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AN INVESTIGATION OF THE SOCIO-ECONOMIC BENEFITS OF LAKE KARIBA TO NYAMHUNGA COMMUNITY

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APPROVAL FORM

We the undersigned, hereby approve that Mark Bwerinofa has met the entire requirements for the Bachelor of Science Education Honours Research Project, Geography department.

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Supervisor Date

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DECLARATION

I, Mark Bwerinofa, declare that this research project is my own work and has not been compiled or lifted from any source without acknowledgement of the source.

Signed …… Date ……

Supervisor……. Date …….

DEDICATION

To my wonderful mother and my sisters for motivating me to be the best I can in everything I do.

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ABSTRACT

The research was intended to find the socio-economic benefits of Lake Kariba to residents of Nyamhunga Township in Kariba. To find out these benefits a survey was carried out.

The survey was carried out using a set of questionnaires, interviews and observations. The questionnaires were administered by the researcher who gave the respondents and came back after three days to collect them. The questionnaires targeted household heads. Interviews were used with key informants who were human resource managers of companies operating in Kariba and regulatory authorities. Observations were done by the researcher throughout the period of researching. It was found out that residents enjoyed some benefits from the Lake. The benefits include uninterrupted water and power supply. People also enjoy the natural beauty of the area as well as water sport, game and bird viewing. The area is also associated with a lot of infrastructural developments which residents enjoy. The research also includes findings, key conclusions and recommendations.

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CHAPTER ONE

1.1 Introduction

Multipurpose river projects are the backbone of development especially in developing countries (World Bank, 2000). Dams and irrigation schemes are such projects, with Lake Kariba being one such prominent project in Zimbabwe (Magadza, 2006). The construction of such multipurpose river development projects affect the community in both negative and positive ways (Ford Foundation, 2005). This research project was however concentrating on the positive effects of the construction of dams. It focused on the socio-economic benefits of Lake Kariba to the local community, that is, the residents of Nyamhunga Township in particular.

1.2 Background Information

Lake Kariba (28.75^{o} E, 16.51^{o}S,) is a man-made lake situated on the Zambezi River between Zambia and Zimbabwe. It was constructed in the period 1955–59 mainly for hydroelectric power generation. The lake drain water from five basins and is 280 km long with a surface area of 5580 km^2 and a volume of 185 km^3 at full capacity (World Commission on Dams, 2000). The mean and maximum depths are 29.18 and 97m, respectively. The lake was constructed to meet the increasing demand for energy in Central Africa. In the then Rhodesia, industry was expanding and the market for consumer goods was growing. The population was also growing rapidly which placed great strain on fuel resources. The existing rail network was unable to move the increasing amounts of coal from Hwange.

The research was prompted by the fact that most studies carried out on benefits of resources on local communities concentrated on rural communities. Some of the studies resulted in campfire projects (World Bank, 2004). This was due to the fact that local rural communities are deprived of their due benefits yet they host the resources. Campfire resulted in some funds generated from the resources being ploughed back to the communities in the form of upgrading of infrastructure in the areas hosting the resources

(Murphree, 2000). Although not much was done through the ploughing back of funds through the campfire program it is a step in the right direction.

It is also true that apart from rural communities, urban communities can also benefit from resources in their locality, hence the need to find if the residents of Kariba are benefiting from the construction of Lake Kariba. In the same way as rural areas, urban areas can be deprived of benefits from resources in their locality. As a result of the above this project investigated the benefits of Lake Kariba to the residents of Nyamhunga Township.

1.3 Statement Of The Problem

Projects are meant to benefit the people in the country and in most cases the inhabitants of the area where the resource is located. However, there are instances when local communities are deprived of the benefits from the resource in their area. Local communities can have little or no control over how and where the funds accrued from their resources are spent so that those who bear the cost of having large projects in their area frequently do not benefit from the financial returns generated (Geographical Association of Zimbabwe, 1995). This will generate problems in as far as sustainable management of the resource is concerned, as the local populace alienates itself from the project. The research focused on the perceptions of Nyamhunga residents on the socioeconomic benefits of Lake Kariba. This was done in order to determine the status quo in the management of the resource so that future generations will also enjoy the same benefits.

