

**UNIVERSITY OF NAIROBI**

**INSTITUTE OF DIPLOMACY AND INTERNATIONAL STUDIES**

**MASTER OF ARTS IN INTERNATIONAL STUDIES**

**// THE ROLE OF REGIONAL COOPERATION IN SHARED FRESH WATER  
RESOURCE MANAGEMENT: A STUDY OF THE CONTROL OF WATER  
HYACINTH IN LAKE VICTORIA (2000-2005) //**

**SUBMITTED BY**

**CAROLINE WAIHERA GAITHO**

**R/50/P/8247/02**



**UNIVERSITY OF NAIROBI  
EAST AFRICANA COLLECTION**


**THIS DISSERTATION IS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS  
IN INTERNATIONAL STUDIES AT THE INSTITUTE OF DIPLOMACY AND  
INTERNATIONAL STUDIES OF THE UNIVERSITY OF NAIROBI**

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## Declaration

This project report is my own original work and has never been submitted to any other university for an award of any degree.

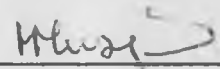
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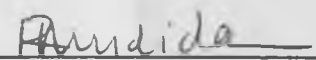
This project report has been submitted for external examination with our approval as the University Supervisors

**Prof. Makumi Mwangi**

Signature 

Date 20/11/06

**Mr. Robert Mudida**

Signature 

Date 17/11/06

## Dedication

To my late grandmother Veronica Wanjiru Mwaura whose final words and encouragement to me were that I should study very hard.

## Acknowledgement

First I would like to thank God for divinely giving me an opportunity to pursue a Master's degree at the University of Nairobi, His grace and faithfulness has guided me all through. Praise, glory and honour to His Name.

This work would not have been possible without the advice, assistance and dedication of Mr. Mudida, my supervisor. Through his commitment I have been able to complete this study. Thank you for your support and guidance and God bless you. My sincere thanks go to Mrs. E. Miheso, whose knowledge and invaluable suggestions guided me when I was off-track. I am greatly indebted to Mr. Kenneth Nyamolo who spared his time and effort to provide much needed assistance especially in the fieldwork. Thank you for the useful insights through out the research project, God richly reward you.

I wish to register my appreciation to the staff of the Ministry of East Africa Community especially H. Oriaro and L. Kwinga for sharing your office with me. Thank you all the staff that assisted me in various ways; it is difficult to mention you all by name but am eternally grateful for your assistance. It would be cruel not to mention the undying love, patience and financial support of my parents. Thank you so much, you are special.

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## Abbreviations and Acronyms

EAC	East Africa Cooperation
IUCN	World Conservation Union
LVEMP	Lake Victoria Management Programme
FGD	Focused Group Discussions
BOD	Biological Oxygen Demand
SIDA	Swedish International Development Agency



## Abstract

Nature has not endowed every nation on earth with the same amount of resources and at the same time it does not respect national boundaries. One of these natural resources is freshwater. Fresh water is central to life, as no living thing can exist in its absence. It is this intrinsic value of fresh water coupled with the fact that it runs across national boundaries that has the potential to cause or exacerbate conflict between states but also can be a cause of interstate cooperation.<sup>1</sup>

This project is an outcome of a study carried out to determine the role of regional cooperation among the three East African Countries of Kenya, Uganda and Tanzania in the management of Lake Victoria, which is a shared freshwater resource among the three countries, particularly in the control of water hyacinth weed.

When the water hyacinth first appeared on Lake Victoria, it continued to grow almost unchecked until its peak infestation. The invasion affected the normal utilities of the Lake thus affecting the national economies of the riparian states and threatening the socio-economics of the Lakeside communities leading to the deterioration of their standard of living. The Lake being a shared resource among the three East African states, made it difficult for any of the states to solve the water hyacinth menace individually.

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<sup>1</sup> A. P. Elhance, *Hydro-Politics in the 3<sup>rd</sup> World, Conflict and Cooperation over essential and Scarce Natural Resources*, 1999, United States Institute of Peace, Washington D.C U.S.A, p.3

Through the use of questionnaires, and qualitative research techniques like focused group discussions (FGDs), the study explored the impact of regional cooperation on the control of water hyacinth particularly on the Kenyan side of the Lake and whether the joint effort of the three riparian states has been successful or had any impact on the livelihood of the Lake communities living on the Kenyan side.

Findings from the study showed that there has been improvement in the control of water hyacinth especially through the efforts of the Lake Victoria Environmental Programme (LVEMP) which is a regional institution formed by the three East African Countries, however according to the findings, when it reaches the bottom level of the institutional structure, it only addresses the lowest institutional members rather than use the institutions to address the members of the community. However if regional cooperation is to have great impact and success in the management of the Lake members of the communities will have to be involved as they are the one who interact with the Lake daily.

# CHAPTER ONE

## INTRODUCTION

### Background Information

The chapter begins with a detailed analysis of the current state of the world in relation to the environment and human health. The impact of industrialization and technological advancement on the environment is discussed, highlighting the increasing levels of air and water pollution. The text also addresses the growing concern over climate change and its potential effects on the planet. The author emphasizes the need for a comprehensive approach to environmental protection, involving governments, industries, and individuals.

The chapter then discusses the role of education in environmental awareness. It highlights the importance of teaching environmental science and ethics in schools and universities. The author argues that a well-educated population is more likely to support and participate in environmental conservation efforts. The text also mentions the role of media and public awareness campaigns in promoting environmental protection. The author concludes the chapter by emphasizing the need for a global perspective on environmental issues and the importance of international cooperation in addressing these challenges.

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# CHAPTER ONE

## 1. INTRODUCTION

### 1.1. Background Information

Fresh water sources occupy a relatively small portion of the surface of the earth in comparison to marine and terrestrial habitats. The amount of fresh water including glaciers of the arctic and Antarctic regions accounts to only 2.4% of the total global amount of water of which Lakes contain only the very small part of about 0.01% of the global amount of water. 97.6% belong to the vast amounts of water in the oceans<sup>1</sup>

This goes to show that if the human population relies on only 2.4% of fresh water, potential of conflict is enormous. This is because globally 47% of all land falls within international river basins and nearly fifty states on four continents have more than three quarter of their total land in international river basins. According to Clarke this in human terms means that almost 40% of the world's population lives in international river basins. This people are therefore dependent on the cooperation of all the countries sharing the basins in the management of the freshwater, for a guaranteed consistent supply of quality water and for their environmental stability.<sup>2</sup>

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<sup>1</sup> S. Jørgensen and R. Vollenweider, *Guidelines of Lake Management Vol. 1, Principles of Lake Management*, 1988, International Lake Environment Committee and United Nations Environmental Programme P. 19,

<sup>2</sup> R. Clarke, *Water the International Crisis*, 1991, Earthscan Publications Ltd., London. pp. 91

Lake Victoria where this study will be carried out is the second largest freshwater Lake in the world and is shared by three East African countries namely, Kenya, Uganda and Tanzania. This study will focus on the control and management of the water hyacinth weed as a result of regional cooperation among the three East African countries.

Lake Victoria covers an area of 69000km<sup>2</sup> and a volume of 2700km<sup>3</sup>. The Lake measures 337km at its longest and 240km at its widest with a mean depth of 40m and a maximum of 92m. Lake Victoria is the largest tropical Lake in terms of size, species diversity, biomass and ecological variability. It is shared between Kenya 6%, Uganda 43% and Tanzania 51% with a total convoluted shoreline of around 4,828km that encloses innumerable small shallow bays and inlets, many of which include swamps and wetlands.<sup>3</sup>

According to the Lake Victoria Environment Management Project Literature, the Lake lies in one of the most populous areas in the world, serving as a source of livelihood for some thirty million people in Kenya, Tanzania and Uganda. It is important to the riparian states for food, agricultural, industrial and domestic water supply, marine transport, biodiversity conservation, tourism and recreation. Current estimates show that annual fish catch from Lake Victoria is between 400,000-500,000 metric tonnes making it a great source of socio-economic development to the peoples of East Africa. In Uganda the Lake

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<sup>3</sup> N. S. Wangai, *The Biology and Impact of Neochetina Weevils on Water Hyacinth, Eichhornia crassipes in the Lake Victoria basin, Kenya*, p.2, PhD Thesis (unpublished), Moi University

is considered as the source of the Nile and provides the waters to generate electricity at the Owen Falls. The Nile then continues as a lifeline to Sudan and Egypt before emptying into the Mediterranean Sea.<sup>4</sup>

All over the world Lakes have continued to play vital roles in the livelihood and prosperity of mankind. Their uses include but not limited to: domestic and industrial water use, irrigation and agricultural development, fishing grounds, modes of transport and a medium for sporting and recreation. Besides, their aesthetic appeal and beauty provides a serene environment for meditation and recreation.<sup>5</sup> However, the Lake Victoria ecosystem is facing several challenges that would impinge on the socio-economic fabric of the riparian states and their communities. Moreover, the ecological functioning of the lake and its processes are put at the verge of collapsing if these challenges are not addressed.

One of the major challenges faced by the Lake has been its infestation by the water hyacinth weed. Water hyacinth is an indigenous plant from South America and is believed to have been introduced by explorers and naturalists into Africa about 100 years ago. The infestation of water hyacinth in the Lake Victoria is suspected to have originated from the Rwandan highlands through River Kagera between 1990 and 1992. The weed then spread through out the Lake due to the favourable eco-climatic conditions

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<sup>4</sup>Lake Victoria Environmental Management Programme Website. [www.lvemp.org/waterhyacinth](http://www.lvemp.org/waterhyacinth)

<sup>5</sup> N. S. Wangai, *The Biology and Impact of Neochetina Weevils on Water Hyacinth, Eichhornia crassipes in the Lake Victoria basin, Kenya*, op.cit.

in the three riparian states of Kenya, Uganda and Tanzania. In East Africa, the presence of the water hyacinth has had profound socio-economic and ecological impacts. These effects include interrupted fishing activity, water supply and hydro electric power generation, loss of biodiversity, increased eutrophication, evapotranspiration and deoxygenation, erosion of the Lake's scenic beauty, prevalence of hippos and crocodiles and disease carrying vectors such as mosquitoes and snails.<sup>6</sup>

Currently the water hyacinth menace has been brought down to controllable measures by use of various control methods, the most effective being the use of biological methods through the introduction of weevils, which are natural enemies of the water hyacinth weed. These measures have mainly been taken by the Lake Victoria Environmental Project, which was established through the cooperation of the three East African States of Kenya, Uganda and Tanzania.

This joint effort by the three riparian states in the management of Lake Victoria basin as a shared ecosystem can be traced back to chapter eighteen (18) Agenda 21 recommendations, following the Rio Summit of 1992. More so, after individual attempts by the three riparian states to individually curb the water hyacinth menace, it became obvious that "the problems, challenges, and opportunities posed by the Lake were of such magnitude that they could not be faced by the riparian states separately. It therefore became necessary for the three states to develop of a collective approach in the

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<sup>6</sup>Lake Victoria Environmental Management programme website, [www.lvemp.org/waterhvacinth](http://www.lvemp.org/waterhvacinth)

management of the shared water resource that would not only roll back the environmental threat that hang over the Lake but also further unlock the vast potential of the Lake for the benefit of the people of the East African region as well as preserve the Lakes ecological integrity and ecological processes”<sup>7</sup>

To further address the challenges and potential of the Lake, efforts are needed to improve the management and quality of databases and information systems coupled with coordinated actions from all fronts. Such database and information is more often than not locked within the communities, as they are the main custodians of the Lake. The communities will thus be among the units of observation together with other institutions and organizations.

Some of the beaches that were heavily infested by the aquatic weed have been selected for the study. These include: Kendu Bay in Rachuonyo, Homabay in Homabay District, Osieko, Luanda and Usenge in Bondo District. These are quite representative as they are well interspersed and circum-navigate the Lake. Moreover Sori and Osieko beaches are routes to Tanzania and Uganda respectively.

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<sup>7</sup> J. Kikwete, Ministry of Foreign Affairs and international cooperation, Tanzania as quoted in the Regional Task Force et al, *The Vision and Strategy Framework for Management and Development of Lake Victoria Basin*, Main Report, September 2003,p.4



## 1.2. Problem Statement

This study stems from the observation that water hyacinth had grown unchecked until its peak infestation in the three East African countries a situation that may have been prevented if the three states would have earlier cooperated in the management of the Lake not only from the regional level but especially further down to the community level, since the riparian communities are the main custodians of the Lake. Therefore, due to lack of joint management all the way from the regional level to the community level, this became an impediment to the socio-economic development of the riparian communities of the three states who depend on the Lake for fishing, mode of transportation of their goods and services among other key utilities by the Lake. Economic activities around the Lake were also brought to a near halt hence the loss of revenue by the three states, deterioration of the living standards and the diminution of the sources of livelihood for the communities around the Lake.<sup>8</sup>

The weed is not only a threat to mankind. Without joint management, the weed also poses a serious ecological catastrophe that threatens the ecological integrity and processes freshwater Lakes. For instance, it covers large surfaces leading to low levels of Biological Oxygen Demand (BOD) for fish and other marine organisms. This leads to the choking of marine life and results to death of certain organisms and reduction of others.

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<sup>8</sup> Lake Victoria Environmental Management Programme website, [www.lvemp.org/waterhyacinth](http://www.lvemp.org/waterhyacinth)

More so, the rate of evapotranspiration increases which plays a role in the reducing of the water levels in the Lake.<sup>9</sup>

Control of the weed is thus necessary and these calls for concerted efforts by the riparian states since the weed is highly mobile and moves with the waves and tides from one country to the other. Therefore this study will examine the role of regional cooperation in addressing the water hyacinth concern not only from the regional level but further down to the to the community level. It will also highlight the socio economic implications of the water hyacinth on the Lake communities as well as identify further areas of cooperation for the sustainable management and utilization of the Lake Victoria waters to avert grievous catastrophes such as those that have occurred due to the invasion of water hyacinth.

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<sup>9</sup> N. S. Wangai, *The Biology and Impact of Neochetina Weevils on Water Hyacinth, Eichhornia crassipes in the Lake Victoria basin, Kenya*, op.cit

### **1.3. Research Objectives**

#### **1.3.1. Overall Objective**

To determine the role of regional cooperation in the management of shared fresh water resources.

#### **1.3.2. Specific Objectives**

- i. To determine the role of regional cooperation in the control of water hyacinth by the three East African countries.
- ii. To establish the effects of water hyacinth on the livelihood of the communities living by the shores of the Kenyan side of Lake Victoria.
- iii. To assess the institutional structures and policy frameworks of three states in controlling the water hyacinth in Lake Victoria
- iv. To assess the community levels of awareness on the East African Community and their capacity to respond and warn on trans boundary spillovers
- v. To assess the ecological processes and functioning of the lake in relation to water hyacinth control.

#### **1.3.3 Hypotheses**

- i. Cooperation synergizes efforts leading to speedy control of water hyacinth in Lake Victoria.
- ii. Riparian communities livelihoods depend on the normal Lake functioning.
- iii. Proper institutional structures with defined mandates and policy frameworks lead to proper management of water resources.

- iv. Increased awareness of the components of cooperation among the three states within the three riparian communities would increase their ability to warn of spillovers and enhance their response capacities in time.

#### **1.4. Scope and Limitations of the Study**

The study will revolve around but within the general and specific objectives of the research. It will explore the individual specific objectives while validating or invalidating the sets of hypotheses and assumptions of the conceptual model as well.

The study will be done in beaches that have been purposively selected and samples drawn randomly on these beaches namely: Homa Bay, Kendu Bay, Sori, Mbita, Luanda, Usenge, Osieko, and Dunga beach in Kisumu. These beaches circumvent the Lake hence a representative sample of the Lake on the Kenyan side with lots of insights on the Ugandan and Tanzanian side on beaches where communities from the other two riparian states interact in Sori, Osieko and Usenge respectively.

Due to the unavailability of time and resources the study will be limited to the Kenyan side of Lake Victoria, and even then to selected beaches. However as mentioned above

the beaches selected circumvent the Lake thus a representative sample of the Lake on the Kenyan side.

