IMPACT OF HUMAN SETTLEMENTS ON WATER RESOURCES AROUND LAKE VICTORIA IN MISUNGWI DISTRICT, TANZANIA

ALEX WILLIAM

THE DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS IN NATURAL RESOURCES ASSESSMENT AND MANAGEMENT OF THE OPEN UNIVERSITY OF TANZANIA
2019

CERTIFICATION

The undersigned certify that I have read and hereby recommended for acceptance by the Open University of Tanzania, a dissertation titled *"Impact of the human settlement to the water resources around lake Victoria in Misungwi district*, Tanzania in partial fulfillment of the requirements for the award of a degree of Masters of Arts in Natural Resources Assessment and Management of the Open University of Tanzania

.....

Professor J. D.Kalwani (PhD)

Supervisor

Date.....

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DEDICATION

This dissertation is dedicated to my late father William Machage.

DECLARATION

I, Alex William, hereby declare that this dissertation titled ‘impact of the human settlements on water resources around Lake Victoria in Misungwi district in Tanzania’ has not been submitted to any other university than Open University of Tanzania (OUT).

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I am also grateful to my family members especially my mother Bernadeta Lusyo, my lovely wife Mariam Kassim, my daughters and son for your love and support. I love you all.

ABSTRACT

The objective of this study was to examine the impact of human settlements to the water resources around Lake Victoria in Misungwi District in Tanzania. Human settlements expand rapidly in response to human nature. But they have an impact on natural resources especially water. Water is very potential for the lives of the people in Misungwi. However, water is becoming a recipient of human and environmental pressure which includes human settlements. It is absolutely undeniable that water resources have contributed enormously to the development of human settlement, families, incomes, and employment as well as social services for the sustainability of indigenous people. This study uses qualitative approach to assess the impact of human settlement on water resources management whereby primary data were gathered by administering the questionnaire to a sample of 219 households. Participant observation and checklist were employed in data collection. The results from this study found a direct relationship between education level, occupation and awareness status of respondent on issues regarding water resources management in the communities around Lake Victoria in Misungwi district. Thus the study recommended that natural resources management to be the collective and inclusive activities from local to national level. Efforts should be made to ensure that broad public participation of all stakeholders in decision making and policy design is essential.

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ABBREVIATIONS

LVB	Lake Victoria Basin
LVEMP	Lake Victoria Environmental Management Program
MDC	Misungwi District Council
MDCSEP	Misungwi District Council Socio-Economic Profile
MWAUWASA	Mwanza Urban Water and Sanitation Authority
NBS	National Bureau of Statistics
NERA	National Environmental Research Agenda
NGO	Non-Government Organization
URT	United Republic of Tanzania
WRMA	Water Resources Management Authority
OECD	Organization for Economic Cooperation and Development

CHAPTER ONE

INTRODUCTION

1.1 Background to the research problem.

Water resource is one of the global highly treasured resources; it includes ponds, rivers, lakes and oceans. In 1996 in Russia Lake Baikal was added to the United Nation Education, Scientific and Cultural Organization (UNESCO) which cited Lake Baikal as the most outstanding example of a fresh water ecosystem (Bunello et al, 2006). This recognition by UNESCO shows water resources of the lake Baikal have a global significance and conservation is a priority. In Canada, Lake Great Bear provides a unique and special attribute in ecological stance. The watershed is largely intact and pristine ecosystems that stand at the confluence of three of Canada's fifteen ecological zones (Nesbitt, 2005). Lake Great Bear is very important to the population surrounding the lake as it provides it with socio-economic benefits like fishing. Lake Chad in West Africa plays a major role in socio-economic changes like population growth as Germany based institution 'GIZ' showed that the growth of the population in area surrounding Lake Chad IS directly linked to the development of the fishing sector (GIZ, 2016). This proves a link exists between water resources and human population which results to settlement expansion in Lake Chad area. In East Africa for example Lake Victoria is a source of fresh water that supports lives of those living around its shores. The current estimates of the population in the region range from 25 million to over 30 million (Awange and Ong'ong'o, 2006). By understanding this, theUnited Republic of Tanzania (URT) enacted the Water Resources Management Act 1999 to provide for institutional and legal framework for sustainable management and development of water resources. This act outlines

principles of water resources management, provides for the prevention and control of water pollution and provides for participation of stakeholders and general public in implementation of the National Water Policy. Human beings are experiencing changes in a rapid shifting to urban living and penetrable settlement to water resources areas. Population growth on a global scale is increasing and putting pressure on environmental resources such as water resources (IFIPPIA, 2014).

Regional governments in East Africa (Tanzania, Kenya, Uganda, Burundi and Rwanda) as well as public and private institutions spearhead various efforts in water management. In Kenya for example, Water Resources Management Authority (WRMA) has already recognized that the main driver of challenges in the context of water resources in Kenya is a growing population (Okello et al, 2015). As the population increases it results to human settlement expansion take example of cities like Kisumu, Mwanza and Entebbe. Their expansion has a direct impact on Lake Victoria. Therefore according to UN-HABITAT the growth of these small and mid-size cities will have significant impacts on water resources in the coming decades (UN-HABITAT, 2010).

Lake Victoria in East Africa and its basin are the largest fresh water sources in Africa and second in the entire world. Of all the tropical lakes, Lake Victoria remains as the greatest fresh water body (Awange and Ong'ang'a, 2006). It is boarded by Tanzania, Kenya, Uganda, and, although not riparian, Burundi and Rwanda also lie within the lake drainage basin (Kayombo and Jorgensen, 2005). The Lake Victoria and its basin are currently valued at around US $ 12.4 billion and is the single most valuable

shared natural resource in the region and the major lifeline to the downstream countries of Sudan and Egypt (UNEP, 2005).

Population growth around Lake Victoria and its basin significantly is higher than the rest of Africa. During each decade, population growth within a 100 km buffer zone around the Lake Victoria outpaced the continent average; which reflects growing dependency and pressure on Lake Victoria and its basin (UNEP, 2016). Tanzania controls 51% of the lake surface area (URT, 2009). The remaining share 49% belongs to Kenya and Uganda. This makes Tanzania the major shareholder.

The lake region in Tanzania is among the most prominent in the country, both economically, demographically and politically. Mwanza region is the second growing economy after Dar- es- Salaam (SIDA, 2004).

These four regions that border Lake Victoria which are Geita, Mara, Mwanza and Kagera (except Simiyu) are among the biggest in terms of population in Tanzania. Mwanza region has the biggest population as well as the biggest population density in the country after Dar-es-salaam (SIDA, 2004). The main rivers that flow into the lake from Tanzania catchment areas are Mara, Kagera, Mirongo, Gruneti, Simiyu and Mori (LVEMP, 2001). Out of thirteen (13) districts in Tanzania bordering Lake Victoria; Misungwi is among of the area where Lake Victoria experiences the impact of human settlement and activities to the water resources around Lake Victoria. Therefore the protection of Lake Victoria water resources is imperative as water is a

scarce resource and it has to be protected for the current and future generation or else it will be a looming disaster waiting to strike.

1.2 Statement of the Research Problem

Lake Victoria basin in Misungwi district is relatively endowed with water resources especially in its wetland. The importance of wetland is not only accounted by being highly productive, biologically rich and provides many ecological services but also their support to both biological and the economy. They are natural assets which make significant contribution to the Tanzanian economy (Munishi et al, 2003). The basin is gradually experiencing impact as results of human settlement expansion and increased economic and social activities. Misungwi district is among fast growing districts in Mwanza region experiencing fast population growth by both natural birth and migration (MDCSEP, 2016).

Most researches in connection with water resources related issues pertaining to the Lake Victoria from the perspective of waste management and health issues. In this case, little has been done to know the impact of human settlements on water resources around Lake Victoria. Also little has been done on change of lake physical features due to human socio-economic activities in Misungwi district. It is the concern of this study to assess the current status on the impact of human settlement and activities in Misungwi district to Lake Victoria water resources, environmental management, socio-economic consequences and its implication towards environmental sustainability.

1.3 Objectives of the study

1.3.1 Main Objective

The main objective was to examine the impact of human settlements to water resources around Lake Victoria in Tanzania for the last fifty years.

1.3.2 Specific objectives

i. To assess the awareness of the local community on water resources management of Lake Victoria in Misungwi district in Tanzania

ii. To assess various human activities responsible for negative impact on Lake Victoria in the study area.

iii. To evaluate the impact of human settlement on the biodiversity and physical feature around Lake Victoria in Misungwi district.

1.4 Research Questions

In relation to the above research objectives, the questions of this study were;

What is the level of awareness of the local community on water resources management in the study area?

What are the human activities responsible for negative impact on Lake Victoria in Misungwi district?

What are the impacts of human settlements on the biodiversity and physical features around Lake Victoria in Misungwi district?

1 .5 Significance of the Study

This study will help to identify human settlement expansion and its impact on water resources in Misungwi district and contribute in academic knowledge on environmental management specific on water resources. Also it will help town planners when planning on emerging town to include sustainable water use and utilization plan as water plays a very crucial role on town growth and expansion. Then it will help the local community to arrange their priority in utilizing water resources by understanding their needs as well as the resources availability. Last but not least it will help conservation of biodiversity which life depending on water resources from Lake Victoria to meet human needs without compromising the quality of water resources as it is always a very scarce resource

1.6 Limitation of the Study

A sample size of four (4) wards were selected out of twenty seven (27), based on proximity for ease data collection and time constraint for the study. The study did not cover the whole Misungwi water channels such as rivers, dams and ponds since some of them are out of bound of the Lake Victoria basin.