1.4 Significance Of The Study

Most studies on the benefits of local resources focus on rural areas. However there are some urban communities which derive benefits from natural resources in their area. Failure to benefit from the resource will have an impact on sustainable management of the resource. The research findings would form part of additional information which could be available to various stakeholders. For example, the findings can be used by the

Parks and Wildlife Management Department to improve their operations for the benefit of the local community and sustainability of the resource. The research would also provide baseline data for further studies.

1.5 Research Questions

i) What the socio-economic benefits of Lake Kariba to the residents of Nyamhunga Township?

ii) Which are the management strategies in place at Lake Kariba?

1.6 Aim

The study aimed to:

Investigate the socio-economic benefits of Lake Kariba to residents of Nyamhunga Township in Kariba Town

1.7 Objectives

The study seeked to:

i) Identify the socio-economic benefits of Lake Kariba to residents of Nyamhunga Township.

ii) Establish the management strategies that are in place at Lake Kariba.

1.8 Definition of Terms

Local people - people living in the area where the resource is located.

Livelihoods - capabilities and activities which are required for a means of living by the local people.

Socio-economic activities - ways in which the people can manipulate services offered by a resource for example a dam to generate income.

Development - use of resources to relieve poverty and improve living standards .

Sustainable Resource Management - using resources in such a manner that future generations will derive the same benefit from the same resource.

Management strategy - a way or method used to safeguard resources.

Poverty - an individual's inability to satisfy basic needs in food ,shelter ,clothing and health.

Deprivation - loss or lacking in provision of desired objects or needs.

Perception - the way one understands or view a concept.

Subsistence - producing for feeding and supporting household.

Gross Domestic Product - total value of production of goods and services in a nation measured in a year.

Riverine communities - settlements near rivers or water bodies.

Vulnerable people - people who can be easily affected by virtue of being poor, orphaned or unemployed women.

Empowerment - raising the status of people.

Planned settlements - settlements developed following guidelines or set rules.

Formal employment - employment which is formally recognised, workers generally have contracts, fixed hours and employment benefits as paid sick or maternity leave.

Informal employment - employment which is not formally recognised, workers generally have no contracts, no fixed hours and no employment benefits as paid sick or maternity leave.

Infrastructural development - construction of communication networks, health centres, administration and power supply necessary for economic development.

Natural resource - any property of the physical environment such as minerals or natural vegetation or water which humans can use to satisfy their needs.

Natural resource management - the management of natural resources to bring into being development that is economically viable, socially beneficial and ecologically sustainable.

CHAPTER SUMMARY

This chapter gave the introduction of the investigation as well as background information on Lake Kariba and the concentrated communities neighboring it. The chapter also entails the significance of the study and also research questions, the aim of the study and the objectives. Definition of terms used in the research are also included in this chapter.

Chapter Two: Literature Review

2.1 Introduction

This chapter reviews literature relating to the socio-economic benefits of a water resource to the local people. It is stated by Adams (1999) that one of the efficient ways to manage resources for human needs is by the construction of dams. These resources have had a pivotal role in development for a long time. They provide water for irrigation, electricity generation, fisheries and water supply. The focus of this chapter is presentation of literature related to the positive effects of large dams on the lives of the local people.

2.2.1 Benefits from the construction of dams

Dams change the lifestyle of the local people. For example the Volta Dam has made a great change in many people's lives (World Bank 2000). Eighty thousand people were moved to fifty four well planned townships and were introduced to modern cooperative methods of cultivation. Originally living in isolated villages producing subsistence crops, they were now contributing to the national economy. They switched to cash crops which helped in the improvement of their welfare as well as the increase in the gross domestic product per capita. This could not have been realised had it not been for the construction of the Volta Dam.

It is stated by Winters et al (2000) that projects are undertaken to improve the welfare of people especially the poor and insecure. According to the World Bank (2000), sixty one percent of the households in Zimbabwe are poor or very poor. It is therefore logical that projects be designed to help improve the status of households. According to Winters etal (2000), this can be done by investing directly into activities for their livelihood generation.

2.2.2 Provision of a source of Protein

Dams provide riverine communities with a cheaper source of protein. According to Carino (2000), dams provide a low cost source of protein. This is because fish and fish

products are relatively cheaper compared to beef and other white meat products. For people who live near dams, fish become cheap and at times people can go fishing for themselves and hence cut costs. According to the World Bank (2000), the money saved can be used for other purposes hence improve the wellbeing of families.