## **1.5. Theoretical Framework**

The relevant theories used are the tragedy of the Commons by Garret Hardin, which will further be supported by another framework based on discussions by the researcher, research assistant and Mrs. Elizabeth Miheso

### **1.5.1. Tragedy of the Commons**

The theory of the tragedy of the Commons is relevant to this study because it is based on the theory that freedom in the use of commonly owned resources for example, a common pasture only brings ruin to the resource. He contends that general public good does not follow from everyone serving his or her own interests. This is because every individual would find it advantageous to unlimitedly exploit the common-which is limited or rather finite- to their own individual advantage which would ultimately ruin the commonly owned resource and in effect rob that individual including the whole society the benefits acquired from the commonly owned resource.<sup>10</sup> Thus he concludes that the only way to preserve and nurture common resources is by relinquishing some freedoms in order to maintain others. In other words, to end the tragedy of the commons be they global,

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<sup>10</sup> G. Hardin in: Susan Armstrong and Richard Bolster, *Environmental Ethics, Divergence and Convergence*, 1993, pp 224-225, Mc Graw-Hill Inc., U.S.A

national or communal is by mutually agreeing to pass laws which even though they would mean infringing on personal liberties, would ensure the preservation and equitable use of the finite common resource, thus bringing to an end the tragedy of the commons.<sup>11</sup>

In his example Hardin uses shepherders on a common pasture whereby each shepherd would find it advantageous to increase the size of his or her own herd, but the result of each engaging in this would lead to overgrazing ruining the common resource for the society as a whole of which he is part of. Hardin also views water pollution as arising from a similar problem. For example, he argues that the cost of discharging raw waste is less than the cost of purifying the wastes before releasing them into the watercourse. However this would also ruin the common resource for most as it has various purposes of which the polluter directly or indirectly benefits from.<sup>12</sup>

This theory is important to this study, as it is applicable to the regionally and nationally owned Lake Victoria. Lake Victoria has for years been an unmanaged common resource used just as Hardin contends in his two examples. Like a pasture, the three riparian states and their communities have to use the lake to satisfy their own utilities. This includes exploitation as a resource for food, water, economic gain, and recreation and at the same time as a disposal bin whereby industrial and urban raw waste has been discharged into the Lake by the three riparian states. As long as the economic and socio-economic status

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<sup>11</sup> Ibid

<sup>12</sup> Ibid

of the riparian states and communities were not immediately threatened, it was not of any immediate concern to them and therefore no measures were immediately taken by either of the three riparian states when the exotic invasive water hyacinth began to creep into the Lake. Thus just as Hardin observed, they continued to use and pollute the shared water resource selfishly with no regard to the survival of the Lake nor the impact of the invasion of the water hyacinth weed on the Lake, its ecological surroundings, not forgetting the potential long term effects it would have on them as socio-economically as states and their communities.<sup>13</sup>

To avoid the deterioration of a common resource therefore, Hardin suggests the mutually agreeing by the necessary authorities to pass laws which would manage the common resource as the authorities would deem fit.<sup>14</sup> In the case of Lake Victoria, considering it is shared among three states, management of the waters through cooperation not only from the regional level but right to the community level would be most efficient and would consequently save the waters from a tragedy and ensure sustainability both ecologically and economically for the riparian states and communities as well the ecological systems.

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<sup>13</sup> D. Okallo, 1999, *Socio-economic implications of the water hyacinth in Lake Victoria on fishing and Trading communities: A Comparative Rural and Urban case Study*, Masters Thesis (unpublished), Moi University p.13

<sup>14</sup> G. Hardin in: Susan Armstrong and Richard Bolster, *Environmental Ethics, Divergence and Convergence*, op.cit

Another framework that applies to this study is the consideration of the members of the riparian communities living by the Lake as the major building block if the management of the Lake is to be successful. Despite the fact that cooperation between the riparian states in the management of the Lake is vital, members of the riparian communities living by the Lakeside cannot be ignored, as they are the actual custodians of the Lake, due to the fact that they continuously interact with the Lake and its ecosystem in their day to day to day activities. This theory therefore considers it very important that the three riparian states devise a structure that involves the individual members of the communities through their various social or economic groupings. This allows the individual members of the community to provide quality database and information as they are on the ground, thus in a better position for early detection and the enhancement of speedy responses.<sup>15</sup>

This information and early warning systems should then be passed to the sub-national levels for example districts, from where the information would be sent to the national levels. The national levels would then be expected to pass on the information to the regional offices. On the other hand, if there is information from the regional offices, it would trickle down using the same path hence the interrelatedness of the model. The model seeks to integrate the riparian communities into decision making processes that affect their lives, in the process eliminating any sort of marginalization. It is a mutually supportive inverted funnel approach, in that information is able to flow from top to bottom and vice versa without the marginalization of any level.<sup>16</sup>

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<sup>15</sup>Based on discussions by the researcher, Mrs. Elizabeth Miheso and research assistant on July 2006 and October 2006 respectively.

<sup>16</sup>Ibid

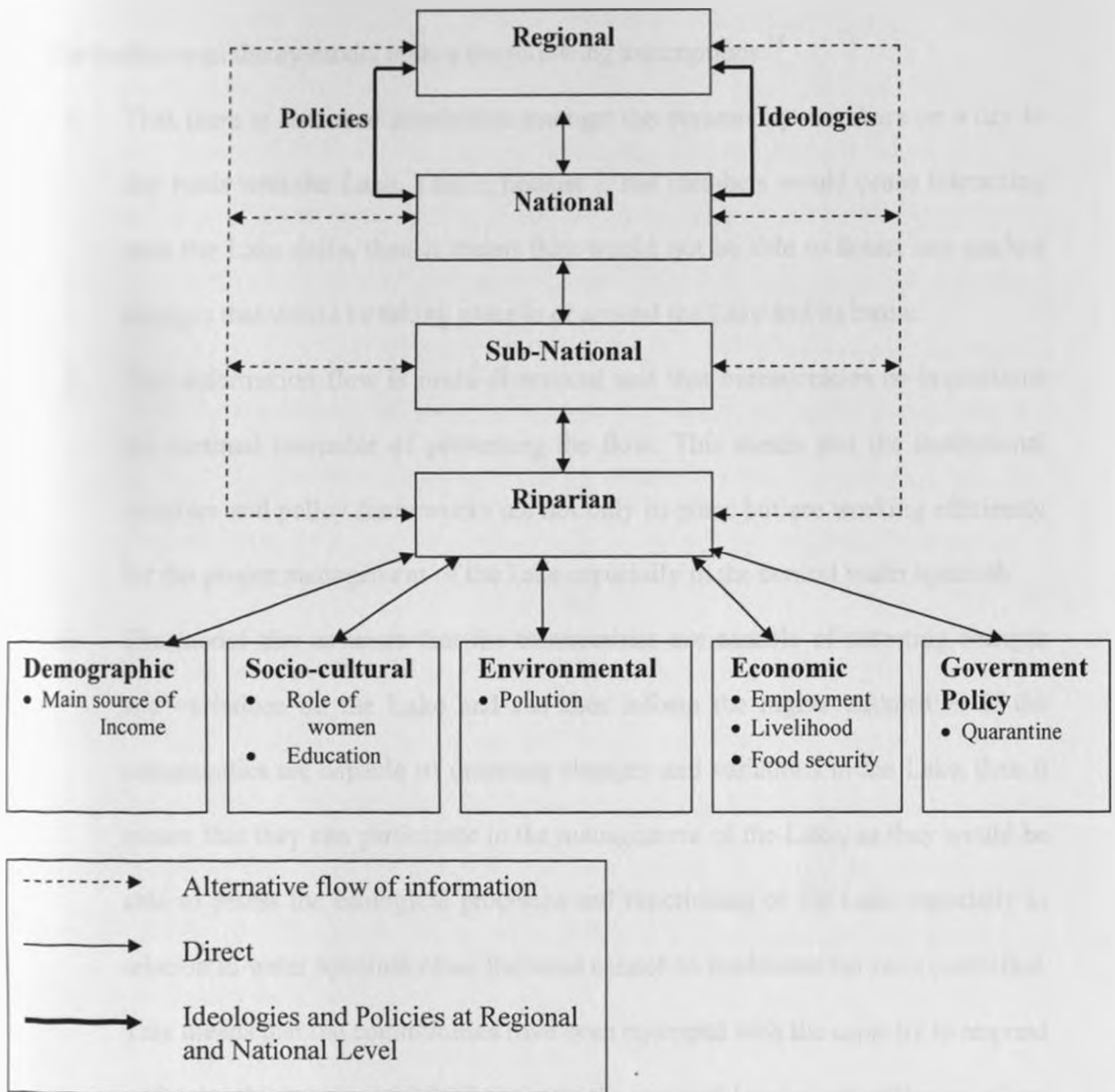


However it is important to note that several factors are known to hinder the communities' capacity to respond to emergency and these include demographic such as age (children's observations are not taken seriously), economic and social-cultural (education etc) factors among others, and these affect the response rate or speed. Regional Cooperation is also affected by political ideologies and policies pursued by a country. <sup>17</sup>

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<sup>17</sup> Ibid

1.5.2. THEORETICAL INSTITUTIONAL FRAMEWORK



Source: Researcher, Mrs. Elizabeth Miheso and Research Assistant, 2005

### **Institutional Theory Model Assumptions**

The institutional theory model makes the following assumptions:<sup>18</sup>

- i. That there is continual interaction amongst the community members on a day to day basis with the Lake. This is because if the members would cease interacting with the Lake daily, then it means they would not be able to detect any gradual changes that would be taking place in or around the Lake and its basin.
- ii. That information flow is multi-directional and that bureaucracies or impositions are minimal incapable of preventing the flow. This means that the institutional structure and policy frameworks are not only in place but are working efficiently for the proper management of the Lake especially in the control water hyacinth.
- iii. The model also assumes that the communities are capable of detecting changes and variations on the Lake and can thus inform the higher authorities. If the communities are capable of detecting changes and variations in the Lake, then it means that they can participate in the management of the Lake, as they would be able to assess the ecological processes and functioning of the Lake especially in relation to water hyacinth since the weed cannot be eradicated but only controlled. This means that the communities have been equipped with the capacity to respond and warn the managers of the Lake up to the regional level about spillovers of any nature.
- iv. That the members of the communities would want to better their living standards by exploiting the Lakes resources to the maximum level however in a sustainable

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<sup>18</sup> Ibid.

manner, hence the need to be the custodians of the Lake. In this way a tragedy of the commons according to Garrett Hardin would be avoided as the communities would use the resource in a sustainable manner that would ultimately promote socio economic development.

- v. The model further assumes that differences in policies and ideologies are harmonized at the regional level and that the countries are cooperating. If the states disagree and have different policies regarding the running of the Lake then there cannot be effective management of the Lake, therefore the Lake becomes a victim of the tragedy of the commons as explained by Garrett Hardin, as the shared water resource would not only be inhabitable by plants and animals but would also not provide human life with the basic necessity of drinking water.

The model therefore portrays the need for the management of Lake Victoria from the Regional level to the community level not only for the prevention and control of aquatic weeds such as water hyacinth, but also for the national and regional exploitation of the waters for economic and socio economic development not forgetting the prevention or management of conflicts that may arise at the regional, national or community levels as a result of the shared water resource.<sup>19</sup>

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<sup>19</sup> Ibid

## 1.6. Justification of the Study

The justification of this study is divided into academic and policy.

Many problems facing the water sector are due to poor implementation of the principles of integrated water resource management. Fragmented institutional structures have been the major impediment for the sustainable management of water resources. The unabated growth of water hyacinth beyond the communities' response capacity is a clear indicator to qualify the above statement.

The study will also add new insights to existing academic knowledge and debate on Regional cooperation in shared water resource management, particularly on whether the already existing communal social and economic groupings should be incorporated in the institutional structure that governs the management of shared water resources through out the different levels beginning from the Regional or whether the lowest leadership levels such as the Beach Management Units are satisfactory. More so feedback from the study will be used to make informed decisions on issues that affect the communities and states that share the Lake.

The study will inform policy of the strengths that exist, weaknesses, opportunities and threats to the Lake Victoria's ecosystem with the riparian community as the basic unit for generating quality databases and information as they interact with the lake daily. It will

foster dialogue among the riparian states for efficient management and utilization of the shared waters.

## **Literature Review**

### **1.6.1. Overview**

This chapter reviews scholarly works related to cases of regional cooperation in water management not only in East Africa but also in other parts of the globe such as Asia and Europe. It briefly mentions the changes the Lake has undergone since the 19<sup>th</sup> Century until present times, then goes on to focus on scholarly works written on the invasion of water hyacinth in the Lake Victoria and highlights its socio-economic implications and control. It also reviews the instruments developed to aid and assist in the management of the Lake Victoria water by the East African Cooperation. This would be able to give a clear picture and perhaps areas where gaps do exist that call for greater sense of cooperation amongst the beneficiary countries.

### **1.6.2. Literature on Regional Cooperation and Water Management**

Clarke defines water as a resource with no substitute and on which there is total dependency. It is a unique natural resource not only because it cannot be created or replaced but also because it moves unlike coal, forests and soil, water flows from mountaintops to plain to sea and inevitably from one country to another.<sup>20</sup> Thus the way water is used in one state can therefore have an effect on all the other downstream states, causing disputes, tension and conflict between states. Thus the political importance of water as a resource has few boundaries explaining why countries that need it pay scant

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<sup>20</sup> Ibid

attention to political boundaries. Clarke gives an example of the Middle East whereby water being the key to economic activity, assured supplies of fresh water have already been used as bargaining tools in attempts to achieve the Middle Eastern peace settlements.<sup>21</sup>

### 1.6.3. Importance of management of shared water resources

Jørgensen and Vollenweider contend that the problems freshwater resources are caused by anthropogenic use of the ecosystems. By this he means that most fresh water resources have multiple uses and the problems that arise are related to the conflict between these uses.<sup>22</sup> Taking the example of Lake Victoria, Muli notes that it has undergone profound disruption since the 1920s due several interrelated factors.<sup>23</sup> These include cumulative impacts of the intentional and/or accidental introduction of exotic species of fish (Nile Tilapia and Nile perch). Eutrophication, pollution from point or non point sources that is untreated domestic and industrial sewage and agricultural effluents, soil erosion, siltation due to deforestation of the catchment areas proliferation of water hyacinth and the degradation of wetlands have wrecked havoc on this species rich ecosystem.<sup>24</sup>

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<sup>21</sup> Ibid

<sup>22</sup> S. Jørgensen and R. Vollenweider, *Guidelines of Lake Management, Principles of Lake Management*, Vol 1, 1988, International Lake Environment Committee and United Nations Environmental Programme, P. 37

<sup>23</sup> J. Muli, *Environmental Problems of Lake Victoria (East Africa): What can the International Community do? 1996*, In: *Lakes and Reservoirs Research and Management* 1996, pp. 47-53.

<sup>24</sup> Ibid



Lake Victoria Environment Management Project further notes that since the 1960's the Lake environment and its natural resources have come under severe stress as a result of multiple activities arising from human population in the basin, which has been growing at 6% the highest growth rate in Africa. The increasing urbanization, industrialization, poverty among the lake basin communities and poorly regulated development are continuing trends which have resulted in serious environmental problems one of the most obvious being Water hyacinth infestation.<sup>25</sup>

According to Hirji, the consequences have included an unstable fishery, lack of biodiversity and accelerated eutrophication as evidenced in more frequent blue-green algae blooms and decrease in water transparency. Algal growth since 1960 has increased fivefold, reducing transparency of the Lake while it has been estimated that nutrient inflow since 1950s has increased threefold.<sup>26</sup>

However, despite the problems of the Lake waters, Okidi highlights that Lake Victoria is a Lake of great importance not only to the riparian states but also to the entire Nile Basin.<sup>27</sup> Hence, to manage the diverse conflicting uses of freshwater resources, Salman and Chazournes suggest that national institutions for facilitating regional cooperation should be established by riparian states, which would support and promote inter-riparian

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<sup>25</sup> Lake Victoria Environmental Management Programme Website, [www.lvemp.org/waterhyacinth](http://www.lvemp.org/waterhyacinth)

<sup>26</sup> R. Hirji, D. Carey, "Managing International Waters in Africa: Process and Progress" In M.A.S. Salman et. al, *International Watercourses; Enhancing Cooperation and Managing Conflict: Seminar Proceedings*, World Bank Technical Paper No 414.