CHAPTER TWO

LITERATURE REVIEW

2 .1 Introduction

This chapter reviews how human settlement impacts water resources. It discusses the understanding and nature of human settlement, water resources and development, it also reviews various human activities responsible for negative impact on Lake Victoria and various impact of human settlement on the biodiversity and physical feature caused by human settlement to the water resources on Lake Victoria.

2.2 Conceptualization of key terms

2.2.1 Water Resources

The concept of water resources is multidimensional. It is not limited only to its physical measures (hydrological and hydro geological), the flows and stocks but encompasses other more qualitative, environmental and socio-economic dimension (FAO, 2016).However, water resources can be defined as natural resources of water that are potentially useful (Water Aid, 2014).

2.2.2 Human settlement

Human settlement can be explained as the totality of the human community whether city, town or village with all the social material organization, spiritual and cultural that sustain it (Adedeji, 2011).

2.2.3 Land use management

According to DAWR (2017) land use management refers to the purpose which the land cover is committed to by the law or existing bylaws.

2.2.4 Environmental Management

It consists of actual decisions and action concerning policy and practice regarding how resources and the environment are appraised, protected, allocated, developed, used, rehabilitated and restored (Science Direct, 2005)

2.2.5 Land Degradation

According to FAO (2016), land degradation as deterioration or total loss of the productive capacity of the soil for present or future. It is totally change of the soil's characteristics.

2.3 Theoretical Review

Theories are developed to explain, predict and enhance the understanding of phenomena. Theories challenges and extend the frontiers of knowledge within the boundaries of critical bounding assumptions (Akintunde, 2017). A theory presents a systematic way of understanding behavior, events and/or situations; a very crucial feature of a theory is its ability to be tested.

Numerous theories and concepts exist for understanding human behaviors in environmental preservation. In this study, Reasoned / Responsible Action theory is subjected on this discussion.

This theory was proposed by Adjzen and Fishbein (1967), the Reason Action theory assumes that human behavior is grounded in rational thought and the model uses the principle of compatibility, which predicts that attitudes reflect behavior only to the extent that the two refer to the same valued outcome state of being (evaluative disposition). The theory stipulates that the intention of acting has direct effect on behavior, and that it can be predicted by attitudes. These attitudes are shaped by subjective norms and beliefs, and situational factors influence this variable's relative importance. Reasoned Action theory accounts for times when people have good intention but translating intentions into behavior is thwarted due to lack of control over behavior or lack of knowledge.

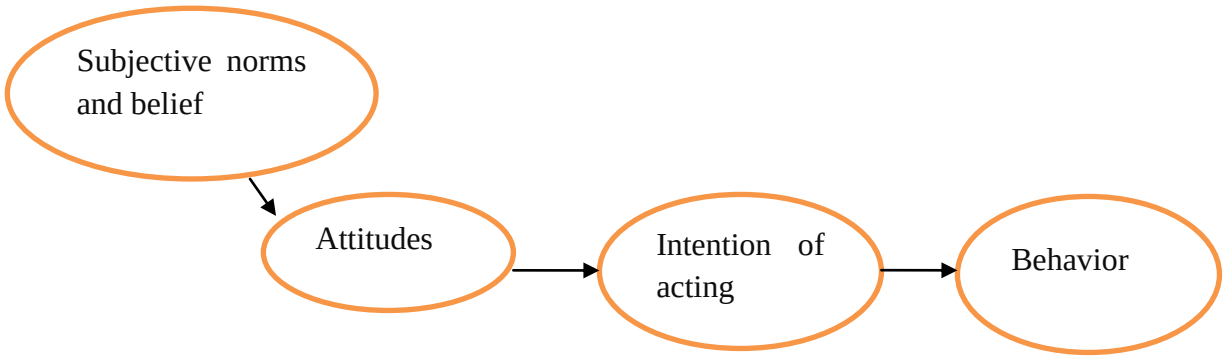

Figure 2. 1: Illustrate Reasoned Action theory relationships graphically

The theory of Reasoned Action is important to this study in Misungwi District as it connects actual picture to the extent that it provides a foundation for the understanding of why people may tend to expand their settlement but not acting in favor of the environment despite having good intention of establishing and expanding human habitat through settlement expansion to accommodate the surrounding community either due to the lack of knowledge or for the reason they

feel they are lacking knowledge to protect or conserve environment or water resources precisely. This has been witnessed by people of Misungwi District whereby they continue to expand their settlement adjacent to water resources particular in Lake Victoria off shore and engage on various economic activities that have negative impacts on water resources existing there.

The population in Misungwi pushed by the desire to have permanent settlement to meet their demands led to their good intentions but their behavior not to consider nature is far from reach and they tend to neglect their responsibility to take care of the mother nature especial water resources.

2.4 Empirical Literature Review

This part reviews the scientific literature on how human settlement impact water resources also it reviews the benefits and negative of human land use and management. The section is divided into sub-headings as follows.

2.4.1 Water Resources, Human Settlement and Development.

There is an increasing recognition of the linkage between rapid population increase and the quality of the environment. Population growth and the resultant human activities generate pressure to the natural and man-made environment (Maduhu, 2004). Human settlement can influence the country's resources management also determine the quality of the environment through socio-economic activities.

Water is a very precious natural resource and vital for sustaining all life on the earth. It is in a continuous circulation movement through the hydrological cycle and is not uniformly distributed in time and space. Due to its multiple benefits and the problems created by excess, shortages and quality requires special attention (Pinderhughes, 2004)

Globally, several studies have found that human settlement expansion and resources like water have inverse relations, in United States (US). The major issue in the western part of US water is the effect of population increase on water resources (Fort, 1992). Eight of the ten fastest growing cities in the US are in the west which are evidenced by the overall development patterns towards a number of large cities dubbed ‘urban archipelagos” where this issue relating urbanization and human settlement has impacted water resources and looks intensified in short term (Fort,1992).

Great Lakes Basin Water (Lake Superior, Huron, Michigan, Erie and Ontario) in US link to significant alteration in how water, energy and materials have moved. Recently, there has been an increase in recognition on the ecological consequence of the hydrological alteration brought about by water uses, diversion and physical modification to the land and waters of the great lakes (Rankin, 1994).All this is due to human settlement and population increase to these places.

In China, particularly, the Tarim River Basin locating at the heart of Eurasian continent, the population grows and eventually expands human settlement and

cultivated land. The expansion in the upper reaches dramatically reduces the volume and degrades the quality of water (Jiang et al, 2003). This brings about impact on water resources in Tarim River Basin. Recently people in the middle reaches of the Tarim River who also engage in large projects have affected the water quality available for the downstream (Leiwen et al, 2005).

The important finding is that the land in the lower reaches had been degraded the most; this was due to the culmination of the problems caused by basin-wide rapid population growth and excessive water consumption and pollution. (Leiwen et al, 2005)

In the context of emerging economies, like South Africa, the same situation prevails in Western Cape Province. The development and growth of human settlement, regardless of their size, affects the Western Cap's natural resources; putting increase in resources on both renewable and non-renewable resources, including water (Braham and Botswana, 2017)

Therefore human settlement has been responsible as an environmental challenge in Western Cape. Urbanization is a major global challenge which causes severe ecological disaster (Braham and Dotwana, 2017).

In East Africa, notably Kenya, the issue of human settlement and impact on water resources is not a new phenomenon. Lake Naivasha is in struggle to conserve its ecosystem against human settlements and activities. The population in the area

around Lake Naivasha has growth from 50,000 to about 250,000 in less than twenty years (Enniskillen, 2002). This has brought about several major impacts to the existing Lake Naivasha ecosystem. Human impacts on the Lake Naivasha are linked to many socio-economic activities this include water pollution, habitat destruction, decline in fishing (Owiti and Oswe, 2002). This show how human settlement impact water resources.

The Lake Victoria Basin (LVB) is experiencing the same changes in land use due to both anthropogenic and natural drivers which are critical to the sustainability of the resources and livelihoods of the community on the use of land (Albinus et al, 2008). Large group of people often migrate to a place that has resources they need or want and migrate away from the place that lacks the resources they need this plus natural birth led to population booming and human settlement expansion.

There has been witnessed a steady decline in the size of per household land holding in the decades up to 2014, this coupled with the basin population growth (Ochola, 2014).

Over 70% of the population in the catchment area of the three riparian countries is engaged in agricultural production, mostly as small-scale farmers (Kayombo and Jorgensen, 2005). There are several occupational activities which the people of the LVB are involved in and these include: Fishing, Farming, Trading activities, quarrying and sand mining as well as gold and others minerals (Odada et al, 2006).

For the case of Misungwi district both human migration and natural birth act as a catalyst towards population increase hence human settlement expansion. Misungwi district is among the fast growing district in Mwanza region which is experiencing fast population growth by both natural birth and migration (MDCSEP, 2016). With this population rate increase it is obvious that it will have an impact on natural resources and ecosystem of the area.

According to Misungwi socio-economic profile report 2016, the population was dynamic in size, structure, distribution and quality with time, for example 2002 population census 256,133 inhabitants counted to 351,607 inhabitants on 2012 population census (MDCSEP, 2016). These data portray that rapid population increase was observed in the area.

Figure 2. 2: Human settlement expansions in Misungwi
Source: Google Earth, 2019

2.4.2 Human Land Use and Land Degradation

Today's landscape result from many cause including variability in a biotic condition such as soils, climate and topography; biotic interaction that generate spatial patterning even under homogenous environmental condition past and present patterns of human settlement and land use; and dynamics of natural disturbance and succession (Turner et al, 2011).

Environmental degradation is both a cause and consequences of migration, making it difficult for people to sustain their livelihoods of their communities of origin and exacerbating natural resources management at their destination (IISD, 2016). Over the years, Lake Victoria has suffered from increasing population as the result of development activities expansion (MWAUWASA, 2013).