Dams also give vulnerable people like women and the unemployed something to do as they can easily engage in fishing as a livelihood strategy. As a result the disadvantaged groups are empowered. Empowerment of women helps greatly in the improvement of the welfare of the children (The World Bank 2000). This is so because money availed to women has greater chances of being used for the children than that made available to men which can be used outside the home meaning that they (men) can get money and spend it on uses not beneficial to the family at large. In addition to fish products game meat is also available to the people in riverine communities as there are a lot of wild animals in areas with large dams (Carino 2000).

2.2.3. Market

Construction of large dams create a ready market for a variety of goods and services. According to the Geographical Association of Zimbabwe (1995) the Aswan High Dam led to the development of settlements where people are concentrated within an area. Also according to the World Bank (2000) the Volta Dam resulted in eighty four thousand people being moved to fifty four well planned townships. In these places where people are concentrated there is need for services thereby creating a market for different products. As a result people within the area sell goods to each other and there is development of for example shops and pharmacies. According to the Geographical Association of Zimbabwe (1995), vending also thrive in such locations. The World Bank (2000), asserts that having a ready market for goods and services help very much in the improvement of the welfare of the local people.

2.2.4 Development of Social Facilities

According to the World Bank (2000), dams result in movement of people from isolated settlements to planned settlements. It is stated by Winters et al (2000) that social facilities as schools, clinics and stadiums are built for people near dams. This is done regardless of the location being rural or urban. Children will as a result travel short distances to school, clinics and other social facilities and those in distant places use efficient transport systems. According to the World Bank (2000), such development will greatly improve the education and health status of the people in the area which is a measure of the improvement of the welfare of the people.

2.2.5 Water Transport

According to the United Nations Development Program (2005), the increased depth of water for an example in the Niger upriver from the lake means that navigation is now possible all seasons as far as Yelwa and into the Niger and Benin Republic. This means that an alternative mode of transport is made possible by the lake. According to Fema (2007), dams provide for a stable system of inland river transportation throughout the heartland of the nation. Also according to the United Nations Development Program (2005) the lakes of the East African Rift Valley have more developed ferry systems. It is stated that in Lake Malawi there are two passenger vessels which move up and down the lake providing transport between lake side villages for local people. Such a development led to the easy transportation of goods and services to the local people which is a sign of improved welfare which cannot be realised where there are no transport services.

2.3 Employment Creation

Dams provide a livelihood for communities in the form of employment. Employment provided is both formal and informal. According to Ellis (2000), production of fish is an element in the economy associated with riverine communities. This is supported by Saddler et al (2000) who stated that many households can depend on fisheries as their source of livelihood. Therefore as fisheries form important livelihood activities in rural population, they also have the same effect on riverine urban communities.

2.3.1 Formal Employment

Dams provide formal employment opportunities for riverine communities. It is also stated by Adams (1999) that Bakolori dam in Nigeria has availed employment opportunities to nearby communities. According to the United Nations Development Program, (2005) Cabora Basa and Lake Malawi also created jobs for the citizens of the respective countries. The United Nations Development Program (2005) also cites the Muela Dam in Lesotho as having created new jobs. This is common in many countries.
After completion, dams provide off farm employment for local communities. It is also stated by Geographical Association of Zimbabwe (1995) that dams provide off farm employment for local people as infrastructure and services are developed. This means that people will be employed in industries developed due to the construction of the dam. For an example people will be employed in tourism and fishing industries. According to Foreign Aid Tour (2010), people are employed in power generation in Zambia and the tourism industry is another major employer in Zambia. It is also stated by Waugh (1990), that the fishing industry is an employer of many. This shows that there are a lot of employment opportunities generated by the construction of dams.

2.3.2 Informal Employment

According to the Wikipedia the Free Encyclopaedia (2009), the informal economy under any governing system is diverse and includes small scale, occasional members often street vendors as well as larger regular enterprises. According to Schejmart and Reardon (2000) as a result of the presence of and availability of fish, people often rely on fishing for income generation. According to the United Nations Development Programme (2005), Carbora Basa has fish but Lake Malawi has the largest number of fish species in Southern Africa. The availability of fish has resulted in people working as self-employed fisherman while others work as fish vendors. According to the United Nations Development Programme (2000), some people take this as a livelihood strategy.