<sup>27</sup> Nicholas Wallis, *Intensified Systems of Farming in the Tropics and Subtropics*: World Bank, Washington D.C

dialogue, put into consideration all the uses of the waters and attempt to solve the conflict between them<sup>28</sup> thus paving the way for effective management and development of shared watercourses.<sup>29</sup> The East African Cooperation on Lake Victoria is a good example of regional cooperation on shared fresh water resources as the three countries of Kenya, Uganda and Tanzania have attempted to jointly address the problems caused by the water hyacinth weed

#### 1.6.4. Cooperation among the East African States

As the states individually continued to realize and feel the biting effects of the aquatic weed, the three states attempted to individually curb the water hyacinth menace.

##### 1.6.4.1. The Water Hyacinth Weed in the Lake Victoria

A. H. Pieterse et al states that aquatic weed problems are either caused by plants native to Africa which grow in nuisance proportions because the environment has been disturbed or altered by man through artificial canals, drains, manmade Lakes and anthropogenic enrichment of the water by industrial nutrients, or by plants alien to Africa which are able to exploit aquatic habitats and build up large populations because of the absence of environmental controlling factors present in their native environments.<sup>30</sup>

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<sup>28</sup> S. Jørgensen and R. Vollenweider, *Guidelines of Lake Management, Principles of Lake Management*, op.cit

<sup>29</sup> Salman Salman, Laurence Boisson de Chazournes Ed., *International Watercourses, Enhancing Cooperation and Managing Conflict*, Proceedings of a World Bank Seminar, 1998, The World Bank, Washington D.C, pp. 93, 94, 167, 169

<sup>30</sup> A. Pieterse, K. Mueohy, *Aquatic Weeds, The Ecology and Management of Nuisance aquatic vegetation*, 1993, Oxford University Press, New York, p.34

According to Wadda, The weed is said to have gained access to Africa in Egypt between 1872 and 1892, South Africa in 1910, and in the democratic republic of Congo in 1952. Ghana, Benin and Nigeria during the first half of the 1980's.<sup>31</sup> The first place in East Africa that water hyacinth was observed to have gotten out of hand was on the Sigi River, near Tanga in Tanzania in 1955.<sup>32</sup> Although Ivens argues that water hyacinth was introduced to East Africa for its decorative value.<sup>33</sup> Twongo and Balirwa state that it was previously unknown to the Lake inhabitants and is suspected to have entered Lake Victoria through River Kagera<sup>34</sup> whose upper tributaries, River Mukungwa and River Nyabarongo were reportedly infested with water hyacinth for an entire length of over five hundred kilometres.<sup>35</sup> They observe that estimates made between April and August 1999 indicated that 3.5 hectares of weed flowed every week into the Lake from this river.<sup>36</sup> Even though the weed was first introduced to East Africa for its decorative value, water hyacinth is now scheduled as a noxious weed through out East Africa and its culture is illegal.<sup>37</sup>

According to Njoka, the aquatic weed water hyacinth is ranked as one of the top ten weeds in the world and is one of the most successful colonizers in the plant kingdom. In

<sup>31</sup> Eng. BN.K. Wadda, Lvemp, Water Hyacinth Control Unit, Lake Victoria Environmental Management Programme Website, [www.lvemp.org/waterhyacinth](http://www.lvemp.org/waterhyacinth)

<sup>32</sup> G.W Ivens, *East Africa weeds and their control*, oxford University Press, Nairobi, 1968, p.4

<sup>33</sup> Ibid

<sup>34</sup> K.Thompson, *The Water Hyacinth in Uganda: Ecology, Distribution, Problems and Strategies for Control*. Proceedings of a National Workshop, October 1991, Kampala, Uganda, UN/FAO, Kampala.

<sup>35</sup> H. Bugaari et. al , *The Water Hyacinth Problem in Lake Victoria*, 1998, East Africa, Aquatics Unlimited, Kampala, February, 1998, Uganda

<sup>36</sup> T. Twongo and J. Balirwa, *The Water Hyacinth Problem and the Biological Control Option in the Highland Lake Region of the Upper Nile Basin: Uganda's Experience*. Paper Presented at the Nile 2002 Conference: Comprehensive Water Resources Development of the Nile Basin, February 1999, Arusha.

<sup>37</sup> G.W Ivens, *East Africa weeds and their control*, op.cit.

its stature, the weed is an erect free floating, stoloniferous, perennial herb. It grows to one meter tall with buoyant leaves, which vary in size according to growth conditions.<sup>38</sup> It is one of the fastest growing invasive plants and is known to double every five to ten days under optimal conditions.<sup>39</sup> However it is important to note that water hyacinth increase in growth and reproduction is not only due to optimal climate conditions but also is accelerated by the availability of nutrients especially nitrogen and phosphorous in the water. Both flowing and still water maybe nutritionally enriched by drainage from agricultural land discharge from factories or urban waste and inadequately treated sewage effluents. All these Factors exist in Lake Victoria thus favouring the prolific growth of the aquatic weed.<sup>40</sup>

#### *1.6.4.2. Socio Economic Implications of Water Hyacinth*

By 1998, experts were saying that one percent of the Lake was covered by the water hyacinth weed. Due to the infestation of the weed, Cargo vessels, which for years ferried goods to regional destinations, were rendered worthless as the weed laid siege to the harbours, leading to a massive slump in business, then estimated at the seventy percent. Many therefore turned to road transport hence delay in delivery of goods to various

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<sup>38</sup> N. S. Wangai, *The Biology and Impact of Nechoetina Weevils on Water Hyacinth, Eichhornia crassipes in the Lake Victoria Basin, Kenya*, op.cit.

<sup>39</sup> Kenya Agricultural Research Institute, Technical Note series No. 3, February 1999. Page 1

<sup>40</sup> LVEMP as quoted in D. Okallo, 1999, *Socio-economic implications of the water hyacinth in Lake Victoria on fishing and Trading communities: A Comparative Rural and Urban case Study*, Masters Thesis (unpublished), Moi University, p.13

destinations. The blocking of ports along the shores also made this cheaper mode of transport quite difficult.<sup>41</sup>

According to Okallo, as the negative impacts of water hyacinth spread along the shores of three riparian countries and were mainly felt in the fishing industries whereby it closed the spawning and the feeding areas of the fish, leading to poor catches, increased fishermen operational costs, reduced fish quality and made landing beaches inaccessible and water for domestic purposes was contaminated making it unfit for human use or consumption. In Uganda, Hydroelectric power generation was inhibited as the weed clogged the turbines leading to disruption of power generation and the soaring of operational costs. The environment was also not spared as the massive sinking of the weed brought about the eutrophication of the lake therefore increasing the death of fish and other water organisms. The health of members of the riparian communities was further endangered as the water hyacinth provided a conducive environment for snakes, crocodiles, and also became a breeding zone for mosquitoes and bilharzias snails.<sup>42</sup> Water hyacinth also blocked water pipes at the intake points denying water to thousands of residents<sup>43</sup>

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<sup>41</sup>Daily Nation, *Weed Crisis Persists in Lake Region*, Newlink Africa. April 21, 1998, p.12, Col 1

<sup>42</sup> D. Okallo, 1999, *Socio-economic implications of the water hyacinth in Lake Victoria on fishing and Trading communities: A Comparative Rural and Urban case Study*, Masters Thesis (unpublished) Moi University, pp. 14-15

<sup>43</sup> East African Standard, 6<sup>th</sup> September 1997, *Promises, Promises many more Promises*, p.13, Col 1

As water hyacinth continued to bloom, it meant that the weed demanded oxygen resulting to oxygen deficiencies for fish species that do not thrive in low levels of oxygen, which led to the elimination or heavy decline in their populations. On the other hand respiratory processes of the water hyacinth resulted into high carbon dioxide levels which when combined with water molecules to form weak carbonic acid. The acid in turn interferes with the PH levels beyond tolerance capacities of especially the exotic fish species, which consequently either migrate or get eliminated. Either way the fish populations reduce and the fish catch is destined for a decline.<sup>44</sup>

The weed therefore had a profound socio-economic and environmental impact on the Lake and the riparian communities that depend on it,<sup>45</sup> and with these socio-economic implications of water hyacinth, there was need for the three riparian States to cooperate in averting the weed menace otherwise, the Lake ecosystem would have ultimately collapsed and resulted to what Hardin refers to as the tragedy of the commons.<sup>46</sup>

#### ***1.6.4.3. East African Cooperation on Lake Victoria***

After the three East African states failed to individually tame the water hyacinth weed, it became obvious that the problems and challenges it posed in the Lake were of such magnitude that they could not be faced separately, thus the realization that the health,

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<sup>44</sup> Ibid

<sup>45</sup> Ibid

<sup>46</sup> G. Hardin in: Susan Armstrong and Richard Bolster, *Environmental Ethics, Divergence and Convergence*. op.cit.

sustainable socio-economics and environmental development of the Lake Victoria Basin depended on the combined efforts and integrated management of common resources across sectors and national boundaries.<sup>47</sup>

It is with this realization that the three East African countries signed the tripartite agreement of August 1994, which provided for the preparation and implementation of the Lake Victoria Environmental Management Programme. It is only after combining their efforts that the three countries have been able to alleviate the water hyacinth weeds to a manageable level.

Okallo discusses the various methods that the three states used and continue to use in the control the water hyacinth weed. These include manual control, which is labour intensive, mechanical control, which involves the use of specialized equipment and machinery specifically designed for the mechanical removal of water hyacinth. This method however proved to be too costly for the three states and also had minimal success thus it was discontinued. Finally is biological control, which entails the use of living organisms such as insects, mites and pathogens, and is considered the long term environmentally friendly and sustainable method of controlling the weed.<sup>48</sup>

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<sup>47</sup> Regional Task Force et al, *the Vision and Strategy Framework for Management and Development of Lake Victoria Basin*, Main Report, September 2003,p.4

<sup>48</sup>D. Okallo, 1999, *Socio-economic implications of the water hyacinth in Lake Victoria on fishing and Trading communities: A Comparative Rural and Urban case Study*, Masters Thesis (unpublished) Moi University, pp. 14-15 East African Standard, 6<sup>th</sup> September 1997.

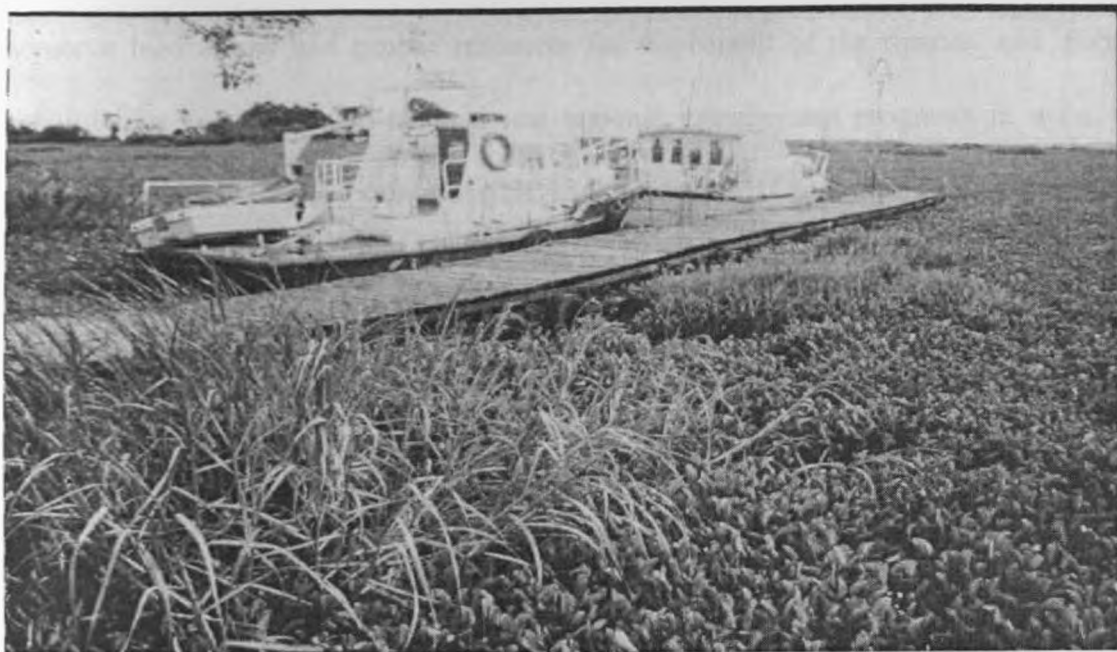
Currently, the water hyacinth menace in East Africa has been brought down to controllable measures by use of various control methods namely, manual and mechanical methods but the most effective has been the use of biological methods through the introduction of weevils, which are natural enemies of the water hyacinth weed. These measures are being taken by the Lake Victoria Environmental Management Programme, which was established through the signing of a tripartite agreement between the three East African States of Kenya Uganda and Tanzania in 1994.<sup>49</sup>

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<sup>49</sup> Lake Victoria Environmental Management Programme Website. [www.lvemp.org/waterhyacinth](http://www.lvemp.org/waterhyacinth)



**Plate 1(a) Water Hyacinth infestation before cooperation**



Source: Lake Victoria Environmental Management Programme (LVEMP)

**Plate 1(b) Same Section of the Lake after Cooperation**



Source: Lake Victoria Environmental Management Programme (LVEMP)

The programme endeavours to restore a healthy Lake ecosystem, which is stable and can support in a sustainable way the many human activities in the Lake and its catchments, conserve biodiversity and genetic resources for the benefit of the riparian and global communities and harmonize national and regional management programs in order to achieve to the maximum extent possible in the reversal of environmental degradation while promoting regional cooperation among the partner states.<sup>50</sup>

#### **1.6.5. Literature on Involvement of Members of Lake Communities in the East African Cooperation**

Sexton et al argue that despite the importance of cooperation at the regional level, meaningful involvement by the affected communities is an increasingly important aspect of environmental decision making<sup>51</sup> Chambers goes further to note that centralized urban and professional power, knowledge and values have flowed out over and often failed to recognize the knowledge of the rural people themselves. He states that rural people's knowledge is an enormous and under utilized national resource and that many activities undertaken by rural people and scientist are similar in that they distinguish and classify entities in their environments. More so, they observe compare and analyse, they also experiment and attempt to predict. Thus he concludes that the knowledge of outsiders and that of the rural communities should be assessed to see how their strengths may be combined and their weaknesses neutralized.<sup>52</sup> Therefore, Sexton et al observe that there is need for paradigm shifts from the top down approach to a bottom up approach, through which properly mandated, empowered and informed communities can contribute to

<sup>50</sup> Lake Victoria Environmental Management Programme Website. [www.lvemp.org/objectives](http://www.lvemp.org/objectives)

<sup>51</sup> K. Sexton et al, *Better Environmental Decisions, Strategies for Governments, Businesses, and Communities*, 1999, Island Press, Washington D.C, p. 331

<sup>52</sup> R. Chambers, *Rural Development, Putting the Last First*, 1983, Longman, Hong Kong, pp. 82, 92-93

decisions that affect them and play an indispensable part in the management of the shared fresh water resource and also create and maintain a securely based sustainable society.<sup>53</sup>

This then leads to the questioning as to whether the institutional frameworks, mandates and implementations of the East African Cooperation do give sufficient avenues for the peoples participation in decisions that play a significant role in shaping their lives. The assessment of these structures can only be done by the riparian communities ascertaining to the fact that the East African Cooperation on Lake Victoria does support and build the capacities of the communities on the ground. This will be revealed by the survey.

## **1.7. Research Methodology**

### **1.7.1. Introduction**

The study will adopt qualitative approaches in the collection analysis and interpretation of the data collected in the field.

### **1.7.2. Methods of Data Collection**

The researcher intends to use both data and methodological triangulation to minimize biases that may result from the field during the study.