In the Lake Victoria basin, forests have experienced immense human use and destruction. Forest has been subjected to harvest of timber and provision of wood for fuel and graying. The ever increasing population has necessitated the clearing of forest for crop land (Awange and Ong'ong'o, 2006).

Another related environmental problem is the deterioration of aquatic system. Aquatic resources include the marine and fresh water ecosystem, wetland mangrove forest, coral reef lakes and rivers (URT, 1994).

Figure 2. 3: Human land use around Lake Victoria wetland in Misungwi district
Source: Google Earth, 2019

2.4.3 Resources and Environmental Management

The activities carried out within and outside the surrounding of Lake Victoria include uncontrolled grazing, cultivation, extraction of building minerals (sand and stone), tree clearing, use of fishing gears and other human activities.

This means that, any degrading factor due to outside activities have great influence inside the Lake Victoria on water purity, ecosystem performance which in turn reduce the water level.

The National Environmental Policy (1977) under review, the Environmental Management Act of 2004, The National Environmental Research Agenda (NERA)

2022, Human settlement Policy of 2000, National Water Policy 2002 URT and all the relevant policies guiding agriculture and socio-economic activities provide for legal and institutional frameworks for sustainable management of the environment, prevention and control of pollution and waste management environmental quality standards in Tanzania.

Mitchell (2002) explains that environmental change and violent conflict or resources inadequacy is the increasing like hood of the conflict among the people. Therefore human activities are the contributors to environmental changes and decrease in the quality and quantity of water resources. Given the current rate of population increase, water resources utilization in and around most of the rift valley lakes is not sustainable (Gunnya, 2009)

2.5 Research Gap

Despite these studies, there is a call for more studies to test earlier findings in different context. In order to contribute to a better understanding of the impact of human settlement to the water resources in Misungwi district, Tanzania

2 .6 Conceptual Framework

Figure 3 is a conceptual framework adopted from the literature review. The core aim is to serve as a guide to help the research outline and methodology employed in achieving the study objectives.

Human settlement expands as population grows (Khan et al. 2014). Thus there is a direct relationship between these two phenomena. Most of human settlements from pre-history to present happen to the area supportive on human activities such as agriculture which influence human settlement with direct relation to resources management including water resources.

Potential environmental impacts are likely to occur as the outcome of the population booming and settlement expansion in Misungwi district. Everyday people are moving closer and closer to settle around Lake Victoria and put a threat to ecological sensitive areas with negative impacts to water resources. Various interventional measures are in place to revert negative impacts which are likely to occur. NEMC and other stakeholders spearhead the effort to mitigate negative impacts by conducting training on environmental management through workshops and seminars that help to raise people awareness which will help in water management and conservation.

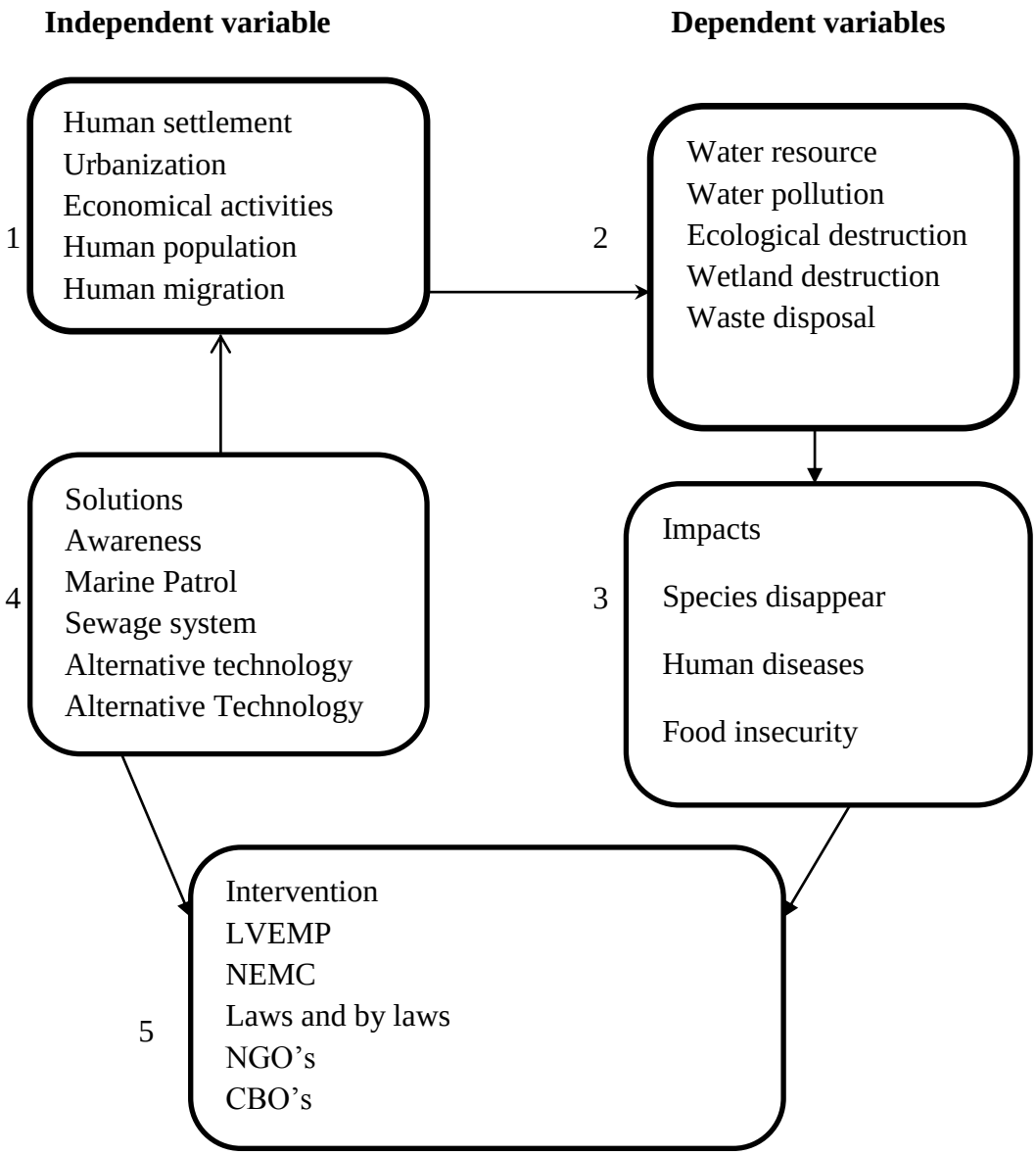

Figure 2. 4: A diagram for Conceptual Framework showing the impact of human settlement on water resources as well as intervention and solutions.

CHAPTER THREE

RESEARCH METHODOLGY

3.1 Introduction

This chapter includes the research methodology of the dissertation for outline the research method, the research approach, the method of data collection, the selection of the sample, the research process, the data analysis and the research limitations.

3.2 Study Area

The study was carried out in Misungwi District and geographically the district shares border with Sengerema and Nyang'hwale districts to the west, Shinyanga Rural on South, Mwanza city to the North, and Kwimba District to the Northeast. In terms of international identification the district lies between latitude 20^0 35^I and 3^0 15^1South of the Equator and between Longitude 32^0 45^I and $30^0 15^I$ east of Greenwich (MDCSCP, 2016). The district has the population of 351,607 (NBS, 2012) and it predicts to reach 401,700 in2018. The district is basically in semi-arid with the average rainfall between 700mm and1000mm. The district has the area of 2,555 km^2 including around 175 km^2 of the Lake Victoria (MDCSCP, 2016).

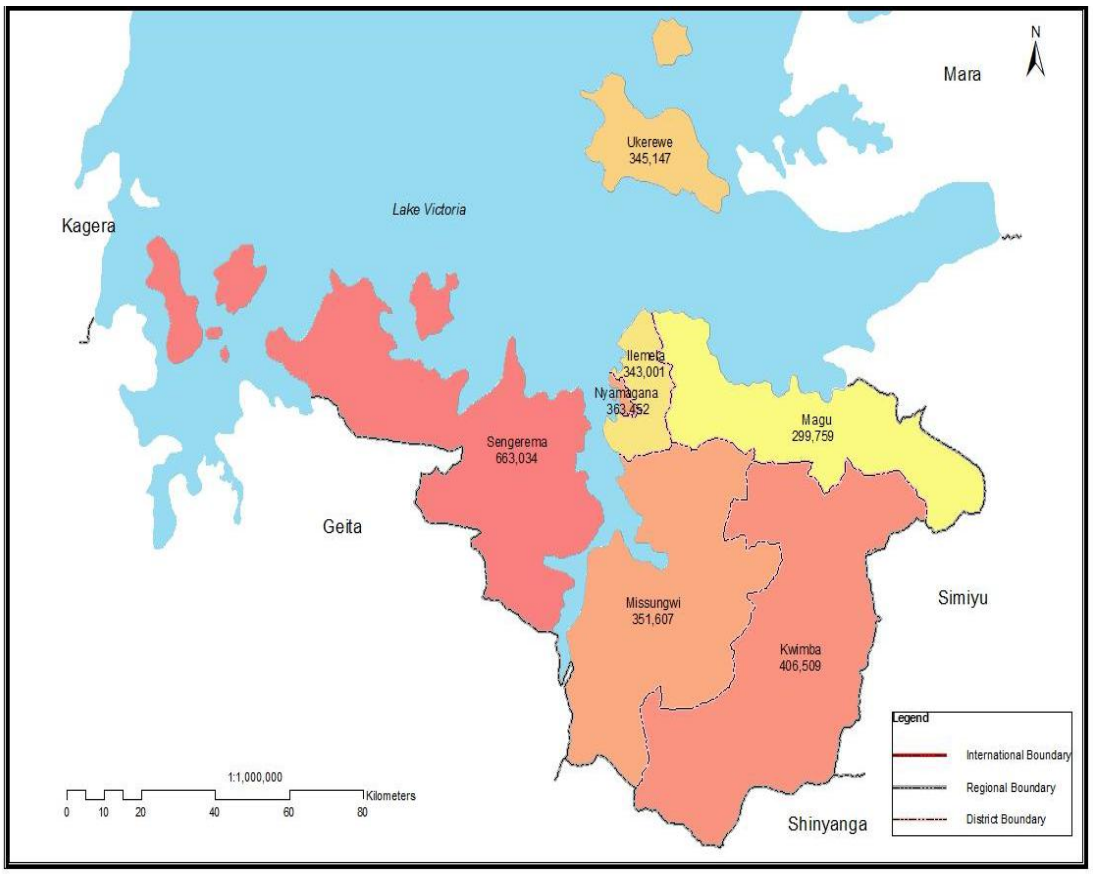

Figure 3. 1: A Mwanza region showing the location of Misungwi District and population