The sale of craft ware as souvenirs by people in tourist resort centres is another source of income. According to Schejtman and Reardon (2000) a variety of craft-wares are sold by people close to the Aswan High Dam. As a result people earn a living out of income generated from the sale of craft ware. According to the United Nations Development Programme (2000), it is a common site to see vendors selling craft ware in tourist resort centres and on roads linking these centres and others.

2.4 Power Generation

Dams can be used for electricity power generation. The United States of America is one of the largest producers of hydropower in the world second only to Canada (Fema, 2007). Dams produce 13800 megawatts of renewable electricity and meet about eight to twelve percent of the nation's power needs. According to the United Nations Development Programme (2005) in Lesotho Muela Dam provide most of Lesotho's power needs and the Katse Dam which is one hundred metres long support a small hydro-electrical plant. According to Saddler et al (2000), the Kafue Dam supply power to Zambia.

Pazvakavambwa and Van Berg (2000) stated that Cabora Basa provides electricity for Mozambique and sometimes export surplus energy. According to Pazvakavambwa and Van Berg (2000) the Liphopho Dam in Swaziland hosts the Ezulwine hydro-electric power scheme. This will go a long way in easing the lives of the people due to the availability of electricity.

Hydropower is considered clean because it does not contribute to global warming, air pollution, acid rain or ozone depletion. It plays a major role in the effort to reduce greenhouse gas emissions (Lake Benefits, 2006). So far power from the Glen Canyon Dams in the United State of America has prevented the release of over three hundred and twenty billion pounds of carbon dioxide emissions into the atmosphere. This number continues to grow with each passing year of operation (Lake Benefits, 2006).

2.5.1 Economic Development

Water is a natural resource which forms the back-borne of development. According to Mukwada (2000), the environmental importance of water makes it one of the most indispensable natural resources. It is stated by the National Geographic Association of Zimbabwe (1995) that ancient civilisations owe their existence to the availability of water. In the same vein, the development of Kariba Town was due to the damming of the Zambezi River. According to the Wikipedia, the Free Encyclopedia (2010), the town was established to house workers who were constructing the dam in the mid and late 1950s. As a result the town now acts as a service centre for the local people. Had it not been for the dam, people from the area would be travelling to other towns which are farther away. According to the Wikipedia, the Free Encyclopedia (2010), the town has among other developments a crocodile farm, air-port to Harare and Victoria Falls. In addition the Wild Zambezi (2009) states that there is Lake Harvest and many more companies including hotels, safaris and supermarkets. Some furniture shops are also available in the town.

2.5.2 Infrastructural Development

Dams are associated with infrastructural development. According to the Geographical Association of Zimbabwe (1995), physical infrastructure is reasonably developed with well-constructed and maintained highways providing easy access to most tourist destinations. This ensures that people can travel easily with reliable transport systems. Most hotels near large dams are of relatively high standard while parks and wildlife management estates provides a wide range of extremely self-catering accommodation. Availability of such infrastructure as hotels and lodges means that people in the community can use them for occasions such as weddings and birthdays (Winters et al, 2000). Therefore the study seeks to establish if the residents of Nyamhunga also use the infrastructure in that way.

2.6.1 Water Storage

According to Fema (2007) dams create reservoirs throughout the United States of America that supply water for many uses including industrial, municipal and agricultural. So without water storage facilities it will be difficult to develop. According to Falkenmark and Widstrand (1992) water is the life blood of the biosphere in which all things exist. Mukwada (2000) also states that the ancient civilisation which thrived in the valleys of the Euphrates, Tigris and the Nile owe their existence to the availability of water. It must be stressed that any development strategy which should be adopted in industry, agriculture and other spheres of our economies which directly depends on the availability of clean, fresh water need to be harmonised with sustainable resource management strategies (Mukwada 2000).