#### ***1.7.2.1. Primary Data Collection***

A survey will be conducted within several beaches around the lake Victoria. With the help of questionnaires, interview schedules, focus group discussions, environmental

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<sup>53</sup> K. Sexton et al, *Better Environmental Decisions, Strategies for Governments, Businesses, and Communities*, 1999, Island Press, Washington D.C, pp. 361-363

checklists and observation sheets, data will be collected for analysis. Observation and photography will also be used to compliment the above mentioned tools.

#### ***1.7.2.2.Secondary Data Collection***

Several sources will be consulted to gather secondary data. These would include libraries, websites, and other publications such as journals, dailies among others. These sources shall be the basis of literature review for the work to be carried.

#### **1.7.3. Sampling Techniques**

The researcher intends to put into use the following techniques:

##### ***1.7.3.1.Purposive Sampling:***

A purposeful selection of the beaches to be visited will be carried out. This is because not all the beaches will be able to provide the needed information since several of them do exist. The most relevant will be selected.

##### ***1.7.3.2.Random Sampling:***

A simple lottery will be conducted. A list of all fishermen, traders etcetera in the selected beaches will be obtained at the shores. Small pieces of paper will be indicated with the names and crumbled. This will be shaken well in a container and samples drawn from it for interviewing.

#### **1.7.4. Snow Balling:**

The respondents will be expected to guide or refer the researcher to other individuals who may not have been sampled out but possess knowledge on the subject matter. The chain is expected to continue hence snowball sampling.

#### **1.7.5. Sample Size**

A sample size that is equivalent to a quarter of the listed population in every beach will be used as the standard sample size for the survey.

#### **1.7.6. Feedback**

It is expected that a feedback from the study will be used to inform policy and create general awareness among the riparian communities for the improvement of their well being.

#### **1.7.7. Ethical Consideration:**

The researcher will handle confidential information with utmost good faith and where name are not to be given out fictitious names will be used to represent the respondent in order to retain confidentiality.

## CHAPTER TWO

# 2. PERSPECTIVES ON REGIONAL COOPERATION AND SHARED WATER RESOURCE MANAGEMENT

### 2.1. Overview

Cooperation in the management of shared fresh water resources has become an important strategy for the realistic long-term sustainability of the resources. This chapter reviews scholarly works on regional cooperation attempted and achieved globally and regionally in East Africa. The chapter begins by discussing the Importance of Regional Cooperation in the Management of Shared Fresh Water Resources, and then goes on to raise arguments as to why states are more inclined to cooperate than to conflict in shared freshwater resources. This is followed by the reviewing of the different approaches suggested by the World Bank for regional cooperation, which are ultimately incorporated into the national water resource management strategies. The chapter will then focus on the East African Cooperation on Lake Victoria, its conception, the provision of a legal basis for its existence through the East African Treaty and finally the evolution, establishment and implementation of the Lake Victoria Environmental Management Project.

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## 2.2. Importance of Regional Cooperation in the Management of Shared Fresh Water Resources

Although sovereign states are inherently inclined to exploit their water resources unilaterally, Elhance argues that in the end even the strongest riparian states sharing international basins are compelled to seek some form cooperation with their weaker neighbours. States first turn to unilateral means to deal with their growing needs for water but when these means have been exhausted and shortages persist or new demands develop, States are forced to recognize their hydrological interdependencies. A case in point is in the Parana-La Plata basin whereby Brazil had historically preferred to construct water projects within its own territory to deal with its growing need for water and energy. However having exhausted the more easily available and cost effective solutions, Brazil was impelled to seek cooperation with its neighbours resulting in the Itaipu Project with Paraguay.<sup>1</sup>

In nearly all shared water resources, cooperation can be shown to be a win-win game in the long run for all the riparian states, and especially if the full costs of non cooperation and lost opportunities would be factored in. In a situation of growing water scarcity States that share water resources are naturally inclined to view hydro-politics as a zero-sum game where one players gain is seen as another's loss. Although this may seem valid in the short term, it is deeply flawed when applied over the long term. Elhance argues that short term calculations of gains and losses fail to take into account the economic,

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<sup>1</sup> Ibid, P.234

political, social and environmental costs that lack of cooperation continues to extract from all the players. It also fails to factor in the substantial opportunity costs that all the players continue to incur by not cooperating with their neighbours. Therefore from a long term perspective, lack of cooperation in international basins turns out to be a lose-lose game for all.<sup>2</sup>

Elhance gives an example of the Ganges-Brahmaputra-arak basin, one of the most resource rich basins yet one of the most impoverished. In the absence of an integrated basin wide development initiative, India has benefited substantially by exploiting the potential of the shared rivers within its own territory, but millions of its citizens living in the basin continue to suffer from abject poverty. The persisting state of underdevelopment in the neighbouring states as well as the political and societal tensions engendered in the border regions of India by the influx of a large number of economically deprived Bangladeshi and Nepalese citizens, continues to pose serious political and security problems for India. By objecting strongly to India's proposals for developing the shared waters and raising the issue of floods and ecological degradation down stream, Bangladesh too has paid a heavy price in the past. However recent efforts by the three countries to reconcile their differences and search for new ways to cooperatively develop the vast potential of their shared water resources indicates a turn toward a win-win approach. Elhance also notes that the advantages of cooperation are such that even states that are hostile to each other in other issues or areas sometimes have explicit or implicit

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<sup>2</sup> Arun P. Elhance, *Hydro-Politics in the 3<sup>rd</sup> World, Conflict and Cooperation over essential and Scarce Natural Resources*, 1999, United States Institute of Peace, Washington D.C U.S.A, P.233



understanding for sharing and managing their shared waters. An example is the covert cooperation between Jordan and Israel, which co-existed with and then outlasted a state of war between the two countries.<sup>3</sup>

However, Elhance argues that cooperation among states that share international waters is never easy to achieve especially when such cooperation challenges notions such as sovereignty, territorial integrity and security not forgetting other political, economic, technical and strategic impediments are the core concerns of states therefore hindering regional cooperation.<sup>4</sup> For example, cooperation challenges over the Lake Victoria basin are not mainly among the East African states but rather between the three East African states and the upper riparian States particularly Egypt. The problem lies in their diametrically opposed theories of water rights whereby the upper riparian states which are the East African States assert claims to individual property rights in the part of rivers and lake in their territory (for example the Harmond Doctrine which states that a state has the right to do whatever it chooses with the waters that flow through its boundaries, regardless on its effect on any other riparian state), while lower riparian states especially Egypt's makes the opposite claim insisting on the principle of non-interference with the natural flow of the rivers in their territory that flow into Lake Victoria.<sup>5</sup> For this states to successfully cooperate in the management of the Lake Victoria, they have to according to the World Bank, take the fundamental step of accepting the principle of equitable and

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<sup>3</sup> Ibid, p. 234

<sup>4</sup> A. P. Elhance, *Hydro-Politics in the 3<sup>rd</sup> World, Conflict and Cooperation over essential and Scarce Natural Resources*, op.cit

<sup>5</sup> A. Okoth-Owiro, Occasional Papers, East Africa No. 9, *The Nile Treaty, State Succession and International Treaties Commitments: A case Study of the Nile Water Treaties*, 2004, Konrad Adenauer Foundation and Law and Policy Research Foundation, Jacaranda Designs Ltd., Nairobi, Kenya. pp 28-29

sustainable use. Upstream and downstream states must acknowledge each other's rights to use water resources for national development as well as each nation's responsibility to prevent the pollution and degradation of water. Once this step is taken, the World Bank researchers argue that state relations will yield higher benefits for all parties.<sup>6</sup>

### 2.3. Arguments as to why states are inclined Cooperation rather than to Conflict in Shared Freshwater Resources

Wolf contends that war over water is neither strategically rational, hydrographically effective nor economically viable. It is with these factors in mind that Wolf quotes Delli Prescoli in his description of water as "humanity's great learning ground for building community."<sup>7</sup> This is he argues, is because shared interests along a waterway seem to overwhelm water's conflict-inducing characteristics and once water management institutions are in place, they tend to be consistently resilient. Thus Wolf contends that water can be described as a resource whose characteristics tend to induce cooperation.<sup>8</sup>

He goes on to say that even though freshwater resources are known to be a cause for political tension among states all over the world for example, the Arabs and the Israelis, Americans and the Mexicans not forgetting the countries on the Nile Basin, it is a

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<sup>6</sup> World Bank, *African Water Resources, Challenges and Opportunities for Sustainable Development*, Technical Paper 331, African Technical Department Series, 1996, World Bank, Washington D.C, U.S.A, p. 57

<sup>7</sup> D. Prescoli in Aaron Wolf, *Conflict Prevention and Resolution in Water Systems*, 2002, Edward Elgar Publishing Ltd., UK, P. 195

<sup>8</sup> A. Wolf, *Conflict Prevention and Resolution in Water Systems*, 2002, Edward Elgar Publishing Ltd., UK, P. 195

resource that has no substitute and therefore the conflict inducing characteristics are often outweighed by cooperation. Wolf discusses various arguments as to why cooperation among states tends to outweigh conflict when it concerns shared freshwater resources. In one of his arguments namely the strategic argument, he contends that an aggressor would have to be a downstream country. This is because according to him an upstream state would have no reason to launch an attack. The downstream state would then have to decide whether to launch an attack. If the project was a dam for example, destroying it would result in a wall of water rushing back on down stream territory. On the other hand, if it were a quality-related project either industrial or waste treatment, destroying it would probably result in even worse quality than before as it would mean polluting the whole freshwater resource. Thus it would be difficult to rationalize the launching of a war.<sup>9</sup>

Secondly Wolf raises the shared interest argument where he states that by reading through treaties which have been negotiated over shared water resources, each treaty shows exquisite sensitivity to the unique setting and needs of each basin and also detail the shared interests a shared fresh water resource will bring. For instance, he says that better dam sites are usually upstream at the headwaters where valley walls are steeper and incidentally, the environmental impact of dams is not that great. Whereas prime agricultural lands are generally downstream, where gradient drops off and alluvial deposits enrich the soil. A dam in the headwaters cannot only provide hydropower and

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<sup>9</sup> A. Wolf, *Water Policy I*, 1998, pp 251-265 in Aaron Wolf, *Conflict Prevention and Resolution in Water Systems*, 2002, Edward Elgar Publishing Ltd., UK, p. 193

other benefits for the upstream states, but also can be managed to even out the flow downstream agriculture.<sup>10</sup>

In the case of a shared resource that acts also as a boundary between states, no development can take place without cooperation because all stakeholders be they farmers, environmentalists or beach goers all share an interest in seeing a healthy stream system, and most states usually share an interest in high water quality. Examples of such shared interests exemplified in treaties include: the Mekong agreement of 1957 where Thailand helped in the funding of a hydroelectric project in Laos in exchange for a proportion of the power to be generated. In the Lesotho highlands treaty of 1986, South Africa agreed to help finance a hydro electric/water diversion facility in Lesotho. South Africa thus acquired rights to drinking water for Johannesburg and Lesotho receives all of the power generated, while a 1994 treaty allowed Jordan to store water in an Israeli lake while Israel leased Jordanian land and wells.<sup>11</sup>

Wolf raises another factor that once cooperative water regimes are established they turn out to be tremendously resilient over time even between hostile riparian states as they wage war over other issues. For example the Mekong Committee has functioned since 1957 exchanging data throughout the Vietnam war, and the Indus river commission survived through two wars between India and Pakistan, to name but a few. Finally Wolf

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<sup>10</sup> Ibid

<sup>11</sup> Ibid

raises an economic argument that water is neither a particularly costly commodity nor, given the financial resources to treat, store and deliver it is it particularly scarce. Full scale war on the other hand is tremendously expensive and a water war would not cost out. This he argues was best pointed out by an Israeli defence force analyst responsible for long term planning during the 1982 invasion of Lebanon. When asked whether water was a factor in decision making, he said, " Why go to war over water? For the price of one weeks fighting, you could build five desalination plants. No loss of life, no international pressure and a reliable source you don't have to defend in hostile territory."<sup>12</sup>

Even though there are many genuine reasons as to why states may choose not to cooperate there are just as many why they should opt for cooperation. States may lack the military capability to engage in full-scale wars over water. This is because it would impose very heavy costs in human lives, economically and also politically, both domestically and also internationally. These costs would continue to escalate with time thus would prove to be very costly in the long term therefore would not serve as a long-term solution. A geographically favoured upper riparian state may resort to the diverting of water before it reaches the lower riparian states, however this would also not be sustainable as this would require the diverting State to build large dams and reservoirs not forgetting the canals to divert the full flow of the shared water resource and would also have to ensure that it can fully utilize or store the water. These would probably prove to be very expensive and would also impose heavy environmental, economic, political and

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<sup>12</sup> Ibid

social costs on the upper riparian state. These are some of the reasons why States are continuously encouraged to seek peaceful ways rather than reverting to means that would only be harmful to themselves in the long run.<sup>13</sup>

State sovereignty has also been and continues to be challenged by global environmental changes such as the threat of global warming, by growing interdependence in the global economy and the flow of goods, ideas and information across increasingly porous international borders. States are therefore finding themselves becoming parties to a growing number of environmental treaties and agreements both at global and regional levels. And because water resources are central to maintaining the health of all local, national and regional economic and environmental systems, there is a growing recognition world wide that interstate cooperation must also now extend to international water basins.<sup>14</sup>

This is not to say that there are no obstacles standing in the way of cooperation. They could be political, economic or technical obstacles but they all constrain the willingness and ability of states to enter into cooperative agreements with their neighbours over trans-boundary water resources. One of these obstacles is the notion of state sovereignty where by a state does not like to share with others what it considers to be its own further more the recognition of water security as a national security concern can also further impede

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<sup>13</sup> Ibid, P. 243-247

<sup>14</sup> Ibid

regional cooperation. A state may also forgo the benefits of cooperation with other states due to the fear that it may become dependent on those states thus become vulnerable to their threats such as cutting off supplies of a critical source. Egypt serves as a good example where by as a downstream state in fear of such vulnerability, Egypt decided to construct the Aswan high Dam, breaking any immediate dependency on the upstream Nile basin states.<sup>15</sup>

Cooperation may also be impeded by the fact that water scarcity is often a sub national problem whereby only certain parts of a country may suffer from water scarcity whereas others may enjoy a surplus of water. In such cases national leaders may be hard pressed to persuade the entire population into accepting that cooperation with neighbouring States is necessary or beneficial for every citizen especially if such cooperation requires a substantial diversion of national resources. Cooperation may also benefit only certain areas and groups within a State even though the entire country may have to shoulder the burden of paying for the cooperative venture, more so, new institutions may need to be created as a consequence of cooperation among the States, which could conflict with the existing institutions and laws in one or more of the riparian States.<sup>16</sup>

Although he contends that water wars are yet to be heard of, Wolf is careful to note that the connection between water and political stability certainly is not. This is due to the fact

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<sup>15</sup> Ibid

<sup>16</sup> Ibid, P.236-242

that the lack of clean fresh water supply is capable of leading to instability, which in turn can create an environment more conducive to political or military conflict. A case in point was the Bangladeshi instability and environmental refugees brought about by the environmental degradation of which in turn was caused by Indian diversion of Ganges waters. Thus even though water wars may not likely be fought, it is no reason to reduce efforts in the providing of adequate clean water supply for the world population<sup>17</sup>

Regional cooperation is therefore vital in the management of shared water resources if states are to meet their priority challenges for sustainable water resource management. This is because shared freshwater resources link the challenges of pollution, environmental degradation and national security across co-riparian states. The externalities of uncoordinated basin management can increase localized poverty, negatively impact entire sectors on national economies for example, agriculture, energy and industry and even destabilize the political situation of an entire region. Thus countries which are highly reliant upon the shared freshwaters and which face the threat of water scarcity, pollution and degradation of freshwater resources must overcome the challenges posed by regional cooperation in the management of freshwater resources.<sup>18</sup>

To overcome the many barriers to regional cooperation and to persuade and enable the respective riparian states to see cooperation as a win-win situation for all concerned, regional initiatives are often required. Presently, as water scarcity for multiple needs

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<sup>17</sup> Ibid

<sup>18</sup> World Bank, *African Water Resources, Challenges and Opportunities for Sustainable Development*, Technical Paper 331, African Technical Department Series, 1996, World Bank, Washington D.C, U.S.A, p. 87



grows all over the globe, more regional efforts will be required to bring about peaceful resolution of conflicts over Trans boundary freshwater resources and to help forge inter state cooperation for the development and sharing of their full multiple use potential. Such efforts will need to be informed about the factors, circumstances, strategies and approaches that can help overcome the many barriers to regional cooperation.<sup>19</sup>

## **2.4. Approaches To Regional Cooperation And Shared Water Resource Management as Proposed by the World Bank**

The World Bank stresses the need of managing fresh water shared resources through cooperation. This may be feasible through the creation of regional cooperative management organizations whose objective would be to define the measure required to undertake the management of these resources in accordance with adopted goals and policies. The strategies developed would then be ultimately incorporated in the broader national water resource management strategy. The World Bank gives different approaches to this effect<sup>20</sup>.