Source: (NBS, 2013)

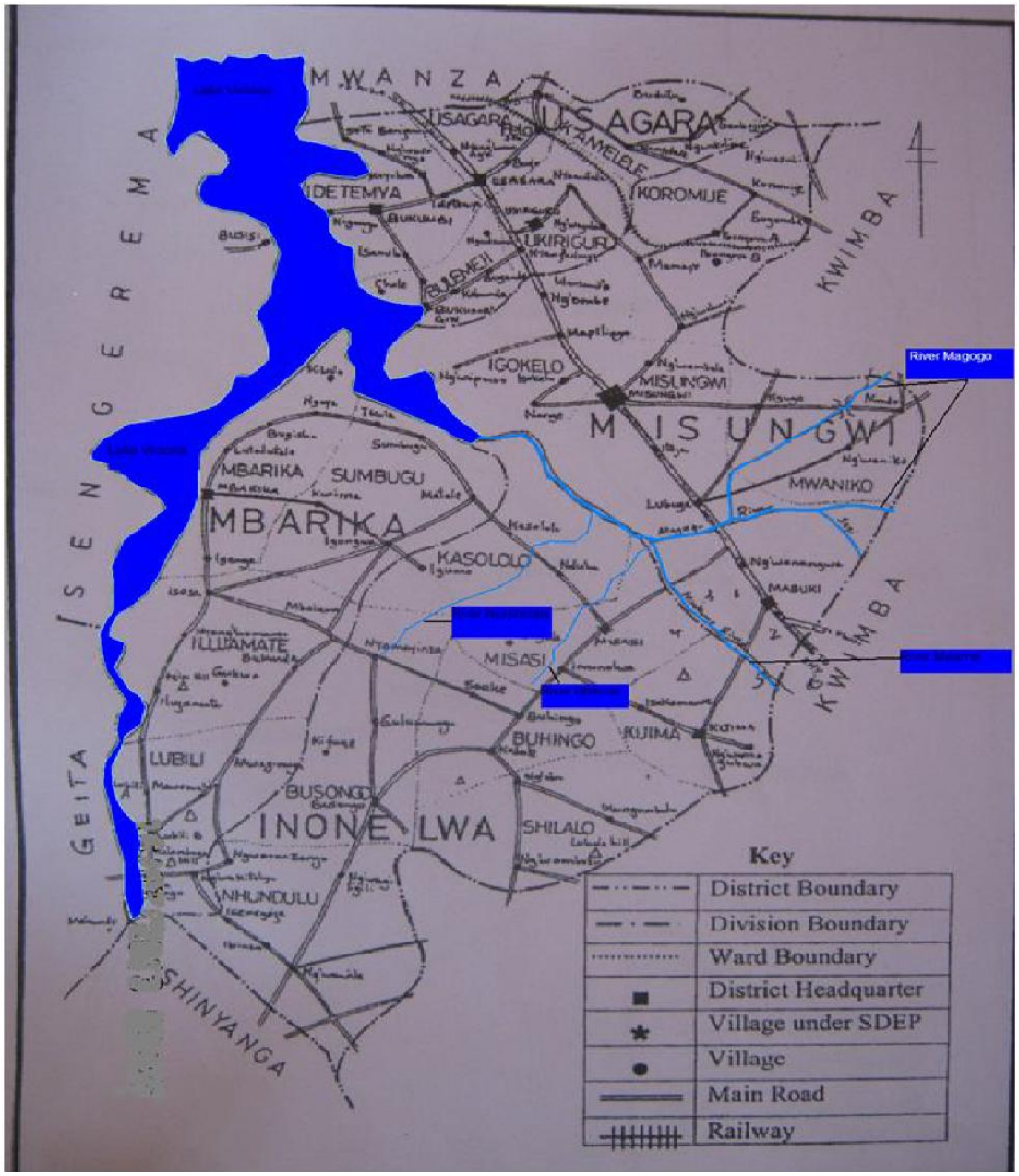

Figure 3. 2: Misungwi district map showing district, division and ward boundaries where the study was carried out
(Source, Misungwi DC).

The rationale for selecting this area is due to the fact that Misungwi District is one of the districts experiencing rapid population increase in the country as shown by the 2012 National Housing and Population Census. This increase accelerates to high

movements of people towards Lake Victoria shores which become a threat to water resources in Lake Victoria. This is so because people tend to engage in various socio-economic activities like mining, agriculture and pastoralist to meet their daily need that are likely to have negative impact on lake resources particularly on lake shore. So long as water resource is under pressure globally it is very important to study Misungwi area to get to know the magnitude of the problem in Tanzania and Misungwi as a case.

3.2 Sampling Design

Sample was limited to four wards which were Idetemya, Lubili, Ilijamate and Mbarika

3.2.1 Sampling Procedure

Purposive and snowball sampling procedures was used specifically due to the demand of the study as this is a deliberate choice of an informant due to the qualities the informant possesses also helped to find people who were willing to provide the information by virtue of knowledge and experience. Purposive sampling applied because some targeted informants were not easily accessed. Each ward was represented by the government official at ward level who was Ward Environmental Council Chairman, Ward Agriculture Field Officer, Field Assistant Fisheries Officer and Ward Executive Officer in total was sixteen (16) individuals. Likewise there were District Environmental Officer, District Mining Officer and District Water Engineer Officer who totaled to a sample of three (3) individuals. However, snowball sampling was used due to the demand of the study to have some individuals like

influential fishermen, small miners, farmers and elders with environmental knowledge. In this category fifty (50) individuals per ward were chosen and totaled to a sample of two hundred (200) individuals. Nevertheless, Government officials were used for administrative, management as well as on policy issues.

3.2.2 Sample size

The total number of two hundred and nineteen (219) respondents was involved in this study. This sample size enabled the extraction of the information as much as needed in this study as it is designed to reach the root level as it is summarized in the table below.

Table 3. 1: TheSample size showing number of wards, name of wards and number of government officials.

S. No	Wards Name	Government officials Number	Households Number
01.	MBARIKA	Four (4) local government officials ward level (fisheries, agriculture, VEO and Environment)	Fifty (50) individuals (Fishermen-15, Small Miners-10, Farmers-15 and Elders-10)
02.	LUBILI	Four (4) local government officials ward level (fisheries, agriculture, VEO and Environment)	Fifty (50) individuals (Fishermen-15, Small Miners-10, Farmers-15 and Elders-10)
03.	ILIJAMATE	Four (4) local government officials ward level (fisheries, agriculture, VEO and Environment)	Fifty (50) individuals (Fishermen-15, Small Miners-10, Farmers-15 and Elders-10)
04	IDETEMYA	Four (4) local government officials ward level (fisheries, agriculture, VEO and Environment)	Fifty (50) individuals (Fishermen-15, Small Miners-10, Farmers-15 and Elders-10)
		Three government officials district level (Mining officer, Environmental officer and district water engineer).	

Source: Author (Field work, 2018)

3.3.1 Data Collection

The study used qualitative approach to study the impact of human settlement on water resources around Lake Victoria in Misungwi District. However, both primary and secondary data were collected from different sources such as government offices

from village level to national level. The study also used both published and unpublished being in form of hard and soft copy information.

Primary data was open-ended questionnaire in order to obtain qualitative data at all household level. Moreover, the information collected included the current human settlement around Lake Victoria, socio-economic activities that are major basis for Lake Victoria environmental strategies of the water resources at Misungwi District.

A check list was used to collect data came from a key actors who include NGO's, governmental officials ranging from local to national level, influential local people as well as ordinary people to test their awareness concerning the impact of human settlement to the water resources around Lake Victoria in Misungwi district.

3.3.2 Field Observation

This study method was a direct observation by participating in the events (participatory one) on biodiversity of the Lake (fish and forest), soil erosion (brick making site and water inlet channels).Visiting was made around lake catchment areas. The aim was to assess if this has any relationship with human settlement and human socio-economic activities around Lake Victoria in Misungwi District. Also photos were taken to assist in clarifying the problem

3.3.3 Focus Group Discussion

Various groups of people like farmers, small miners, bricks makers, fishermen and other shareholders in the area including women, men and elders were organized to

get more information to test their awareness to water resources management. Fifty (50) individuals from each ward as indicated earlier were chosen by considering age, gender, knowledge regarding the study parameters and they were allowed to use at least thirty (30) to forty (40) minutes so that no one would divert from the purpose of the study as it was an open ended discussion.