2.6.2 Irrigation

Dams also provide water for irrigation. According to the United Nations Development Program (2005) water can make crops grow where none grew before. Rivers can provide this water but sometimes they do not. Often they dry up and then at other times they flood uncontrollably. One of the important irrigation schemes is the Gezira irrigation scheme (United Nations Development Program 2005). Farmers use their profits to improve their life, education and buying radios, sewing machines, bicycles and cars. This shows that the people's lives are improved by the availability of water through a dam.

It is stated by Wikipedia the Free Encyclopedia (2012) that the availability of clean water for domestic use and irrigation is a measure of development. Water scarcity or lack of safe drinking water is one of the world's leading problems affecting 1.1 billion people globally meaning that one in every six lacks access to safe drinking water. Scarcity of safe drinking stall or reverse human progress. This affects health and agriculture. The majority of Africa remains dependent on agricultural lifestyle and so water scarcity translates to a loss of food security (Wikipedia the Free Encyclopedia, 2012). At this point the majority of rural African communities are not tapping into their irrigation potential and irrigation is key to achieving increased agricultural production that is important for economic development and for attaining food security. According to Wikipedia the Free Encyclopedia (2009) Mazvikadei dam supplies water for irrigation to nine thousand hectares. It was constructed to increase cereal production in the country and especially winter wheat by 10%. Another irrigation scheme cited by Mukwada (2000) is the Gwembe Valley in Zambia. It began early in the 1980s under the management of the Gwembe Valley Development Company. The scheme brought two thousand and five hundred hectares under irrigated cultivation. Water was drawn from Lake Kariba and it boosted Zambia's cotton and wheat production. According to Mukwada (2000) the yield from the operation is high about three thousand and five hundred kilograms per hectare compared to just eight hundred kilograms per hectare on Zambia's small subsistence cotton farms. The scheme improved Zambia's food security

by producing ten percent of wheat crop and cotton production earns foreign currency and support the local textile industry. This shows the importance of water as a resource. According to Mukwada (2000) the Jebel Aulia dam in Sudan was built in 1937 fifty kilometres south of Khartoum. The Qoz en Nogara Scheme produces cotton and millet. In the same way urban communities improve their livelihoods through irrigation made possible by the availability of water through impoundments. According to The Foreign Aid Tour (2010), when Kariba dam was being planned the authorities had estimated that twenty five percent of the five hundred thousand acres down the Zambezi River on the Zambian side would become good agricultural land. That would have helped urban communities close to the lake like Siavonga. The water would have helped production of vegetables and other crops for the people in close proximity to the lake. Although this did not materialise water in Siavonga according to the Foreign Aid Tour (2010) is always available which is a result of being close to the lake. Water supply is reliable. According to The Foreign Aid Tour (2010) there is a thriving banana plantation in Zimbabwe and in addition to banana, vegetables and tomatoes are grown on the plantation. This is going a long way in providing vendors with products to sell and the general public an improved diet as the products are relatively cheaper.

2.7 Tourism and Recreation

Water provides a wide range of recreational opportunities. According to Waugh (2009) these opportunities stimulate the tourism industry. It is stated by Guiness and Nagle (2010) that tourism is the largest industry in the world. The World Travel and Tourism Council (WTTC) estimates that tourism sustains more than one in ten jobs in the world (Guiness and Nagle 2010). Iguacu is one of the most popular inland tourist destinations in Brazil. According to Guiness and Nagle (2010) the main attractions are flora and fauna of the national park and the reservoir and city of Foz do Iguacu. The tourism industry according to Waugh (2009) creates jobs and there is also the addition of leisure amneties

which can be used by the local people. So in this research it is intended to find out if the people are realising these benefits as in other areas.

The tourism industry also has a multiplier effect. Which is when the success of one type of industry in this case tourism attracts other forms of economic development and creates more jobs for example in shops, hotels, restaurants, bars and also as guides and instructors (Guiness and Nagle 2010). It also encourages production of souvenirs and creates a market for local farm produce. According to Guiness and Nagle (2010) Lake Victoria in Kenya has tourism as the major source of overseas income and wildlife is also abundant. The availability of water has therefore led to the development of some areas which benefit the locals.