### **2.4.1. Comprehensive Approach**

Another approach according to the World Bank is water resource planning through a comprehensive approach. This requires all stakeholders to participate and also cover all

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<sup>19</sup> A. P. Elhance, *Hydro-Politics in the 3<sup>rd</sup> World, Conflict and Cooperation over essential and Scarce Natural Resources*, 1999, United States Institute of Peace, Washington D.C U.S.A, p.7

<sup>20</sup> World Bank, *Integrated Lake and Reservoir Management, World Bank Approach and Experience*, Technical Paper No 358.1996, The World Bank, Washington D.C, U.S.A, P.8

major activities affecting shared water resource. Formulating a comprehensive management strategy starts with defining a State's social, economic and environmental objectives, evaluating the status of the shared water resource, assessing the composition of projected demand for the waters services and examining the existing policies for managing the resource. This approach recognizes that investments, policies and regulations in one part of the water shed or one part of the economy affects persons and activities in other parts of the water shed, thus decisions should be made in the contexts of a broader strategy that takes a long term view, anticipates the impact on various users and considers the ecosystems, economic activities and social structuring that exist in all the states that rely on the shared water resource.<sup>21</sup>

Comprehensive strategies for managing shared water resources need to be designed for the unique physical and biological characteristics of the individual resources including the type of ecosystem, climate, topography, socio-economic conditions including population density and pressure on the resources, economic and environmental objectives and the legal policies and institutional settings in which the water body is a part. This process can be complex depending on the number and diversity of stakeholders and the hydrological conditions of the resource.<sup>22</sup>

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<sup>21</sup> Ibid

<sup>22</sup> Ibid, p.9

### 2.4.2. Systemic Approach

The World Bank also proposes a systemic approach to shared water resource management. A systematic approach reflects socio-economic, ecological and equity considerations. It should not be interpreted as an approach favouring a more extensive and rigorous central planning role and the establishment of administrative arrangement, which would increase government control of water resources. Rather a systematic approach requires a broad based partnership including all stakeholders from public sector, the private sector, farmers and even members of the local communities, to participate in the management of the shared waters. Such a comprehensive and coordinated approach would allow each sovereign state to assess water needs in a multi sectoral framework and also take into account trans-boundary considerations.<sup>23</sup>

### 2.4.3. A Basin-wide Approach

Another approach suggested by the World Bank for sustainable water resource management is the basin wide approach to planning and action. This requires co basin States to adopt strategies involving varying degrees of cooperation from coordinated behaviour (for example, harmonized legislature and exchange of data) to joint action (for example multilateral investment and implementation of projects). It is argued that the result would be a more efficient use on the whole of the basin waters which would ultimately benefit all states.<sup>24</sup>

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<sup>23</sup> Ibid, p. 60-61

<sup>24</sup> Ibid, p.76

## 2.5. East African Cooperation in the Management of the Shared Freshwater Resource of Lake Victoria

The Lake Victoria Basin is considered as one of the most important shared natural resource by the partner states of East Africa.<sup>25</sup> The three East African states for a long time had no harmonised laws and regulations to facilitate the management of the Lake as a single unit. More so, whatever programmes they had as individual states were not meant for the management of the Lake but mostly addressed the utilization of the shared fresh water resource and not its conservation. However, following the Rio Summit of 1992, not forgetting the challenge of controlling the water hyacinth weed which was at the time immensely affecting the waters of the Lake in all the three states, informal discussions among the three states started immediately in accordance with chapter eighteen (18) of the recommendations of the Agenda 21 with an aim of broadening regional cooperation in environmental management and other issues affecting the Lake Victoria Basin.<sup>26</sup>

This culminated in the establishment of the Lake Victoria Environmental Project (LVEMP) through a tripartite Agreement signed by the three riparian states of Kenya, Uganda and Tanzania in August 1994. This development preceded the revival of the East African Cooperation in 1996, which also has achieved a number of milestones for the Lake Victoria Basin. These include:

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<sup>25</sup> Regional Task Force et al, *the Vision and Strategy Framework for Management and Development of Lake Victoria Basin*, Main Report, September 2003, p.3

<sup>26</sup> Ibid

- The first EAC Development Strategy, 1997-2000, which designated Lake Victoria Basin as an economic growth zone in recognition of the economic potential.
- Signing of the treaty establishing the EAC in November 1999, which provided the legal basis for the establishing of a body to manage the Lake Victoria Basin that is, Article 114 of the treaty
- The commissioning of a study on economic potentials and constraints in the Lake Victoria Basin in 2000 to provide a conceptual basis for developing a strategy for the Basin
- Signing in April 2001, of the partnership Agreement between EAC and Development Partners and the establishment of the partnership consultative Committee to guide future interventions in the Basin.
- Development of a protocol for sustainable management and development of the Lake Victoria Basin in 2002<sup>27</sup>

### 2.5.1. The East African Community Treaty

As mentioned earlier the signing of the treaty establishing the East African Community in November 1999, provided the legal basis for the establishing of a body to manage the Lake Victoria Basin. Article 114(IV and VI) advocate for the strengthening of regional natural resources management bodies and the establishment of a body for the management of Lake Victoria respectively.<sup>28</sup>

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<sup>27</sup> Ibid

<sup>28</sup> *East African Community Treaty*, EAC Publication 1, East African Community Secretariat, Arusha, pp. 98-99

When establishing the East Africa Community Treaty the partner states according to article 111 (I) recognize that developmental activities may have negative impacts on the environment leading to the degradation of the environment and that a clean and healthy environment is a pre-requisite for sustainable development. In Article 111(1a) they agreed to take concerted measures to foster cooperation in the joint and efficient management of and sustainable utilization of natural resources within the community, (1b) to undertake through environmental management strategy, to cooperate and coordinate their policies and actions for the protection and conservation of the natural resources and environmental resources against all forms of degradation and pollution arising from developmental activities. Thus action by the community relating to the environment according to Article 111(2a) is to meet the objectives of preserving, protecting and enhancing the quality of the environment.<sup>29</sup>

To meet these purposes of Article 111 the partner states in Article 112 undertake to cooperate in the management of the environment and in Article 112(1a) endeavour to develop a common environmental management policy that would sustain the ecosystems of the partner states, prevent arrest and reverse the effects of environmental degradation. This they will achieve through Article 112(2a) adoption of common environmental control regulations, Article 112(2j) harmonise their policies and regulations for the

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<sup>29</sup> Ibid, pp. 95- 97

sustainable and integrated management of shared resources and ecosystems and Article 112(21) adoption of community environmental management programmes.<sup>30</sup>

### **2.5.2. Lake Victoria Environmental Management Programme**

The Lake Victoria Environmental Management Project evolved through the process guided by the tripartite agreement of August 1994, which provided for the preparation and implementation of the project. The fundamental objective of the project is to restore a healthy Lake ecosystem, which is stable and can support in a sustainable way the many human activities in the lake and its catchments. This the project would implement through the relevant government departments and institutions. Regional and national coordinating mechanisms were also put in place to ensure timely and quality implementation of the various components of the project.<sup>31</sup>

The overall objectives of the LVEMP have been to maximise the sustainable benefits to riparian communities from using resources within the lake basin to generate food, employment, income, supply of clean water and sustain a disease free environment. Secondly to conserve biodiversity and genetic resources for the benefit of the riparian and global communities and thirdly to harmonize national and regional management programs in order to achieve the maximum extent possible the reversal of environmental

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<sup>30</sup> Ibid, pp. 94-97

<sup>31</sup> Lake Victoria Environmental Management Programme Website. [www.lvemp.org/homepage](http://www.lvemp.org/homepage)

degradation. Finally it aims at promoting regional cooperation among the three East African states.<sup>32</sup>

According to the LVEMP website the programme boasts of some major achievements. These include reducing hyacinth infestation to manageable levels, initiating and establishing Beach Management Units for co-management of the fisheries, identifying and documenting procedures for conserving biodiversity, renewed export of fish to European markets, Creating baseline data and information on environmental and socio-economic threats, testing and recommending suitable environmental management measures. According to LVEMP, these achievements are clearly being reflected by the impact they are having on the lives of the riparian communities. These benefits include maintenance of the annual fish production at an acceptable level to avoid depletion of the fish species in the lake, Increase in biodiversity within the lake basin; Improvement in water quality generally, Increase in agricultural production resulting from improved land use practices, reduction in water, soil and nutrient losses, improvement in the quality of industrial and municipal effluents due to improved waste treatment practices, enhanced human and institutional capacities at all levels.<sup>33</sup>

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<sup>32</sup>ibid

<sup>33</sup> Lake Victoria Environmental Management Programme Website. [www.lvemp.org/achievements](http://www.lvemp.org/achievements)



## 2.6. SUMMARY

This chapter discusses the different perspectives found in regional cooperation in the management of shared water resources. The chapter highlights the importance of Regional cooperation in shared fresh water resource management whereby Elhance argues that even the strongest riparian states sharing international basins are compelled to seek some form cooperation with their weaker neighbours especially when they have to deal with their growing needs for water, when shortages persist or new demands develop. At this point he argues that states are forced to recognize their hydrological interdependencies.

In nearly all shared water resources, cooperation can be shown to be a win-win game in the long run for all the riparian states, and especially if the full costs of non cooperation and lost opportunities would be factored in. Therefore, from a long term perspective, lack of cooperation in international basins turns out to be a lose-lose game for all.<sup>34</sup>

However, Elhance notes that cooperation among states that share international waters is never easy to achieve especially when such cooperation challenges notions such as sovereignty, territorial integrity and security not forgetting other political, economic, technical and strategic impediments are the core concerns of states therefore hindering

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<sup>34</sup> Arun P. Elhance, *Hydro-Politics in the 3<sup>rd</sup> World, Conflict and Cooperation over essential and Scarce Natural Resources*, 1999, United States Institute of Peace, Washington D.C U.S.A, P.233

regional cooperation.<sup>35</sup> He gives the example of the cooperation challenges existing over the Lake Victoria basin between the three East African states and the upper riparian states particularly Egypt. According to the World Bank For these states to successfully cooperate in the management of the Lake Victoria, they have to, take the fundamental step of accepting the principle of equitable and sustainable use. Upstream and downstream states must acknowledge each other's rights to use water resources for national development once this step is taken, state relations will yield higher benefits for all parties.<sup>36</sup>

Arguments on why states are usually inclined to cooperate rather than conflict on matters concerning the use of shared freshwater resources have also been highlighted. Wolf contends that war over water is neither strategically rational, hydrographically effective nor economically viable. For this reason he concludes that water can therefore be described as a resource whose characteristics tend to induce cooperation rather than conflict.<sup>37</sup> More so, with the existing global environmental changes such as the threat of global warming, the growing interdependence in the global economy and the flow of goods, ideas and information across increasingly porous international borders, states are finding themselves becoming parties to a growing number of environmental treaties and agreements both at global and regional levels. And because water resources are central to

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<sup>35</sup> A. P. Elhance, *Hydro-Politics in the 3<sup>rd</sup> World, Conflict and Cooperation over essential and Scarce Natural Resources*, 1999, United States Institute of Peace, Washington D.C U.S.A, p.7

<sup>36</sup> World Bank, *African Water Resources, Challenges and Opportunities for Sustainable Development*, Technical Paper 331, African Technical Department Series, 1996, World Bank, Washington D.C, U.S.A, p. 57

<sup>37</sup> A. Wolf, *Conflict Prevention and Resolution in Water Systems*, 2002, Edward Elgar Publishing Ltd., UK, P. 195

maintaining the health of all local, national and regional economic and environmental systems, there is a growing recognition world wide that interstate cooperation must also now extend to include shared freshwater resources and their basins.<sup>38</sup>

The World Bank also proposes different approaches that may be considered in the creation of regional cooperative management organizations whose objective would be to define the measures required to undertake the management of freshwater resources and the strategies developed would then be incorporated in the broader national water resource management strategies.

The chapter also states the genesis of the East African Cooperation in the management of Lake Victoria, its legal foundation in the East African Treaty and finally the establishment of the Lake Victoria Environmental Programme (LVEMP) through a tripartite Agreement signed by the three riparian states of Kenya, Uganda and Tanzania.

Also highlighted are the achievements of the Lake Victoria Environmental Programme, which it asserts are clearly being reflected by the impact continue to have on the lives of the riparian communities especially those living by the Lakeside.

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<sup>38</sup> Ibid

## CHAPTER THREE

### 3. FINDINGS AND CRITICAL ANALYSIS

#### 3.1. Overview

This chapter focuses on the findings of the surveys that were conducted in eight beaches namely Homa Bay, Kendu Bay, Sori, Mbita, Luanda, Usenge, Osieko, and Dunga beach in Kisumu, along the Kenyan side of Lake Victoria. The survey was done to establish the role of regional cooperation in the control of water hyacinth on the Kenyan side of Lake Victoria. Included in this chapter is the methodology applied in the collection and collation of the information collected in the field. The findings and critical analysis have been organized so as to put to light the research objectives and how they have been met. Demographic data has been included especially the sources of income in order to determine the main sources of livelihoods and the socio-economic implications of water hyacinth. Social grouping aspects of the members of the beach communities are also included in order to determine if they can be used as institutional structures at the lowest levels. Effects of Water Hyacinth on the Communities shall also be included to reveal its effects on the livelihood of the communities and also its effects on the ecological processes and functioning of the Lake. The findings will also aim to reveal the awareness levels of the communities about the East African Community and whether the cooperation of the three states through the Lake Victoria Environmental Programme has brought about any changes to the lives of the members of the Lake communities.

## **3.2. Research Methodology**

The study adopted the quantitative approach to collect data and analyze information on the control of water hyacinth through regional cooperation.

### **3.2.1. Methods of Data Collection**

Primary and secondary sources of data were used in the gathering of information.

#### ***3.2.1.1. Primary Sources of Data***

The main source of primary data included the following:

##### **3.2.1.1.1. Questionnaires**

The survey was conducted using questionnaires. A sample of the questionnaire used has been appended on the final report. The same have been analysed to come up with the report.

##### **3.2.1.1.2. Key Informant Interviews**

The principle informants in the study included people who were knowledgeable on the subject matter. These included staff members of organizations, fishermen, fish traders who were mainly women, water traders and members of the beach management units

##### **3.2.1.1.3. Case Studies**

This technique proved useful in giving personal accounts of experiences by fishermen and fish traders who are considered knowledgeable. During case studies, it became necessary to conduct in-depth discussions with a few selected individuals. This was

useful where individuals' personal experiences could not be obtained by the other methods. This gave more insights on the case under study.

#### **3.2.1.1.4. Photography**

Shots of photographs were taken by researcher and research assistant and some collected from the LVEMP library to illustrate the various aspects of the area under study, these included shots of the Lake Victoria at the peak of the water hyacinth infestation and after the joint efforts of the three states through LVEMP to control the weed.

#### **3.2.1.2. Secondary Sources of Data**

The researcher reviewed literatures from the libraries, websites, and journals in order to determine the existing gaps in knowledge. Moreover, this was used for the literature review.

### **3.2.2. Research Assistant**

The researcher hired a research assistant to assist in areas where the researcher would encounter language barrier and also assisted in the collection and collation of data.