3.3.4 Interview

Interview refers to the method of data collection which involves the presentation of oral-verbal stimuli and reply in terms of oral-verbal responses (Kothari, 2004). Also, Olive and Abel (2003) defined interview as an oral administration of a questionnaire. Interviews are conducted through telephone or a personal (face-to-face) interview using an interview questions. There are three types of interview namely structures interviews, semi structured interviews and unstructured interviews. Structured interview involves the set of predetermined questions as a standard way of recording (Kothari, 2004). Semi structured is the mixture of structured and unstructured interview which are flexible with greater freedom of supplementary questions and do not follow predetermined questions and standardized technique. This study employed personal interviews with unstructured questions that provided more freedom of expression to the respondents on the topic of the study. This data collection method helped the researcher to gather information from Water Engineer Officer, Ward Environmental Council Chairman, Field Assistant Fisheries Officer and Elders with potential information related to the need of this study. . The questionnaire was detailed and consisted mainly with open-ended that served to gather information on the basic environmental issues, socio-economic activities.

3.4 Data Analysis

Data was analyzed and presented thematically reflecting the specific objective of the study. In the analysis of data, the researcher also considered the triangulation of data collected in from multiple sources in order to ensure the validity and reliability of the information obtained

3.5 Data Presentation

Data generated (output) was presented in descriptions or text form with the support of tables, graphs, figures, photos and maps where necessary for clarification of information obtained.

CHAPTER FOUR

FINDINGS

4 .1 Introduction

This chapter presents the findings collected in the field for 219 respondents

4.1.1 Age and Sex

Age and sex are the most fundamental characteristics in this study especially for understanding the nature of the population in Misungwi District. On the other hand, age and sex structure of the population in Misungwi are also determinants to human activities that have direct relationship to this study as it tried to explore the relationship between human population expansion and its impact on water resources in Misungwi especially on Lake Victoria water.

Misungwi population gradually increased as three national censuses 1988, 2002 and 2012 show. In 1988 Misungwi had the population of 191,283. The 2002 Population Census showed that Misungwi population reached 256,133 and the 2012 census report showed that Misungwi District had the population of 351,607 (NBS, 2013).
From a glance at population increase and expansion showed by those three national censuses, it was noted that there was a rapid population increase that tends to have direct impact on resources and here water resources is our case study facing direct consequences from human population.

To meet demands of the population increase human economic activities also expand, activities like agriculture and animal keeping required more sustainable land and lake

shore provide all the quality hence overpopulation and over cultivation of the lake shore that destroyed water sources areas and even pollution on water resources.

4.1.2 Level of education

The research findings point out that most of the respondents had some level of formal education as shown in Table 4.2.3. Out of 159 respondents, 72.6% have attained basic education level mainly primary school. A total of 40 (18%) respondents indicated to have obtained secondary education; and those who completed high school and vocational training institutes. Others 3(1.3%) respondents indicated to have attained tertiary education while the remaining 17 (7.8%) said that they have not been to school at all.

These data suggest that, the majority of the population are primary education achievers or below. It implied that, the study area has majority of its inhabitants lacking awareness on protection of the environment leading to unsustainable ways of conserving water resources by cutting down forest in the catchment areas for building shelter or clearing land for cultivation on land resulting in poor soils and silting of the lake land.

Table 4. 1: Level of education of respondents

Education level	No of Respondents	Percent
No schooling	17	7.8
Primary (universal level)	159	72.6
Secondary and vocational	40	18.2
Tertiary level	3	1.4

Source: Author (Field work, 2019)

4.1.3 Major livelihood occupation

As part of the research objectives, it was necessary to identify the major livelihoods activities practiced in the communities around Lake Victoria in Misungwi District. Based on findings, the major livelihood activities can be categorized broadly into Agricultural production, animal husbandry, mining, bricks making and fishing. A total of 69 respondents (31.5%) indicated that agriculture was their major livelihood activity, while 60 respondents (27.3%) indicated that animal husbandry was their major economic activity. However, 46 respondents (21%) indicated that fishing was their major economic activity. Besides, 34 respondents (15.5%) indicated that mining was their major economic activities. Nevertheless, 8 respondents (3.6%) indicated that bricks making was their main economic activities and the remaining 2 respondents (0.9%) specified other livelihood activities and this includes teaching and administrative activities (fi.4.1)

For the case of crop farming, the majority of farmers cultivated both food (Maize, Millet and Cassava) and cash crops particular Cotton and Sunflowers. The crop farming is the first followed by animal husbandry and then fishing as they generate substantive income. Besides, they do mining which is believed to be a very lucrative booming activity in the area. However very small percent of the population are involved in this activity due to its hardship and it demands capital for chemical processing like mercury and carbon as well as time. This can be confirmed by the following remarks made

“Sidhani kama watu katika hii jamii ni maskini, kwa sababu wanapata pesa nyingi sana kwenye kilimo cha mpunga, uvuvi au madini ambayo yanatuwezesha kupeleka watoto wetu shule za msingi mpaka vyuo vikuu” (Personal interview, 2018).

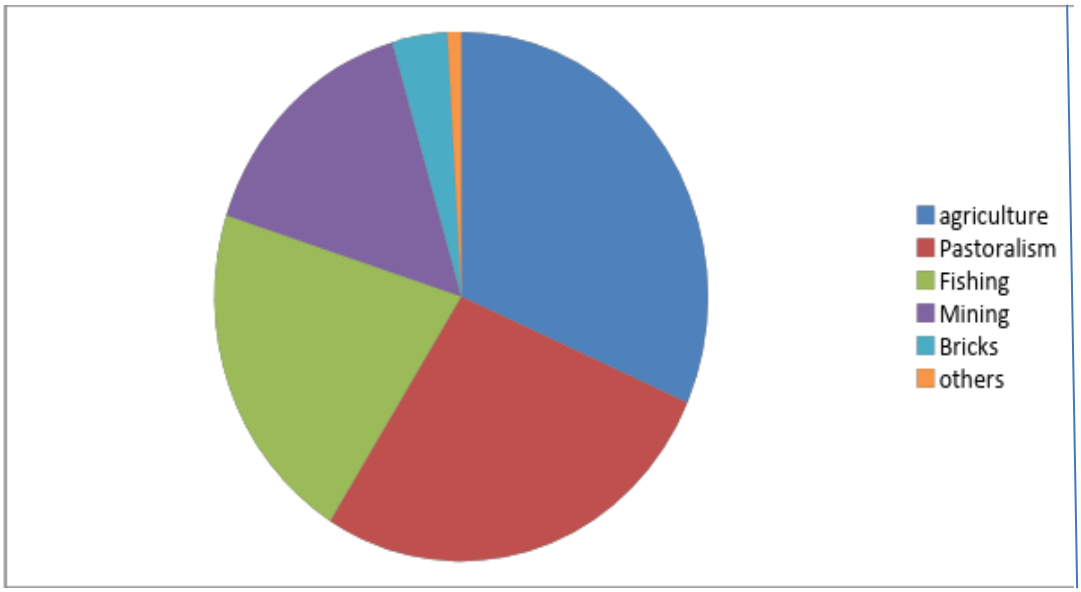

Figure 4. 1: Major livelihood occupations
Source: (Field work, 2019)

4.1.4 Duration of stay in community

The length of stay in the community was also assessed. The highest response of 189 respondents (86.3%) indicated to have stayed in the community for more than 16 years and above. The next high category of 16 respondents (7.3%) had stayed in the community between 11-15 years while 14 respondents (6.3%) stated that they had stayed between 6-10 years (Table 4.2)

Though the household respondents were sampled randomly without prior knowledge of their duration of stay in the respective community, the findings revealed that every

respondent involved in the study has at least stayed in the community for a minimum of one year thus to be able to share some experiences and knowledge regarding various aspects of the research question. The essence of this assessment to achieve the overall objective of the study cannot be under estimated because human settlement and water resources are location specific.

Table 4. 2: Duration of stay of respondents in the community.

Duration of stay in community	Percent
1-5 years	0.1
6-10 years	6.3
11-15 years	7.3
16 years and above	86.3

Source: (Field work, 2019)

4.2 The status of awareness of the local community on water resources management.

The first research question sought to understand awareness level the local community water resources management around Lake Victoria in Misungwi District. The literature review showed that communities having interacted with the environment over years have developed valuable knowledge and experience that makes the best managers of the water resources where they live. A general observation is that the communities in Misungwi District need water resources knowledge and experience that makes them best manager of the water resources around Lake Victoria. As described by Jasper (2003), water resources management and environmental sense come from multidisciplinary and participatory perspective.

In terms of association of respondent(s) environmental awareness on water resources based on location of respondent the study found that there was no important differentials between those located within catchment area and the buffer zone.

The results showed that local government authority, NGOs, CBOs and central government programs like LVEMP are the only institutions that are involved in creating awareness and capacity building on environmental issues. For that case local government authority's involvement is 54%, NGOs 12%, CBOs 8% and LVEMP 26% as it is indicated in Figure 4.3. The results also showed that 41% of the respondents did not attend environmental awareness campaigns on water resources that were carried out in the area. Furthermore 12% of the respondents had not heard the existence of such campaigns.

The study also revealed that community awareness towards environmental governance and bylaws on water resources is not high and alarming since 56% of the respondents know the rules and regulations related to mining activities, structural development, and agricultural activities, fishing activities, waste disposal and forest management. About 32% of the respondents lack knowledge and therefore they are not aware of roles and regulations towards environmental management in general.