The development of the craft industry can also be aided by the tourism industry. According to Guiness and Nagle (2010) the craft industry has been identified as a strategic sector for the economic upliftment of South Africans. The craft industry has the potential to create meaningful jobs and the department of arts and culture has begun to consolidate the marketing and distribution of South African products to international markets such as Art Mundi in Brazil. According to Guiness and Nagle (2010) in 2009 the department established the annual National Craft Awards where sixty crafters across the nine provinces were recognised and awarded prizes for their contribution to craft development. As such this will result in the empowerment of the people and raising the standard of living as people can now engage in various activities for their livelihood. The research seeks to find if Lake Kariba has stimulated the craft industry.

2.8 The Implication for Deprivation of Benefits

According to the World Bank (2010) large scale investments do not benefit local communities. The investments tend to deny land for local communities, destroy livelihoods, reduce political space for peasant oriented agricultural policies and distorts markets towards increasingly concentrated agri-business interests and global trade rather

than towards sustainable peasant or small holder production for local and national markets. According to Food and Agriculture Organisation, (2008) the deals lead to displacement of households. This means that the locals will not benefit from development. It is stated by the World Bank (2010) that grabbing of land tends to accelerate eco-system destruction and the climate crisis because many of the deals rely on industry and monoculture oriented production systems.

According to the World Bank (2010) many of the projects do not grow food for example arable land turned into zones of cultivation of jatropha. One sided example is the multimillion dollar British Jatropha Project in the Kisarawe district of Tanzania. It involved acquiring nine thousand hectares and clearing eleven villages which according to 2002 census was home to eleven thousand two hundred and seventy nine people. As a result locals are deprived of their due benefits as they do not benefit from employment created by the projects as they are moved from the land and located somewhere in most cases far away.

The communities with forests also suffer from deprivation. According to McCommick (2010) the forest and its dwellers do not directly benefit from the presence of many tourists. Forests benefit only if tourists' money can change land use patterns of local people or corporate destroyers of the forests towards more sustainable activities. In the tropics exploding population and widespread poverty have forced local people to exploit the forest as a source of sustenance. Tourism dollars can provide much needed revenues for remote communities, improving living standards and thereby reducing pressure on the natural environment (World Bank 2000). However according to McCommick (2010) this is not the case as too often the money generated does not benefit these people. It goes to developed countries where tourists originated. This gives little economic protection to the resources e.g. forests. The World Bank (2010) estimate that forty five percent of the revenue reaches the host country and in less developed countries the percentage is lower. According to the World Bank (2010) in Annapurna region of Nepal

only ten percent of every dollar spent stayed in the local economy. Within the country the money may end up in large cities or in the hands of the wealthy elite. This according to the World Bank (2010) will result in the resources being degraded as they cannot buy their survival. So this shows that in many cases local communities do not benefit from resources in their localities. According to the World Bank (2000) Sustainable management of the resource will be compromised.

2.9.0 Management Strategies and Legislative Measures

Shortage of clean, fresh water, the spread of water-borne diseases and high medical costs are ever present in environments where management programmes are non-existent (Mukwada, 2000). Most desirable water management programmes should therefore ensure the availability of water in the right amounts and quality at the right place and at the right time. Falkenmark and Widstrand (1992) stress that the problem of getting enough water for growing populations and increasing agriculture and industry has frequently caused conflicts in the past. In the 1990s the control of the Jordan River was one of the primary causes of the conflict between Israel and its neighbours including Jordan, Syria and Lebanon (Mukwada, 2000).Any sound water management programmes should take the linkages that exist between the subsystems into consideration (IUCN/UNEP/WWF, 1991). A more useful way of planning water resource management programmes is to examine the processes which occur within each of the main components of the hydrological cycle. It requires a detailed analysis of the hydrogical cycle.

In order to ensure equitable access to water and its efficient allocation, regulations and laws are often promulgated so as to control the manner in which water resources are used and managed (Botkin and Keller, 1995). The Zimbabwe Water Act number 41 of 1976 was reviewed with the intention of repealing it (Mukwada, 2000). Throughout the world regulations are used to control water abstraction, storage, use and pollution.

There are many legislative measures which can be implemented to manage resources water include .These include polluter pays principle, user pays principle, water use rights among others. Besides legislative measures there are other strategies employed to manage resources in a sustainable manner. According to Heyns, (1993) if resources are not conserved mankind can be wiped out of the face of the earth. Therefore a variety of measures are used to support management of water resources.