### **3.2.3. Sampling Techniques and Sample Size**

#### **3.2.3.1. Purposive Sampling**

This method proved appropriate as it selected on specific beaches, which had been affected by the weed, and also specific people who have had a long experience and considered to be knowledgeable on the changing trends of the lake especially before and after the control of water hyacinth.

### **3.2.3.2. Snowball Sampling**

The already interviewed persons directed the researcher to identify the next respondents for instance, those who had been affected socio-economically at the peak of the water hyacinth infestation.

### **3.2.4. Sample Size**

A total of 22 individuals were interviewed (excluding the focused group discussions) in the study as the sample population. Questionnaire interviews and focused group discussions were used as tools of interrogation.

### **3.2.5. Data Analysis**

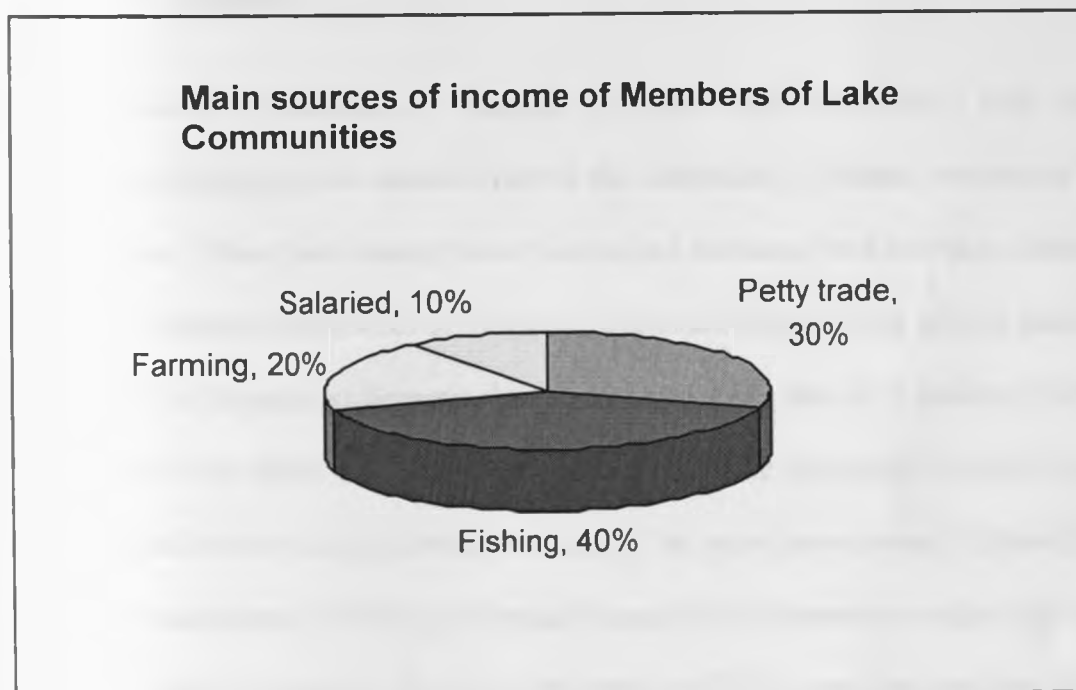
The responses were interpreted by looking at the trends in response. This has been presented in form of pie charts and tables.

## **3.3. Findings on the Effects of Water Hyacinth infestation on members of the Lakeside Communities before Regional Cooperation**

### **3.3.1. Socio-Economic Implications of the Infestation of Water Hyacinth on the Lake Communities**

The socio-economic importance of the Lake to members of the Lake communities is invaluable. This is because even those who are not fishermen rely on the fish as a means of livelihood and even those who are salaried are also employed in the fish industry.

Those that are farmers also rely on the waters of the Lake for their farming.<sup>1</sup> Out of the total number individuals interviewed, 40% were fishermen, 30% were Petty traders who mainly traded in fish or the fingerlings used as bait for catching the fish. 20% were farmers who mainly use the lake as their source of water for their farming while the remaining 10% were salaried mainly hired by wealthier fishermen who own more than one boat. This statistics show that although members of the Lake communities have diverse job descriptions, they are all centred on the waters of Lake Victoria.



**Figure 1**

Source: Field Survey Undertaken by Researcher on November 2005

<sup>1</sup> Information as narrated by interviewees in all beaches visited



Invasion of the Lake by the water hyacinth weed therefore affects the whole fabric of the Lake community, which has a symbiotic relationship. This concurs with the findings of Okallo who observed that the weed has had profound socio-economic impact on members of the Lake communities.<sup>2</sup> These socio-economic implications of the weed emphasize the importance of the three countries to continue in the joint management of the Lake Victoria to avert the potential catastrophe that can be caused by the water hyacinth weed.

### 3.3.2. Diseases

For some beach communities for example, in Homa Bay, Kendu Bay, Sori, water hyacinth has brought about sickness due to the habitation of disease vectors on the hyacinth plant. These have mainly been malaria and bilharzias and also skin diseases. One of the women interviewees at Homabay explained that she had to stop catching nyapus (catfish fingerlings) because she would always fall sick with malaria and her husband could not afford the medical expenses. Due to the decreased fish catch when water hyacinth was at the peak infestation, one of the male interviewees disclosed that female fish traders were forced to give sexual favours to the fishermen in order to get fish for trading. This has played a big role in the spread of HIV among the members of the beach communities especially the fishermen and the female fish traders.<sup>3</sup> This confirms Okallo's findings on water hyacinth being a hub for mosquitoes and bilharzias snails.<sup>4</sup>

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<sup>2</sup> D. Okallo, *Socio-economic Implications of the Water Hyacinth in Lake Victoria on Fishing and Trading Communities*, op.cit

<sup>3</sup> Information as narrated by interviewees in Kendu, Homa Bay, Sori and Dunga Beach.

<sup>4</sup> D. Okallo, *Socio-economic Implications of the Water Hyacinth in Lake Victoria on Fishing and Trading Communities*, op.cit

However, he does not mention the soliciting of sexual favours by the fishermen from the female fish traders which played an accelerated the spread of the HIV virus among members of the Lake communities. The East African Cooperation should address this issue albeit at the national level of its institutional framework to avoid a double tragedy of water hyacinth and AIDS destroying the lives of the Lakeside communities. This the three countries can achieve through the dissemination of information from the National to the sub national and finally the riparian communities through their various existing social groupings as shown in the theoretical institutional framework.

### 3.3.3. Effects of Water Hyacinth on fishing

As the water hyacinth weed continued to cover vast areas of the Lake surface, not only did it become difficult to fish, navigation through the waters became almost impossible. According to the fishermen at Homa Bay and Dunga beach in Kisumu the weed grew on the shores of the landing beaches making them inaccessible. This according to Hirji is the cause for an unstable fishery.<sup>5</sup> Consequently they were sometimes forced to remain in the waters with their catch, which ultimately ended up rotting making it unfit for consumption causing the fishermen to incur heavy losses.<sup>6</sup>

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<sup>5</sup> R. Hirji, D. Carey, "Managing International Waters in Africa: Process and Progress" In M.A.S. Salman et al, *International Watercourses; Enhancing Cooperation and Managing Conflict: Seminar Proceedings*, World Bank Technical Paper No 414.

<sup>6</sup> Information as narrated by interviewees in Kendu, Homa Bay and Dunga Beach.

**Plate 2      Attempts to fish in a hyacinth infested part of the Lake**



Source: Lake Victoria Environmental Management Programme (LVEMP)

**3.3.4. Discolouration of Water caused by the Water Hyacinth**

Where the water hyacinth weed is able to get rooted in the water, it reduces the flow of the water and makes it either stagnant or very slow moving, which causes the water to discolour and have a foul smell. According to the women it therefore cannot be used for human consumption. The fishermen are also affected because once the fishing nets get

into contact with the discoloured and foul smelling water, the foul smell keep the fish at bay decreasing the mount of fish catch.<sup>7</sup>

### 3.3.5. Impact of Water Hyacinth on Water transport

When the water hyacinth weed blocked the landing beaches, shores and ports, boats were unable to access the piers and therefore beaches that thrived in trade finally became like ghost towns as trade activities decreased. An example is Kendu bay, which was well endowed with silos for maize stock ready to be shipped to other places. However inaccessibility caused the pier to be abandoned. In Homa Bay and Sori traders also blamed the weed for the receding waters, which also caused the pier at Homa Bay to close down those who used water transport, were forced to turn to road transport, which is more costly. At Dunga Beach in Kisumu an officer explained how the weed caused leisure activities such as boat rides to come to a halt because the water was not navigable.<sup>8</sup> This means that the observation of experts in 1998 as published in the East African Standard that water hyacinth covered one percent of the Lake<sup>9</sup> was true as many Kenya Railway piers are deserted with the people resorting to the use of small boats for transportation across the Lake. Even though the water hyacinth is now manageable in the Lake, it is obvious that it will take a number of years for some of these beaches to reclaim their past glory

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<sup>7</sup> Ibid

<sup>8</sup> Information as narrated by interviewees in Kendu, Homa Bay, Sori and Dunga Beach.

<sup>9</sup> East African Standard, 6<sup>th</sup> September 1997, Promises, Promises many more Promises, p.13, Col 1

**Plate 3      The water hyacinth infestation in Lake Victoria**



Source: Lake Victoria Environmental Management Programme (LVEMP)

### **3.3.6. Institutional structures and policy frameworks**

Institutional structures and policy frameworks do exist at different levels from the regional to the community levels. The Tripartite Agreement signed by the three East African States provided implementation mechanisms at the establishment of the Lake Victoria Environment Management Programme. These include government ministries and institutions responsible for the day to day implementation of the various LVEMP

activities on the ground.<sup>10</sup> Secondly is the Regional Policy and Steering Committee composed of nine Permanent Secretaries, three from each country. These are those who are responsible for environment, agriculture, fisheries, water or natural resources in their respective countries. They are responsible for policy guidance and decisions, which affect operations of the Project. Thirdly is the National Secretariat, which is responsible for coordinating and supervising the implementation of the LVEMP various activities. Fourthly is the regional Secretariat based in Arusha, Tanzania. It is headed by a Regional Executive Secretary who ensures harmony and uniformity in Project implementation in the three countries. Next is the International Panel of Scientists a Committee of internationally renowned scientists. Two members of the panel are from Kenya, Tanzania and Uganda and one member appointed by the World Bank. There is also a Water Hyacinth National Steering Committee appointed by the three governments to supervise and advise on the control of the water hyacinth as well as ensure the involvement of local communities and Non Governmental Organizations. Finally is the Project Implementation Committee composed of technical staff that implements the Project on the ground. These include Project Coordinators, Task Leaders, Secretariat staff, Non-Governmental Organisations and Community Based Organisation representatives. The Committee is responsible for monitoring and evaluating the day-to-day implementation of Project activities.<sup>11</sup>

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<sup>10</sup> Lake Victoria Environmental Management Programme Website, [www.lvemp.org/institutionalstructure](http://www.lvemp.org/institutionalstructure)

<sup>11</sup> Ibid

However the structure has failed in reaching the common man at the grass roots due to an institutional structure that is not only a top-bottom approach as mentioned by Sexton<sup>12</sup> but when it reaches the bottom it only addresses the lowest institutional members who are the leaders of the Beach Management Units (who according to the survey rarely pass on the information to the rest of the fishermen), rather than reach the individuals members through the various already existing groupings that they are involved in such as the women groupings and church groupings to address the members of the community.<sup>13</sup>

Although Sexton et al observe that there is need for paradigm shifts from the top down approach to bottom up approach, an approach where by information can travel from either top to bottom and vice versa as suggested in the theoretical institutional framework would be appropriate. This is because as stated by Chambers the knowledge of the scientists, environmentalists, government officials and that of the rural communities are all just as valuable. He argues that many activities undertaken by rural people and scientist are similar in that they distinguish and classify entities in their environments. More so, they observe compare and analyse, they also experiment and attempt to predict. An example is that of the discovery by some of the members of the beach communities on the effects of the winds on the water hyacinth weed and also preferable soils for the water hyacinth weed as was narrated by some of the interviewees in some of the beaches

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<sup>12</sup> K. Sexton et al, *Better Environmental Decisions, Strategies for Governments, Businesses, and Communities*, 1999, Island Press, Washington D.C, p. 331

<sup>13</sup> Information as narrated by interviewees in all beaches visited.

especially Sori and Kendu bay. Thus he concludes that should be assessed to see how their strengths may be combined and their weaknesses neutralized.<sup>14</sup>

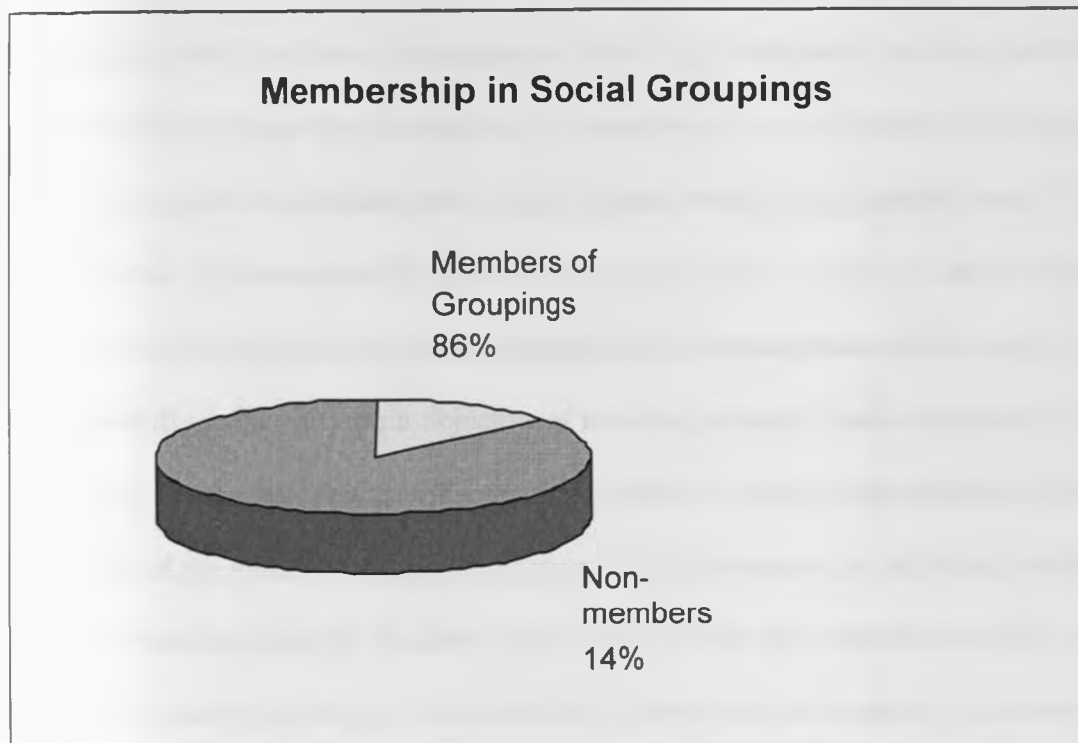
Thus the institutional structure should be such that information is able to flow from the regional level to the existing local community groupings and vice versa. These groupings should participate in the key decision making processes and also be used as the key sensitisation stations, as their involvement would produce long lasting sustainable results, the reason being they continuously interact with the Lake.

By having the Beach Management Units as their lowest and only institutional connection the structure, members of the beach communities remain ignorant of the existence of such projects or they may have the knowledge of their existence but have no understanding of what they entail. Thus they fail to identify with the projects since they are not involved from the conception stages of the projects. By not using the already existing community groupings to facilitate, disseminate and educate the people, the people are unable to identify with the new groupings that are formed at the onset of projects thus when the training ends or funds for the project are exhausted, there is no continuity. From the study it was obvious that members were highly organized and belonged to at least one social group.