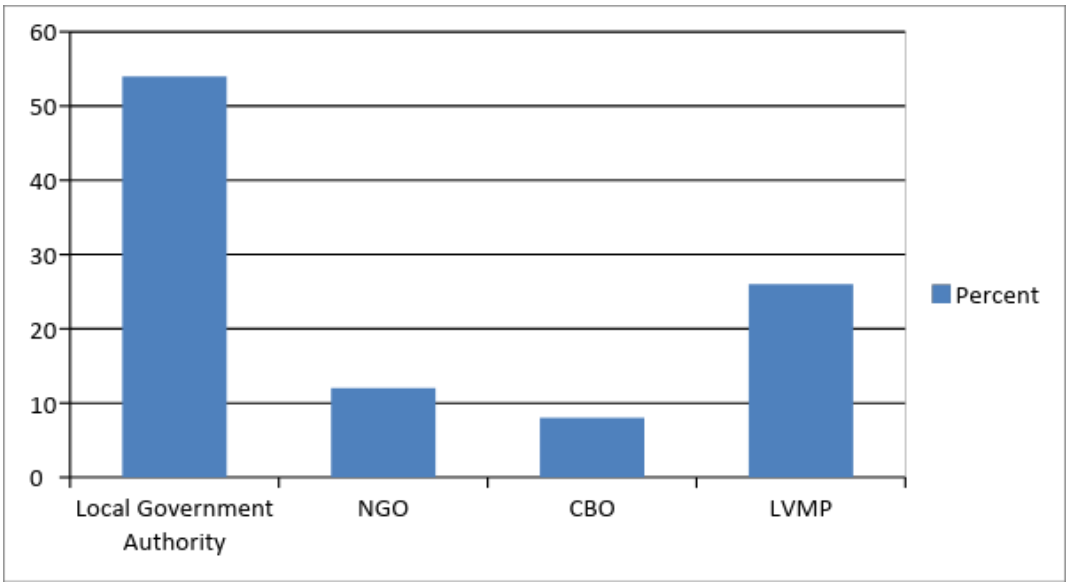

Figure 4. 2: Institutions responsible for environmental awareness in Misungwi district.

Source: (Field work, 2019)

4.3 Human activities responsible for negative impact on water resources around Lake Victoria in Misungwi district

The study results revealed that majority 93% of the respondents were engaged in agriculture production, livestock keeping, fishing activities and bricks making activities, mining activities and formal employment while a small 7% proportion of old age people were not engaged in economic activities in the study area. A total of 69 respondents (31.5%) indicated that agriculture was their major livelihood activity, 60 respondents (27.3%) indicated that animal keeping was their major economic activity, 46 respondents (21%) indicated that fishing was their economic activity whereas 34 respondents (15.5%) indicated that mining was their main economic

activity and the remaining 2 respondents (0.9%) specified other livelihood activities as this includes teaching and administrative activities.

In details, the majority of the farmers here refers to both commercial and subsistence, 41 respondents (22.3%) mentioned cotton, paddy and sunflowers as their main activities. 20 respondents (9.1%) mentioned maize, millet and cassava also the study revealed existence of horticulture whereby 8 respondents (3.6%) verified that horticulture were their main activities. Furthermore, the result showed that 13 respondents (18.8%) practiced irrigation activity while 56 respondents (81.1%) are not practiced irrigation agriculture in the study area and 90% use Lake Victoria water for irrigation and remaining 10% use rain water stored in borehole during rainy season.

Result revealed poison discharge in the study area was common since 59.4 % of the respondents in the study experienced poison discharged especially in wetlands. When asked about the main cause of the poison discharged 86.9% of the respondents pointed to horticulture agriculture around Lake Victoria wetland in Misungwi District (FIG. 4.4)

Figure 4. 3: Farming in Lake Victoria wetland zone

Source: (Field work, 2019)

The results also showed that 27.3% of the respondent's livestock keepers were located within the buffer zone or wetland areas and the remaining 18.4% located inland. When asked about the sources of food for their animals the majority 69% of the respondents)mentioned from the buffer zone or wetland areas of the Lake Victoria and 99% use Lake Victoria water for sustaining their livestock (fig.4.5).

Figure 4. 4: Animal keeping in Lake Victoria wetland zone

Source: (Field work, 2019)

The result of the study continued to reveal that 21% of the respondents practiced fishing for both commercial and domestic purposes. 72% of them use local made boats and fishing gears, 15% unspecified methods and the remaining 13% revealed the use of poison and others outlawed method like mosquito net and dynamite. From wetland to deep water area Sato and Nile Perch is highly fished as well as silver cyprinid 97% were fishermen from the locality. There is no seasonal fishing activity in Lake Victoria in Misungwi district. It is a daily activity (day and night) for a whole year.

Figure 4. 5: Fishing activities in Lake Victoria

Source: (Field work, 2019)

Study also revealed that 100% of the household involved in the study generates solid wastes. The results also showed that 56% of the household placed wastes into the polythene bags at home premises. While the remaining 46% disposed their wastes or dump to unspecified location. 100% showed that no waste recycling did take place within the study area.

The results from the study also revealed that 34 respondents (15.5%) were involved in mining activities use both open cast and underground mining although in small scale. 97% of the respondents revealed the uses of mercury on extracting minerals and 3% applied carbon which is environmental friendly but expensive compared to mercury. 94% of the respondents were looking for gold and the remaining 6% were looking for other precious metals like diamond. Also the study exposed existence of mining activities near the wetland or buffer zone and the application of mercury leads to discharge of toxic materials to the lake water where it also revealed that there was no water stabilization pond (WSP) (fig. 4.6).

Figure 4. 6: Mining activities in Misungwi district near Lake Victoria wetland zone

Source: (Field work, 2019)

The results also revealed the presence of transportation activities where 94% of the respondents use ferry transport to cross the Lake Victoria from one side to another (Busisi to Kigongo and Kigongo to Busisi) twenty four hours. It is a public ferry under TEMESA a government agency responsible for supervising ferry activities country wide and the remaining 6% use local made boats both engine propeller and human propeller "kasia" in a Swahili language they use them for the same purpose apart from other economic activities (fig. 4.7)

Figure 4. 7: Transportation in Lake Victoria in Misungwi district

Source: (Field work, 2019)

4.4 Impact on the biological and physical features as a result of human settlement around Lake Victoria in Misungwi District over fifty years.

During the period 1961-1964 the level of Lake Victoria rose by around 2.5 m and the period 1977-1980 rose by 1.5 m (Kite, 2009). The lake area is about 68,000km^2 with a catchment area of 193,000km^2 (IOC, 2015).

The topography around the lake is a gentle slope and the wetland area of the Lake Victoria in Misungwi is continuing degraded which leads to the total land cover and shape change due to human population settlement and human associated activities including bad agriculture practices and over-stocking. This practice leads to soil degradation, hence water level to fall up to 200m as one respondent explains.

“Water level was not reaching here, it was near that small mountain and we used to fish there but as you can see today here we stand there is no water at all”(person interview, 2018)

From infrastructure development point of view, waste dumping, bad activities practiced especially on wetland, human pressure regarding water resources, chemical distortion and excessive Lake Victoria water consumptions are at the high level and at an alarming rate (figs. 4.8 and 4.9).

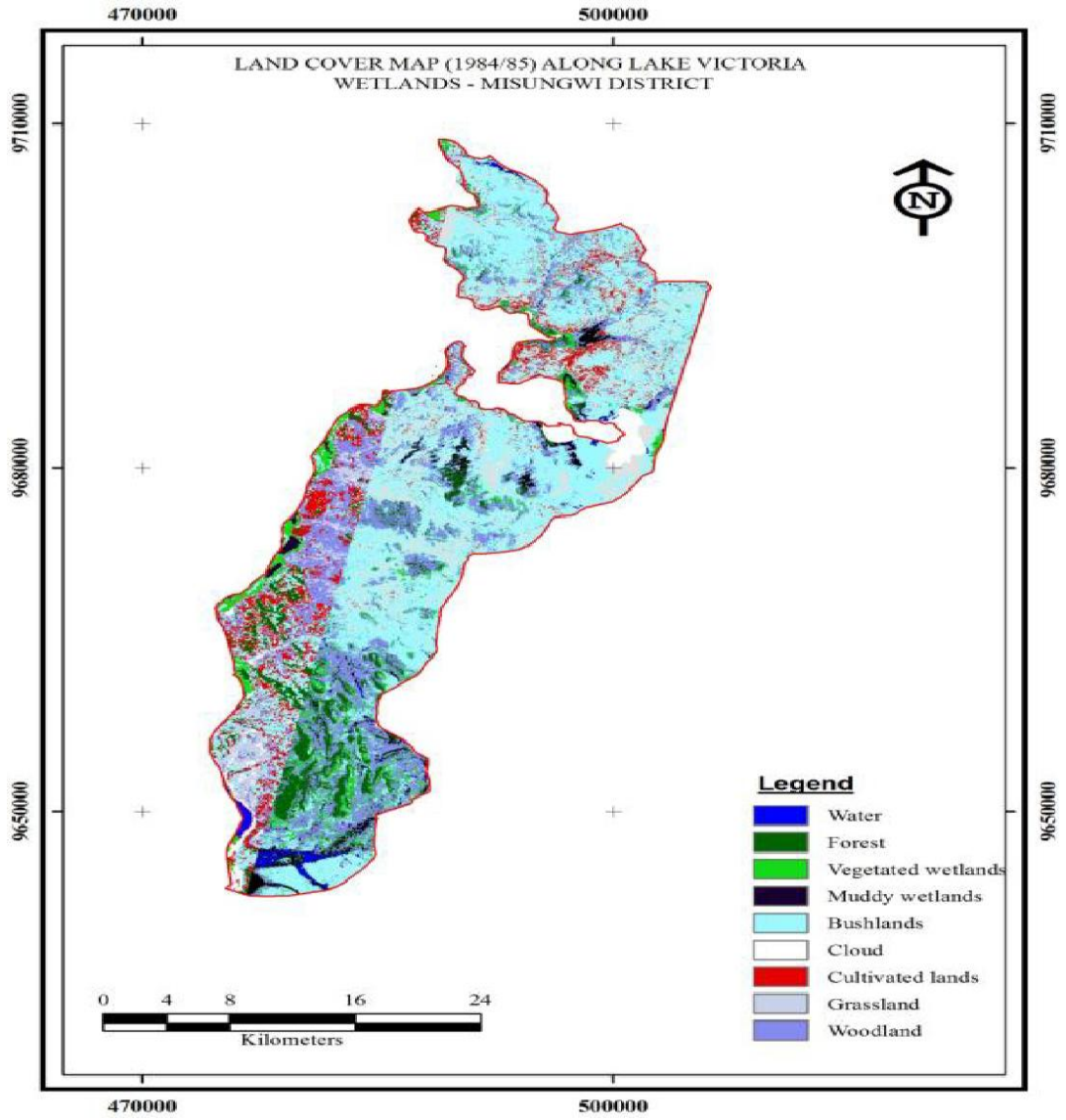

Figure 4. 8: Lake Victoria shore photo in Misungwi (1984) showing unpopulated areas of the Lake Victoria

