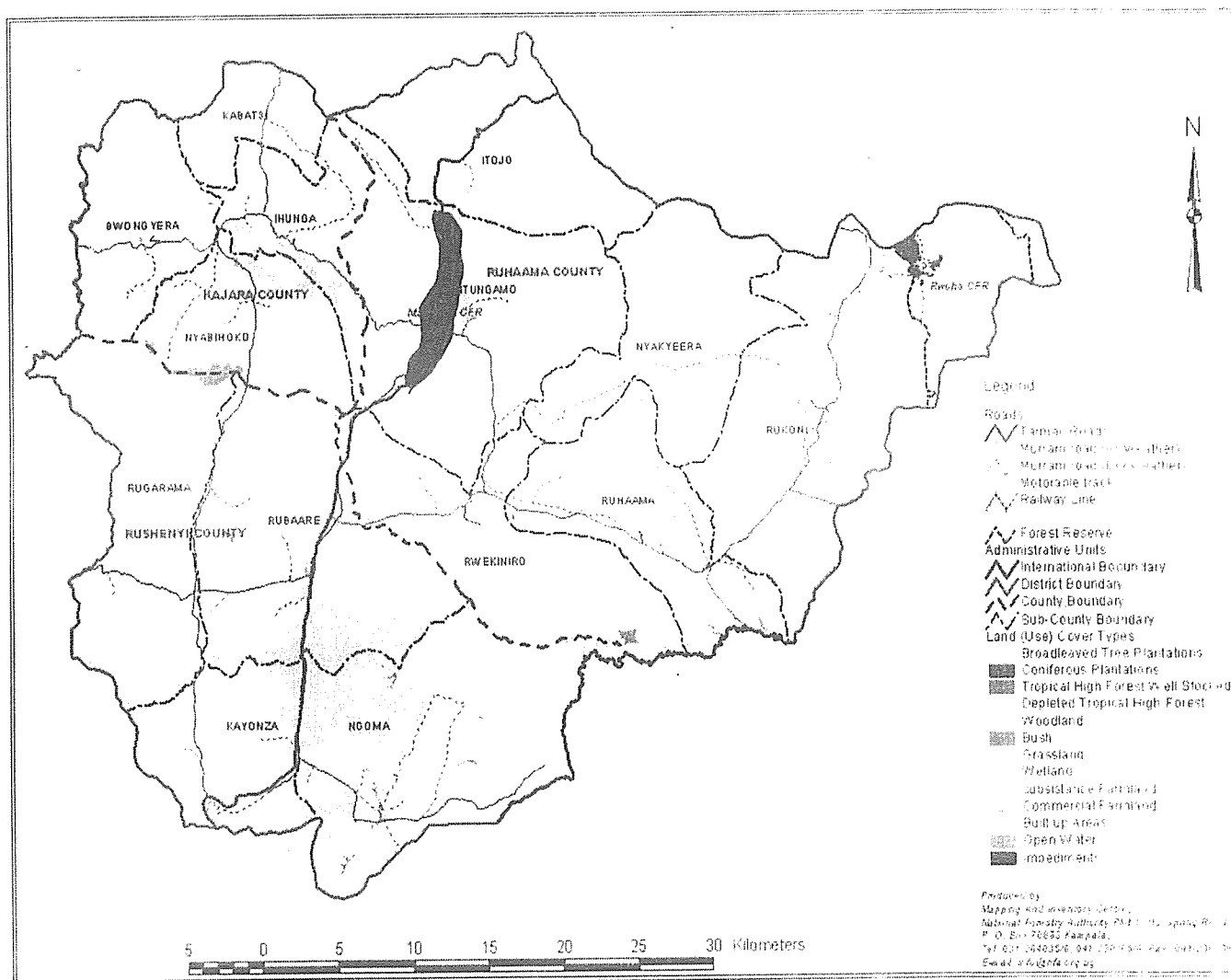
12. If the local efforts to curb the impacts of human activities on the wetland are inadequate, what do you/your organization recommend should be done?

.....
.....
.....
.....

APPENDIX III: THE MAP OF UGANDA SHOWING THE LOCATION OF NTUNGAMO DISTRICT.



APPENDIX IV: MAP OF RUHAAMA COUNTY SHOWING THE LOCATION OF MURANBI WETLAND.



APENDIX V: PERMITION LETTER.

Butte Parish
Dodgeville
10th March 07

The Community
Munroe & Kingline cells
Butte Parish

Re: INTRODUCTORY LETTER OF RECOMMENDATION

I hereby introduce to you the above mentioned
person who is making a research in your area
concerning the wet lands.

So any assistance rendered to him will be
valued.