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<sup>14</sup> Robert Chambers, *Rural Development, Putting the Last First*, 1983, Longman, Hong Kong, pp. 82, 92-93





**Figure 2**

Source: Field Survey undertaken by Researcher, November 2005

According to the figure above the study shows that 86% of the members of the communities in the beaches visited belonged to at least one social group and were highly organized. However the only group that has greatly been involved are the fishermen groups and this only at the leadership level of the Beach Management Units. The rest rarely receive the knowledge and information. This was well displayed at the Usenge beach where a water trader had never heard of Lake Victoria Environmental programme but was immediately informed by a member of the Beach Management Unit that it was the organization that had erected the fence next to the beach. Even though members of the communities may be benefiting from the efforts of the LVEMP<sup>15</sup>, members of the

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<sup>15</sup> Lake Victoria Environmental Management Programme Website. [www.lvemp.org/achievements](http://www.lvemp.org/achievements)

Lake community hardly know of their existence and this is because the institutional structure ends with the Beach Management Units they established and the leaders of these units usually keep the information to themselves as was witnessed at Usenge.<sup>16</sup> Despite its success in alleviating the water hyacinth weed to manageable levels, if the Lake Victoria Environmental Programme does not involve, empower and build the capacities of the already existing social groupings in the management of the Lake, it may not successfully achieve its main objective of restoring a healthy Lake ecosystem, which is stable and sustainable, neither will it be able to achieve to the maximum possible extent the reversal of the already existing degradation.<sup>17</sup> This is because the individual members of the communities living by the Lake interact with it daily and therefore would be ideal for the daily observation of the Lake especially in identifying any unusual occurrences or alien plants or animals in the Lake and ultimately if the Lake resources are to be utilized in a sustainable manner, the Lake Victoria Environmental Management Programme cannot have a great impact without educating and involving individual members of the Lake communities because members of the Lake communities do stand as a threat to the Lake in their daily interaction with the Lake.

This is supported by Jørgensen and Vollenweider who stated that the problems freshwater resources face are mainly caused by anthropogenic use of the ecosystems. By this he means that most fresh water resources have multiple uses and the problems that arise are related to the conflict between these uses. For example as was observed at the beaches

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<sup>16</sup> Robert Chambers, *Rural Development, Putting the Last First*, op.cit.

<sup>17</sup> Lake Victoria Environmental Management Programme Website. [www.lvemp.org/objectives](http://www.lvemp.org/objectives)

particularly at Mbita, the water was used for domestic purposes and washing kitchenware, while a stone's throw away was some cows quenching their thirst while dropping dung in the water. Not far away was a woman doing her laundry and at a distance one could see group of women and children bathing and swimming respectively. Next to the pier were little boys fishing, and just at the shore were some cars being washed. The waters are therefore polluted with dung from the cows, detergents from the clothes and bathing, and oil from the cars. This scenario makes the management problem more complex as the solutions to the problem must consider all the uses and users of the lake and attempt to solve the conflict among them.<sup>18</sup>

From the survey it was also observed that the beach communities have not received adequate education on invasive plants thus would not be in a position to identify them. Those with the information are the leaders of the Beach Management Units who unfortunately rarely get into the waters as they have hired fishermen, and since the institutional structure does not reach to the individual members of the community, they cannot warn on Trans boundary spillovers and thus their capacity to respond to Trans boundary spillovers is very inadequate. The regional and national institutions should be at the forefront of alleviating ignorance on the enemies of the lake and should revise the structure in order to ensure that every member of the community has knowledge on ways of preserving the lake and also ways of curbing its enemies.<sup>19</sup>

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<sup>18</sup>S. Jørgensen and R. Vollenweider, *Guidelines of Lake Management Vol 1, Principles of Lake Management*, 1988, International Lake Environment Committee and United Nations Environmental Programme, P. 37

<sup>19</sup> Observation as made by researcher and research assistant while holding interviews with members of beach communities in all beaches visited.

### 3.4. Lakeside Communities' Awareness Levels on the East African Cooperation's Participation in the Control of Water Hyacinth in the Lake

Although many of the members of the beach communities visited have heard about the East African Cooperation, most of them were not aware of its achievements even in the control of the water hyacinth weed that had reined havoc on their lives. They found it to be insignificant to them, as they claimed it had had no direct impact on their lives. This they said was especially because the fishermen are still harassed by the authorities of the other two states especially Uganda. They are forced to eat raw fish, are physically abused and their fishing gear confiscated. They therefore suggested that it would be in order if the East African States would come up with one license that serves all the fishermen of the three states to avoid conflict with the authorities of the neighbouring states.<sup>20</sup>

The comments by the fishermen prove that even though the three states have been successful in managing the water hyacinth they should extend the joint management to other areas of cooperation. According to the treaty of the East African Community, Article 112(2j) endeavours to harmonise the policies and regulations of the three countries for the sustainable and integrated management of shared resources and ecosystems.<sup>21</sup> However the three countries are yet to fulfil their promise to the citizens of

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<sup>20</sup> Suggestions by fishermen in all the beach communities visited

<sup>21</sup> *East African Community Treaty*, EAC Publication I, East African Community Secretariat, Arusha, pp. 94-97

East Africa and until the citizens of the three states can feel its impact up to the grassroots level, the harmonization of policies and regulations of the three countries in the management of the Lake will remain theoretical.

Another reason why the states should extend the joint management in the Lake, according to an official at the LVEMP, Kenya is the preferred breeding ground by the fish, due to the contours of the Kenyan shores, which are wavy. A wavy shoreline as explained by the official is preferred by fish for breeding because the movement of the water is not at a high speed compared to that on a straight shoreline thus the tides are unable to sweep away the eggs of the fish or the fingerlings. Most fish are thus hatched and bred on the Kenyan shoreline and later migrate to other parts of the Lake after maturity. When such issues are considered, boundaries on the Lake should be ignored as the fish are also ignorant of the boundaries and move freely in the Lake preferring different parts of the Lake for different stages of their lifecycle. Due to these migrations, no country should claim ownership to the fish found on any part of the Lake.

The findings of LVEMP support Clarke's argument that because of its unique nature of flowing and inevitably moving from one country to another, countries should pay scant attention to political boundaries when it comes to issues pertaining to water.<sup>22</sup> The East African states in their attempt to manage fishing activities in the Lake should therefore do away with the imaginary boundaries they have created on the Lake, come up with similar

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<sup>22</sup> R. Clarke, *Water the International Crisis*, 1991, Earthscan Publications Ltd., London. p. 91

policies on fishing that would be beneficial to all, as the fish themselves have no respect for the imposed boundaries.<sup>23</sup>

### **3.4.1. Ecological Processes and Functioning of the Lake in relation to Water Hyacinth control after Regional Cooperation**

In assessing the ecological processes and functioning of the shared fresh water resource in regards to the impact and control of the water hyacinth infestation on the ecosystem, much was discovered and identified through out the study. These included:

#### ***3.4.1.1. Restoration of diversity***

The weed has had some good impacts especially in the restoration of diversity, as fish species that had been considered almost extinct have returned in large numbers an example of these are catfish and lungfish which are protected by the weed especially from predatory fish which are unable to manoeuvre in the water hyacinth.<sup>24</sup> More so, when the weed was removed larger fish species like tilapia were found, showing that the decline in this species could be due to interference of breeding grounds and catching of mature fish that lay the eggs. It is important that effects of hyacinth on each fish species be investigated, since no conclusion can be made so far as it had both benefits and losses for the same.<sup>25</sup> Hirji's observation that the weed has caused lack of biodiversity is

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<sup>23</sup> Based on interview conducted by researcher with an official at the Lake Victoria Environmental Program in November 2005

<sup>24</sup> Information as narrated by interviewees in Kendu Bay in November 2005

<sup>25</sup> As narrated to research assistant in Osieko beach in November 2005

therefore not substantive.<sup>26</sup> However as noted in the East African Standard Newspaper, if weed continues to bloom it consumes a lot of oxygen which results in oxygen deficiency for fish species which do not thrive on low oxygen levels. It is this that led to the decline of some fish species particularly the Nile tilapia.<sup>27</sup>

Catfish fingerlings locally known as nyapus that are found in the water hyacinth have been used as bait to catch fish and thus been a new source of income for many individuals especially the women. This is one of the advantages that has been brought about by the water hyacinth weed. However, the weed has also kept some fish away for example the tilapia, which have gone further into the Lake decreasing the Kenyan fish catch as Kenya only has 6% of the Lake.<sup>28</sup> It is therefore possible to argue that although the water hyacinth weed has mostly been a menace for the Lakeside communities and the three east African states, it has also brought with it a few advantages.

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<sup>26</sup> R. Hirji, D. Carey, "Managing International Waters in Africa: Process and Progress" In M.A.S. Salman et al, *International Watercourses; Enhancing Cooperation and Managing Conflict: Seminar Proceedings*, World Bank Technical Paper No 414.

<sup>27</sup> East African Standard, 6<sup>th</sup> September 1997, Promises, Promises many more Promises, op.cit

<sup>28</sup> J. Wakhungu, G. Sikoyo, *Shared Aquatic Ecosystems of East Africa, Status and Trends*, 2003, African Center for Technology Studies, Nairobi, Kenya, Transboundary series No. 1, p.4

### *3.4.1.2. Protection of breeding grounds by Water Hyacinth*

The water hyacinth also rendered some areas of the Lake inavigable especially the bays, therefore protecting fish breeding areas in some parts of the Lake. As explained by one of the interviewees, after the clearing of the water hyacinth fishermen in Dunga beach experienced bumper harvests and increase in the size of fish caught although it was for a brief period of time.<sup>29</sup> However this proves that it is because of the interference with breeding grounds that has led to poor and undersize fish catches.

### *3.4.1.3. Reclamation of land where the Lake has receded due to the Impact of Water Hyacinth*

The receding of the waters has meant drying up of the lake consequently becoming new land and being reclaimed for farming by the communities who have further gone on to destroy even the wetlands which not only have they been the custodians of a diversity of plant and animal species for years, but have also acted as the sponges filtering a lot of agricultural and industrial chemicals from reaching the waters. More so, as narrated by one of the interviewees at Kendu bay, conflict between humans and the animals such as hippos has also risen. The reclaiming of land was witnessed at Kendu bay.<sup>30</sup>

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<sup>29</sup> Information as narrated by interviewees in Dunga Beach.

<sup>30</sup> As observed by researcher and research assistant and as narrated by interviewee at Kendu Bay.



#### *3.4.1.4. Effect of Soils and Wind on the Water Hyacinth Weed*

Types of soil, wind and the contours of the lake have also affected the extent of water hyacinth impact on the lake. For example the beaches where the survey was conducted had either cotton or sandy soil. According to interviewees who were members of a beach community but were also frequent visitors of other beaches, Water hyacinth tended to anchor on beaches with cotton soil, as its roots are able to anchor themselves well into the soil. This was witnessed in Kendu bay and Homabay where the weed dried up the water along the beach boundary causing the to recede further into the lake and also blocking the landing beaches which has various effects environmentally such as the receding of the Lake and socio-economically in various ways for example transportation.

However the weed cannot anchor in sandy soil. This was witnessed in Sori, where the weed was unable to anchor on the beach and therefore has not been adversely affected by the weed environmentally or socio-economically. Wind also affects the proliferation of the weed depending on its direction. It was therefore noted that in areas where there are strong winds such as in Osieko, the weed could not anchor well on the beaches as the wind would push it backwards and since it is a floating weed before anchoring on the ground, it is pushed back into the deep waters and thus cannot cause havoc on the beaches. However this also depends on contours of the lake, the wind is not of much assistance if it blows the weed into the bays.<sup>31</sup>

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<sup>31</sup> As observed by researcher and research assistant and as narrated by interviewee at Kendu Bay and Sori.

When this information was relayed to an official at the LVEMP, the officer was aware of the information however the information remains undocumented and therefore no further research has been done. This is an example of Chambers observation of how centralized urban and professional power, knowledge and values often fail to recognize the knowledge of the rural people themselves. It is evident from the information collected in this study that rural people's knowledge is enormous yet remains under utilized.<sup>32</sup> It is therefore necessary that urban professionals combine their knowledge with that of the rural communities and deliberate and work together in the sustainable management of the Lake Management.

#### *3.4.1.5. Effects of Water Hyacinth on Water Levels and Navigational routes*

Water hyacinth has contributed to the decrease of water levels especially when it was at its peak. Shorelines have therefore receded.<sup>33</sup> Due to the receding waters, Cargo vessels were rendered worthless as was reported in the Daily Nation Newspaper. This is because the weed laid siege to the harbours while some harbours became too shallow for the vessels to dock.<sup>34</sup> The reduction of the water levels has exposed rocks that were only known in theory but have now become visible. This has consequently brought change in navigational routes. This was witnessed while crossing the lake with the Mbita-Luanda ferry, which had to circumnavigate the rocks. This calls for the drawing of new route maps as the old ones may soon become inapplicable posing a danger to both cargo and

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<sup>32</sup> R. Chambers, *Rural Development, Putting the Last First*, 1983, Longman, Hong Kong, pp. 82, 92-93

<sup>33</sup> As observed in Homa Bay and Kendu Bay on November 2005

<sup>34</sup> Daily Nation, *Weed Crisis Persists in Lake Region*, Newslink Africa. April 21, 1998, p.12, Col 1

passenger water vessels.<sup>35</sup> In the vision and strategy framework for the management and development of Lake Victoria Basin, the three East African states aim to improve water transport and navigation and set up regional policies on water transport yet it fails to mention the mapping out of new routes.<sup>36</sup> One is left to wonder if they are aware of the exposed rocks caused by the receding waters.

### 3.5. SUMMARY

This chapter focuses on the findings of the survey that was conducted in eight beaches namely Homa Bay, Kendu Bay, Sori, Mbita, Luanda, Usenge, Osieko, and Dunga beach in Kisumu, along the Kenyan side of Lake Victoria. The survey was done to establish the role of regional cooperation in the control of water hyacinth on the Kenyan side of Lake Victoria. Primary and secondary sources of data were used in the gathering of information. The primary sources included the use of a questionnaire, a sample of which has been appended.

The socio-economic importance of the Lake to members of the Lake communities is invaluable. Statistics collected during the survey show that although members of the Lake communities have diverse job descriptions, they are all centred on the waters of Lake Victoria. Invasion of the Lake by the water hyacinth weed therefore affects the whole fabric of the Lake community.

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<sup>35</sup> As observed by researcher and research assistant while crossing with the Mbita-Luanda Ferry.

<sup>36</sup> East Africa Community, *the vision and strategy framework for the management and development of Lake Victoria Basin*, 2005, East African Community Secretariat, Arusha, Tanzania, p.114

Water hyacinth brought about sickness mainly malaria and bilharzias and skin diseases. Difficulties in fishing were also experienced as navigation through the water became impossible. By reducing the flow of the water, water hyacinth caused the water to have a foul smell therefore unfit for domestic use and human consumption. Water hyacinth has contributed to the decrease of water levels especially when it was at its peak.<sup>37</sup> Shorelines have therefore receded making some harbours too shallow for the vessels to dock.<sup>38</sup>

From the survey it was established that institutional structures and policy frameworks did exist from the regional level up to the community level. However the structure has failed in reaching the common man at the grass roots due to an institutional structure that is not only a top-bottom approach as mentioned by Sexton<sup>39</sup> but also when it reaches the bottom it only addresses the lowest institutional leaders who are the leaders of the Beach Management Units.<sup>40</sup> According to the figure above the study shows that 86% of the members of the communities in the beaches visited belonged to at least one social group and were highly organized. The Lake Victoria Environmental Programme should therefore sensitise and build the capacity of the already existing social groupings for sustainability of projects and long term management of the Lake.

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<sup>37</sup> As observed in Homa Bay and Kendu Bay in November 2005

<sup>38</sup> Daily Nation, *Weed Crisis Persists in Lake Region*, Newslink Africa. April 21, 1998, p.12, Col 1

<sup>39</sup> K. Sexton et al, *Better Environmental Decisions, Strategies for Governments, Businesses, and Communities*, 1999, Island Press, Washington D.C, p. 331

<sup>40</sup> Information as narrated by interviewees in all beaches visited November 2005

Types of soil, wind and the contours of the lake have also affected the extent of water hyacinth impact on the lake. When this information was relayed to an official at the LVEMP, the officer was aware of the information however the information remains undocumented and therefore no further research has been done. This is an example of Chambers observation of how centralized urban and professional power, knowledge and values often fail to recognize the knowledge of the rural people themselves. It is evident from the information collected in this study that rural people's knowledge is enormous yet remains under utilized.<sup>41</sup>

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<sup>41</sup> R. Chambers, *Rural Development, Putting the Last First*, 1983, Longman, Hong Kong, pp. 82, 92-93

## **CHAPTER FOUR**

### **4. CONCLUSIONS AND RECOMMENDATIONS**

#### **4.1. Overview**

This chapter summarizes the whole research study and gives recommendations based on the research results.