Sources: Mbarika Agro-Pastoralist Migration Survey, 2012

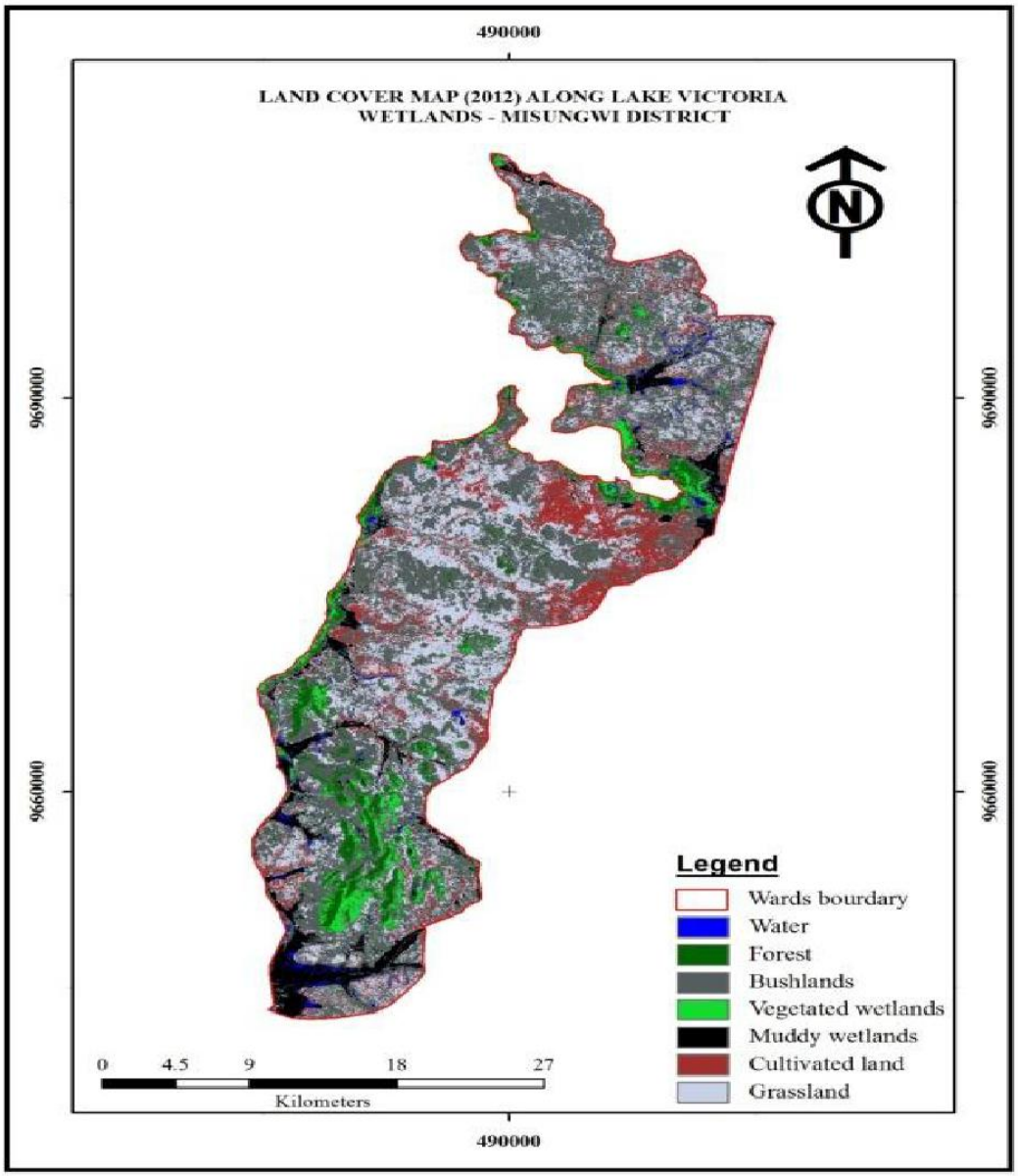

Figure 4. 9: Lake Victoria shore photo in Misungwi (2012) showing heavily settled area with large herds of cattle's, cultivation and deforestation areas of the Lake Victoria.

Sources: Mbarika Agro-Pastoralist migration survey, 2012)

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.1 Introduction

This chapter presents a summary of major findings of the study as discussed in the previous chapter. The discussion is carried out in regarding various aspects of research specific objectives with the aim of ascertaining the issues of human settlement expansion and impact on water resources in Lake Victoria but more precisely in Misungwi District.

5.2 Status of awareness of the local community on water resources management

The study pointed out that the understanding of water resources and its sustainable management is valid and reflected on education and awareness level of the community. Education both formal and informal is widely used as a conservation intervention in order to develop positive attitude, and it is often assumed that effective education will automatically lead to environmentally responsible behavior (Dobson, 2007). There is a growing recognition of the importance of social norms and attitudes in the management of water. Recent main policy documents recognize the importance of awareness rising to influence these norms and value towards more sustainable use of water resources (Schaap and Van Steenburgen, 2002), it also indicated that young people, women, and people of higher education level have influence on awareness status of local community like that of Misungwi District.

Although various stakeholders like local government and NGOs continue to conduct seminars, workshops and campaigns concerning public awareness and capacity building, residents of Misungwi district are yet to abide on waste management or waste minimization particularly about solid and hazardous waste like Mercury and Cyanide chemicals used on processing gold. This is so true simply because most people do not know or realize the importance of waste minimization and how easily it can be accomplished sometimes (Mvuma, 2002).

In this study education, occupation and duration of stay in the community found to have an influence on respondent(s) level of awareness on water resources management. But those with formal education were more aware of water resources management issues regarding to those carrying activities like bricks and artisan mining due to variation on environmental and natural resources (i.e. water) management information. However, the study showed that those people living near Lake Victoria in urban areas are more exposed to environmental and resources issues which results to more initiatives in controlling environmental and water resources problems compared to the people living within and around the wetland who are only aiming at obtaining economic benefits over water resources conservation.

Regarding the literacy level of the respondents, the study showed that most of the respondents know how to read and write. This is an important input to enable the community on awareness and understanding and hence adoption of new technologies, skills and knowledge in simplifying the creation of new strategies to improve water resources management at Lake Victoria in Misungwi district.

Education always becomes a tool helping for eradicating ignorance. Education can be a factor for intervention before a decision making. Particularly, environmental issues need education as a tool to ensure that sustainable development and environmental conservation strategies are both cost effective and successful (Howe, 2009).

5.3 Various human activities responsible for negative impacts on water resources.

The results from the study showed that majority of the respondents were in the middle age groups which fall within the economically active and productive group. These findings are supported by Basnayake and Gunaratne (2002) who showed that the age of a person usually is a factor that can explain the level of production and efficiency. As majority of households own land and depend on it for their livelihood, thus any decision taken on regarding the land use may have either positive or negative impact on Lake Victoria wetland in the study area. This implies that good land management can have positive impact on water resources in Misungwi district. Therefore any economic activities like agriculture and mining can affect water quality and other resources within the lake. This argument supported by Falkenmark et al. (1999) that made the same observation by arguing that exploitation of land resources has undesirable effects on the ecosystem, thus it is essential to understand how human interact with landscape system.

This implies that the degradation of wetland quality due to a certain land use type in upstream parts or a watershed can have negative effects on users in downstream parts

of the watershed and the degradation effect flow through the watershed. These findings are similar to the study conducted by Baur et al (2000) who argues that different land use system may have different impacts on wetland values direct or indirect as a result of land use practice of the stakeholders (upstream and downstream).

Furthermore, the results indicated that the main land use types were farming, animal keeping, settlement and infrastructure. In the present study it was also shown that there was diversity of land use types in the study area which have been changing since 1970s up to date. Likewise, the study showed that the change in the land use with increase of population in wetland and catchment areas as a case of mining which continue to grow as an important economic activity and with immense impact on environment including water resources in Misungwi district.

During the late seventy's and early eighty's there was a migration of agro-pastoralist communities from the neighboring societies to wetland of Lake Victoria in Misungwi District in search for land for cultivation and pasture. This act led to change in land use, economic activities and impact biodiversity on Lake Victoria wetland and water resources in general. Masanja (2013) support this as he observed that the rapid and excessive in-migration of agro-pastoralist from the drought hit neighboring areas had a more adverse effect on the carrying capacity sustainability of the wetland.

Subsistence agriculture is the major activity within the lake watershed. Water resources management of the lake resources is under threats whereby pollution level

from farms and industries and reclamation of wetland for agriculture raised concern. These demands for agriculture land are pushing the farmers to inside wetland where the land is still intact. This study revealed that poor land use management particularly using of toxic materials like fertilizers and pesticides attribute to the level pollution and destruction of the ecological sensitive areas within the wetland in Misungwi district.

The conversion of Lake Victoria catchment area to other uses might be due to rapid population growth in the study area which increases pressure and the demands for natural resources particular water resources for domestic and industrial uses. It can be attributed to negative attitude of local people where they turned wetland as a wasteland. Results of this study is in line with the previous studies (Daryadel and Talaei, 2014) they argued that natural ecosystem especially fresh water ecosystem in the inland flood plain are undergoing profound and extensive disturbances by human worldwide whereby human extensively reclaim natural wetland to expend their economic benefits.

It was also revealed that population increase went side by side with urban expansion so there is a substantial increase in settlement expansion adjacent to the Lake Victoria in Misungwi district including wetland zone as previous study support it. Petiangma et al (2017) argued that the wetland ecosystem of the Ndop plains have increasingly come under pressure as a result of urban development which is mirrored in population growth, housing and other infrastructural development.

5.4 Human settlement impact on biodiversity and physical features around Lake Victoria.

The study continue to reveal that current mining activities emerging in Misungwi district as alternative economic activity to the people especial in wetland zone in a study area where gold and diamond availability change the people economic perspective and led to emerging of artisanal miners in every place of the area. This is done with a little environmental management knowledge. By using of harmful chemicals like Mercury and Cyanide in large quantities which eventual discharge to the water tributaries around and ending up in Lake Victoria water.

This waste needs to be managed using principles that control the environmental impact in both short and long term. This finding was supported by (Lonesiy, 2006) who argued that acidic mine drainage is currently a very important problem in areas where there has been a history of coal or hard-rock mining. Oxidation of exposed sulfide minerals in mine tailing and waste rocks releases toxic metal ion and acidic hydrogen into surface and ground water.

Generally, population increase and settlement expansion is both a panacea and a curse to a Lake Victoria as negative impacts became a threat to ecology and in general biodiversity. Human activities like farming, mining and others disturbing ecology as Lake Victoria wetland covered by weeds, twigs and shrubs are threats to the entire wetland. Local people and environmentalists link the cause with human activities as an outcome of population expansion.

Richard Manase is an environmental officer at Misungwi district who has taken issues of environmental conservation very seriously in the area particularly on Lake Victoria. He says, “Without Lake Victoria this community will face a crisis on water so as a council we have investing a lot on protecting other water sources that contribute water to the lake and emphasis on sustainable uses to protect the Lake Victoria for our existence”.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The study has attempted to assess the impact of human settlement on water resources around Lake Victoria in Misungwi District and identified its possible future trend. It gives a structural description on how human settlement impact water resources. This was carried out by finding the link between socio-economic activities as a result of human settlement expansion and its impact on water resources management in Misungwi district.

6.2 Conclusion

To some extent, the level of awareness on environmental issues has increased significantly in recent years due to efforts made by the government and other stakeholders on sensitizing the public on environmental awareness for sustainable development in the country.

It is clear that the level of awareness on environmental issues has increased significantly in recent years where as environmental awareness is one of components in strengthening sustainable development in the country.

After cross reviewed NBS report on population (2013) the report shows dramatic increase of population in Misungwi district something that implies existing of economic activities that support the flourishing of the Misungwi population and

expansion. Economic activities like agriculture, mining, animal keeping and bricks making happened to have a direct relationship with water resources and in a long run impacted water qualities as no sustainable strategic plan was applied on water resources in Misungwi.

The available evidence from the findings of the study suggests that Misungwi district has experienced a steady or in some period a dramatic increase in urbanization for the past three decades and from all indications, the trend seems likely to continue to the unforeseeable future, unless operational and or strategic policies are put into places. These policies should necessarily have to look into the expansion of human settlement in Misungwi district coupled with its relative endowed natural resources especially water resources.

6.3 Recommendations

(1) This study recommends that, more emphasis be placed on continued emphasis on awareness raised campaign on the role and sustainable use of the water resources around Lake Victoria and its wetland at large lest the environment deteriorates at the expenses of the inhabitant's livelihoods. It is important for the Misungwi authority to strengthen their human resources capacity with adequate skills and technical know-how to enforce laws and deal with any impending consequences that may rise due to human settlement expansion especially on water resources and catchment areas.

(2) For sustainable uses of water resources in every economic activity the study revealed that the existence of economic activities is a threat to water resources in

Lake Victoria wetland. To mention a few; Mining, agriculture and transport activities have negative impact on biodiversity around Lake Victoria in Misungwi due to waste discharge like spilling oil, pesticides and mercury.

(3) All in all, it is not the attempt of this study to denounce the phenomenon of human settlement expansion. Although it has challenges, it also has opportunities that come with it. So long as the process can be controlled and its negative impact be minimized in a more sustainable way, human settlement has the potential to provide an economic benefit among other benefits which may be formed in a healthy environment to facilitate successful urban economic growth as an outcome of human settlement expansion.

6.3 Suggestion for future research

In suggestions for future research on this subject, I should focus more on findings and limitations encountered in this study. For instance nature of awareness creation campaign, the reality /status of the community based natural resources management and biodiversity.

The study may have been adequate in qualitative method but I would suggest for other method like quantative to test it as it was left deliberate to pave way for the new research

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APPENDECIES

Appendix 1 Questionnaire

Date..... Questionnaire .....Street.....Ward

1 Name of household's head.....Name of Respondent.....

Age of respondent.....years

Sex (i) Male..... (i) Female.....

Marital status (i) single..... (ii)Married..... (iii) Widow.....

Education level (a) primary education..... (b) Secondary education....(c) higher education..... (d) Tertiary education..... (e) No formal education.....

Occupation(a)farmer.....(b)Government employee.....(c)businessman.....(d)miner..... (e)Livestock keeper..... (f) Bricks maker..... (g) Fisherman.....

What are major sources of income in your family (a) employment..... (b) Fishing.....

(c) Farming..... (d) Mining..... (e) Livestock..... (f) Transportation.....

For how long have you been living in this village.....years?

General question

9. Have you ever heard of the following environmental issues?

s/no	Environmental issues	Yes	no	status
01	Pollution			
02	Reforestation			
03	Soil Erosion			
04	Waste disposal			
05	Over fishing			
06	Sustainable development			
07	Biodiversity			
08	Habitat destruction			
09	Environmental degradation			

Have you ever heard of environmental rules and regulation related to

s/no	Regulation	yes	no
01	Fishing		
02	Wetland management		
03	Residential development		
04	Agriculture		
05	Waste disposal		
06	Wildlife management		
07	Water resources management		

How could you describe the situation of Lake Victoria (i.e. Fishing, environment, pollution etc.)?

Are by laws for environmental conservation followed? (a) yes.....(b) no.....

If no; why they are not followed?

Agriculture practices

Do you practice agriculture activities.....? (a) Yes..... (b) No.....

What is the distance from your farm to the Lake Victoria wetland...M

Has the size of your cultivated land changed.....?

If yes has it (a) increased.....? (b) Decreased.....

What are the major crops grown on your farm in order of importance?

Do you practice conservation agriculture...? (a) yes.....(b) no.....

If yes what conservation method are you using?

What are/is the main cause/causes of soil erosion/land degradation in your area?

Livestock keeping

Do you practice livestock keeping? (a) yes.....(b)no.....

If yes; what is the number of species do you keep in your area?

No	Species	No of species	Sources of food	Sources of water
01	Cattle			
02	Goat			
03	Sheep			
04	Chicken			
05	Pig			
06	others			

Do you involve in mining activities at your area (a) yes.....? (b) No.....

If yes; what is the distance of your mining site from Lake Victoria wetland/buffer zone?

What kinds of germs are you mining? (a) Gold..... (b)Diamond.....(c) others.....?

What kind of chemical are you using in processing minerals?

Mercury..... (b) Cyanide .....(c) others.....

23 Do you have any safe work procedure (SWP) over chemical waste dumping?

(a) Yes..... (b) No.....

If no; how do you handle your chemical waste?

Do you practice fishing activities in your area? (a) Yes..... (b) No.....

Are there any illegal fishing activities at Lake Victoria in Misungwi district?

(a) Yes..... (b) No.....

If yes; what are they.....?

If no; why.....?

Are fishers use acceptance and sustainable gear? (a) Yes..... (b) No.....

Do you practice bricks making activities? (a)Yes..... (b) No.....

If yes what is the distance is your site located from the Lake Victoria wetland.....M?

Where is the source of firewood (a) Lake zone (b) Non Lake Zone

Do you practice transport activities inside the Lake Victoria?

Yes..... (b) No.....

If yes what is the energy sources are you using (a) Fuel..... (b)Non Fuel.....

For how long have been doing transportation inside Lake Victoria?.....years

Settlement and Urbanization

Do you have a building permit/title deed of the land you own?

(a) Yes..... (b) No.....

31 Where are the sources of building materials?

s/no	Building materials	source
01	Stone	
02	Quarry	
03	Sand	
04	Cement	
05	Wood	
06	Timber	
07	Mud	

32 How much domestic solid waste you produce per week.....kg?

33 How do you treating that domestic solid waste you produced?

Is unsustainable domestic waste disposal associated with Lake Victoria degradation in your area?

What should be done to improve domestic waste management in your area?

Do you have any processing or manufacturing industry in your area?

(a) Yes..... (b) No

If yes; how do they handle their waste produces?

Is there any environmental education, seminar, workshop or capacity building activities provided by local authorities, central government or Non-Governmental Organization at your area? (a) Yes..... (b) No.....

If yes how many times have attended such events or activities.....? (a).....1 (b).....2 (c).....3 (d)several times..... (e) Non.....