#### **4.2. SUMMARY**

Lake Victoria where this study will be carried out is the second largest freshwater lake in the world. It is shared between Kenya 6%, Uganda 43% and Tanzania 51% the Lake lies in one of the most populous areas in the world, serving as a source of livelihood for some thirty million people in Kenya, Tanzania and Uganda. It is important to the riparian states for food, agricultural, water supply, tourism and recreation and generation of electricity. It is also considered as the source of the Nile. One of the major challenges faced by the Lake has been its infestation by the water hyacinth weed. The presence of the water hyacinth has had profound socio-economic and ecological impacts.

This study stemmed from the practical observation that water hyacinth had grown unchecked until its peak infestation in the three East African countries a situation that may have been prevented if the three states would have earlier amalgamated in the

management of the Lake. After the establishment of the Lake Victoria Environmental Programme, by the three East African Countries, the water hyacinth menace has been brought down to controllable measures mainly after their attempts individually curb the water hyacinth menace failed.

This study has also reviewed scholarly works related to cases of regional cooperation in different parts of the globe. It also reviews studies done on the water hyacinth Weed in the Lake Victoria, its Socio Economic Implications, and details of cooperation among the East African states on Lake Victoria. It has looked at the importance of regional cooperation in the management of shared water resources and also discussed the East African Cooperation on the management of Lake Victoria.

Through a survey conducted in the Kenyan side of Lake Victoria, the study has been able to establish the impact of the water hyacinth weed on members of Lakeside communities. Although the East African Cooperation through the Lake Victoria Environmental Programme has had good progress especially in alleviating the water hyacinth weed, it is yet to become popular among members of the communities as its impact is yet to be felt. To achieve this, the East African Cooperation has to involve the already existent community social groupings into the institutional structure for the sustainable management of the Lake. This will improve their capacities to perceive and respond to changes and challenges when they are still within the community's threshold, making its involvement more proactive as opposed to the current passive involvement.

## CONCLUSION

One state cannot be responsible for the proper management of a shared fresh water resource. Cooperation can therefore not be separated from the management strategies considering the fact that most fresh water resources in the globe cut across international boundaries. I therefore agree with Clarke that the survival of the shared resource is dependent on the cooperation of all the countries sharing the resource of which the three East African States have taken the challenge and reaped the results of being able to control the water hyacinth menace.<sup>1</sup>

In the case of the three east African states of Kenya Tanzania and Uganda, Water hyacinth has had devastating results in the Lake Victoria and since they all share the fresh water resource, the three states had to also share in the effects of the infestation of the weed. By coming together and managing the infestation of the water hyacinth weed, it is expected that the states will realize the importance of cooperating on various other issues affecting the Lake both environmentally and as a utility. This is because, even though water hyacinth has been the most outstanding challenge for the three states, it is not the primary cause of the problems facing Lake Victoria rather it is a problem of proper management of the shared fresh water resource.

The governments should not ignore the role that riparian communities have to play in the management of the fresh water resources. If the states are to attain sustainable development in the use of the Lake Victoria they also will have to address the needs of

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<sup>1</sup> Robin Clarke, *Water the International Crisis*, 1991, Earthscan Publications Ltd., London. pp.91



the members of the communities living along the Lake. More so, if the cooperation is to have direct effect on the lives of the community members then the three states will have to harmonize their policies on the management of the Lake resources for example in licensing and selection of suitable fishing gear such as size of fishing nets.

From the research, it is possible to conclude that the world's population is dependent on the cooperation of all the countries sharing fresh water resources.<sup>2</sup> This is because Fresh water is a resource for which there is no substitute and on which there is complete dependency as it is central to life. Lack of regional cooperation and joint management of the resource therefore has the potential of causing tension, disputes and conflicts among riparian states and communities.<sup>3</sup> More so, due to diverse uses of shared fresh water resource by riparian states and communities, lack of joint management could render the waters unfit for all living things making the tragedy of the commons<sup>4</sup> a reality.

## Recommendations

The following recommendations are based on the research results:

From the study it was evident that members of the community did not feel the impact of the east African Cooperation. Particularly the fishermen did not understand how the three states could be in cooperation yet they continue to experience physical abuse and psychological abuse from the authorities of the other two states. More so obtaining

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<sup>2</sup> R. Clarke, *Water the International Crisis*, 1991, Earthscan Publications Ltd., London, p. 91

<sup>3</sup> Ibid

<sup>4</sup> G. Hardin in: Susan Armstrong and Richard Bolster, *Environmental Ethics, Divergence and Convergence*, 1993. Mc Graw-Hill Inc., U.S.A., pp. 224-225.

fishing licenses from the three states was considered cumbersome and expensive, thus it was suggested that three states should come up with a single license for the whole Lake and also that it should be at a reasonable cost. The East African Community should therefore put into action Article 112 (2a and j) which says they will control and harmonize their policies and regulations.<sup>5</sup>

I would also recommend that the East African states adopt the World Bank approaches mentioned in the Literature review as part of their strategies.<sup>6</sup> The countries could incorporate the systemic and basin wide approaches in order to have a more effective and efficient regional framework. A systematic approach is a management approach, which will reflect on the socio-economic, ecological, and equity considerations. It should not be interpreted as an approach favouring a more extensive and rigorous central planning role and the establishment of administrative arrangement which will increase government control of water resources but rather should be viewed as a broad based partnership which will include all stakeholders from public sector, the private sector, farmers and even members of the local communities, to participate in the management of the shared waters.<sup>7</sup> The basin wide approach concentrates on planning and action where by the three states should adopt strategies involving varying degrees of cooperation from coordinated behaviour for example, harmonized legislature to joint action for example, multilateral implementation of projects. By adopting these two strategies both at the national and regional level the result would be effective and efficient management of the Lake

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<sup>5</sup> *East African Community Treaty*, EAC Publication I, East African Secretariat, Arusha, pp. 95-97

<sup>6</sup> World Bank. *Integrated Lake and Reservoir Management, World Bank Approach and Experience*, Technical Paper No 358, 1996. The World Bank, Washington D.C, U.S.A. P.8, 95-97

<sup>7</sup> Ibid

Victoria waters both socio economically and also environmentally which would ultimately be beneficial to all the three East African Countries.

For the three states to succeed in managing and monitoring the Lake, they have to include the community members at the grass root levels.<sup>8</sup> This can be successfully achieved by sensitising, educating and training members of the beach communities through the already existing social, economic and religious groupings. By involving these groupings, more members of the communities are reached and monitoring and management of the lake has continuity since community members interact with the lake on a daily basis. Therefore, the institutional structure should be revised in order to directly involve the already existing social groups in the key decision making processes to ensure continuity even after project funding is over and also to be used as sensitisation centres for proper use of the lake resources and also conservation of its biodiversity.

The knowledge of the members of the communities should also be recognized and not ignored.<sup>9</sup> It was noted from the survey, the interviewees related to the researcher the relationship between water hyacinth and different soils and winds. Thus the knowledge of professionals and scientists should be assessed to see how their strengths may be combined and their weaknesses neutralized.

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<sup>8</sup> R. Chambers, *Rural Development, Putting the Last First*, 1983, Longman, Hong Kong, pp. 82, 92-93

<sup>9</sup> Ibid

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## 6. APPENDIX

### QUESTIONNAIRE

This questionnaire was administered to members of the Lakeside community residing in eight beaches on the Kenyan side of Lake Victoria and officials in various institutions and organizations between 7<sup>th</sup> and 12<sup>th</sup> of November 2005

**FIELD QUESTIONNAIRE****SECTION ONE: IDENTIFICATION PAGE**

DISTRICT \_\_\_\_\_

DISTRICT CODE

--	--

BEACH \_\_\_\_\_

BEACH CODE

--	--

RESPONDENT \_\_\_\_\_

RESPONDENT CODE

--	--

NAME OF ENUMERATOR \_\_\_\_\_

DATE OF INTERVIEW \_\_\_\_\_ / \_\_\_\_\_ /2005

## DEMOGRAPHIC FACTORS

(FOR THOSE WHO HAVE INTERACTED WITH THE LAKE FOR THE LAST FIVE YEARS)

101 Code of Respondent/ Household Members	102 Name of Respondent	103 Gender	104 Age (in full yrs)	105 Marital Status 1. Married (Monogamy) 2. Married (Polygamy) 3. Widow(er) 4. Separated 5. Single 6. Under 18 7. Other (specify)	106 Education 0. None 1. Primary 2. Secondary 3. Tertiary 4. ECD	107 Main source Of income 0. None 1. Farming 2. Fishing 3. Petty trade 4. Salaried 5. Casual 6. other	108 Religion 0. None 1. Protestant 2. Catholic 3. Indigenous 4. Muslim 5. Other	109 Type of housing 1. permanent 2. Semi permanent 3. All temporary materials	110 Group Membership 0. None 1. Women 2. Men 3. Youth 4. Church
01									
02									
03									
04									
05									

06													
07													
08													
09													
10													
11													
12													

SECTION III: THE FISHERMAN

111] How long have you been fishing in this Lake (completed years)?

- 1 1-5 years
- 2 5-10 years
- 3 10-15 years
- 4 15-above years

112] When did you first see water hyacinth on the Lake? \_\_\_\_\_

113] According to you, what is water hyacinth and where did it come from? \_\_\_\_\_  
 \_\_\_\_\_

114] Has it affected your fishing Yes  No   
 If [Yes], How? \_\_\_\_\_  
 \_\_\_\_\_

115] If [No], explain further \_\_\_\_\_  
 \_\_\_\_\_

116] How do you rate your catches/income

[a] Before water hyacinth emerged?

- 1 High
- 2 Medium
- 3 Low
- 4 Very low

[b] During peak of infestation?

- 1 High
- 2 Medium
- 3 Low
- 4 Very low

[c] After removal has began?

- 1 High
- 2 Medium
- 3 Low
- 4 Very low

117] Accordign to 116 above what were the exact catches/income per day/week?

- [a] Before \_\_\_\_\_ fish per day \_\_\_\_\_ Shs. per day
- [b] During peak infestation \_\_\_\_\_ fish per day \_\_\_\_\_ Shs. per day
- [c] After removal has began \_\_\_\_\_ fish per day \_\_\_\_\_ Shs. per day

118] a) How have you coped with this weed? \_\_\_\_\_  
 \_\_\_\_\_

b) Who has been responsible for the removal of the weed?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

119] What are the problems that have been caused by the weed?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_
- 7 \_\_\_\_\_
- 8 \_\_\_\_\_
- 9 \_\_\_\_\_
- 10 \_\_\_\_\_

120] Are there benefits that the weed has brought to you?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_
- 7 \_\_\_\_\_
- 8 \_\_\_\_\_
- 9 \_\_\_\_\_

121] Do you always participate in the meetings of the fishery department

[a] Yes

[b] No  If no why? \_\_\_\_\_

122] Are there organizations that have organized for fishermen training on the management of the lake and fishes in this beach?

[a] Yes

b) No

if yes which are this?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

123] In what ways do you think the community can be involved in the management of water hyacinth in Lake?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

SECTION IV: FISH TRADERS

124] How long have you been a fish trader?

- 1 1-5 years
- 2 5-10 years
- 3 10-15 years
- 4 15-20 years

125] What kind of fish do you trade in?

- 1 Nile tilapia
- 2 Nile perch
- 3 Omena
- 4 Fulu
- 5 Mudfish
- 6 Other \_\_\_\_\_

126] From whom do you get your fish?

- [a] specific fisherman
- [b] Various fishermen
- [c] any other \_\_\_\_\_

127] When did you first spot the water hyacinth?

\_\_\_\_\_

128] Did it affect your trading?

- [a] Yes

If yes

Positively  How?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

Negatively  How?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

- [b] No

129] In what ways do you think the community can be involved in the management of water hyacinth in Lake?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

## SECTION V: THE WOMEN

130] Where do you fetch you water from?

- [a] Rain  [c] Lake   
 [b] Stream  [d] other  Specify \_\_\_\_\_

131] If from the Lake has there been any changes in the water quality?

- [a] Yes  [b] No

If yes, what kind of changes have you noted?

- 1 \_\_\_\_\_  
 2 \_\_\_\_\_  
 3 \_\_\_\_\_  
 4 \_\_\_\_\_  
 5 \_\_\_\_\_

132] When did you first spot the water hyacinth? \_\_\_\_\_

133] Have there been any attempts to remove the weed?

- [a] Yes  [b] No

If yes, who has been responsible for the removal of the weed

- [a] Organizations  Which one(s) \_\_\_\_\_  
 \_\_\_\_\_  
 [b] Fishermen   
 [c] Lake community

134] Has tranport been affected?

- [a] Yes  [b] No

If yes,how has it been affected?

- 1 \_\_\_\_\_  
 2 \_\_\_\_\_  
 3 \_\_\_\_\_

135] Are there any diseases associated with the weed?

- [a] Yes  [b] No

If yes,which diseases are these?

- 1 \_\_\_\_\_  
 2 \_\_\_\_\_  
 3 \_\_\_\_\_

136] where do think the weed came from? \_\_\_\_\_  
 \_\_\_\_\_

137] Are you involved in the decision making process of issues on relating to the Lake?

- [a] Yes  [b] No

If yes,how often?

- [a] Often  [c] Rarely   
 [b] Regularly  [d] Never

138] Which organizations provide training on water management and conservation here?

- 1 \_\_\_\_\_  
 2 \_\_\_\_\_  
 3 \_\_\_\_\_



139] In what ways do you think the community can be involved in the management of water hyacinth in Lake?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

**SECTION VI: INSTITUTIONS AND ORGANIZATIONS**

140] When was the organization formed? \_\_\_\_\_

141] What do you see as the reason for the spreading of water hyacinth? \_\_\_\_\_

142] Is there any organization that provides training on water management and conservation?

[a] Yes  [b] No

If [yes] which ones?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_
- 7 \_\_\_\_\_
- 8 \_\_\_\_\_
- 9 \_\_\_\_\_
- 10 \_\_\_\_\_

143] Have you worked together with the communities in regard to the water hyacinth?

[a] Yes  [b] No

[a] If [yes] how?

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

[b] At what level have you involved the communities?

[a] Local level  [c] National   
 [b] Sub national  [d] Regional

[c] If no, are there any particular reasons why? \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

144] How would you rate the levels of community awareness on the management of water hyacinth in the Lake?

[a]	<input type="checkbox"/>	[c]	<input type="checkbox"/>
[b]	<input type="checkbox"/>	[d]	<input type="checkbox"/>

If any what changes have you observed?

1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_  
4 \_\_\_\_\_

145] What more do you think the three states can do together in the management of water hyacinth?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

146] In what ways do you think the community can be involved in the management of water hyacinth in Lake?

1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_  
4 \_\_\_\_\_  
5 \_\_\_\_\_  
6 \_\_\_\_\_  
7 \_\_\_\_\_  
8 \_\_\_\_\_  
9 \_\_\_\_\_  
10 \_\_\_\_\_

**ENVIRONMENTAL CHEKLIST/ OBSERVATION SHEET**

**BEACH CODE:**

	<b>OBSERVABLE VERIFIABLE INDICATOR (OVI)</b>	<b>STATUS</b>	<b>REMARKS</b>
1.	Shoreline		
2.	• Water Colour		
	• Water Texture		
	• Water Odour		
3.	Evidence of siltation		
4.	Evidence of Eutrophication		
5.	Direct Sewage Discharge/Dirty		
6.	Water refuse disposal/Solid Waste		
7.	Chemical/Soap Detergent discharge		

8.	Deforestation		
9.	Overgrazing		
10.	Soil Erosion		

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