2.9.1. Polluter Pays Principle

One of the strategies which can be adopted is the polluter pays principle (Falkenmark Widstrand, 1992).According to this principle individuals, companies and organisations that pollute the water resources are charged heavy fines. This will safeguard resources as polluters will be responsible for their actions. However for this measure to work successfully anti-pollution laws should be enforceable and offenders must be prosecuted. For this principle to be a success Environmental Impact Assessments have to be carried out at all the stages of a project for example industrial activity. According to Mukwada, (2000), Environmental Impact Assessments are a must for a project to take off in

Zimbabwe. The World Commission on Dams, (2000) outlines the Environmental Impact Assessment in Turkey. The purpose of the Environmental Impact Assessment process is to develop information about a project's environmental impact early in the planning process so that project planners can consider environmental impacts along with economic and engineering criteria when making choices among alternatives and decision makers can do the same when deciding which project to implement. The objectives of the Environmental Impact Assessment process are to identify and evaluate the environmental impacts of proposed public and private activities that may cause environmental problems in order to prevent or mitigate adverse impacts and assess alternatives to the activities.

According to the World Commission on Dams, (2000), the Environmental Impact Assessment regulation was enacted in 1993 following the 1992 preparation of

Environmental Impact Assessment guidelines for water development projects in Turkey. At certain dams such as Keban, Lisu, and Karkamis, the Environmental Impact Assessment is complemented with cultural heritage studies. Project implementers are compelled to pay for the environmental damages related to their operations. If one pays for pollution on the environment one is forced to minimise pollution hence safeguarding the water resources.

In addition the Water Resources Management Act (2009) of Tanzania stipulates that a person polluting water resources shall be liable on conviction to pay the cost of remedying the damage caused and reinstating the quality of the water as far as is possible to the condition that would have existed where the damage was not caused and a fine of not less than three hundred thousand shillings or to imprisonment for a term not exceeding one year or to both fine and imprisonment and in case of subsequent conviction to a fine not less than five hundred thousand shillings. This will serve as a deterrent to pollution.

2.9.2 Water Use Rights

Water use rights can be applied to safeguard resources. Under this strategy governments allocate and enforce water rights (Mukwada, 2000). Without secure water rights there would be hardly any incentive for water users to invest in water management projects in a meaningful way (Young, 1992). Under this strategy governments allocate and enforce water rights (Mukwada, 2000). According to the Water Resources Management Act (2009) of Tanzania every commercial user of water should apply for water permit from the local Basin Water Board. In accordance with this act it is an offence to use water without a permit and one can be prosecuted under this act in Tanzania. A user with rights or permit is likely to use the water resources sustainably and can be answerable for the pollution of the resource unlike one with no rights. This as a result will give a sense of belonging to water resources to the users and in a way the water resources will be managed sustainably.

2.9.3 User Pays Principle

The user pays principle can be adopted to minimise abuse of water. Governments should use sound economic instruments (Heyns, 1993).Of special concern is realistic water pricing systems to ensure that user pays principle is applied. If the prices of resources are low, users are able to abuse them as they will not attach value due to suppressed value. According to Heyns (1993), governments should use sound economic instruments. Of special concern is realistic water pricing systems to ensure that the user pays principle is applied effectively. If the prices of the water resources are low, users are able to abuse them as they will not attach value due to suppressed prices.

The user pays principle needs to be buttressed with the true value principle. According to Louw and Kassier (2002) water pricing is one tool for reducing demand for water withdrawals from existing reservoirs. They argue that in the world over for example farmers receive subsidised irrigation water and therefore have no incentive to conserve water. If the subsidies that currently support water withdrawal and consumption were switched off to support conservation measures such as drip irrigation and to reward reductions in water consumption, farmers would reduce their consumption of water thus making it available for other uses. According to the World Commission on Dams, (2000), sanctions could also be used to discourage the cultivation of low value, water intensive crops in water short areas. The pricing of water and subsidies for conservation measures can also be applied to households and industry. Governments should avoid distortion of water prices by heavily subsidising water provision. According to Mitchell, (1990), this ensures that prices will reflect the true value which its users attach to it thereby encouraging conservation of water resources. If this principle is properly adopted sustainable management of water will be ensured.

2.9.4 Acts of Parliament

Sustainable management of resources can be enhanced by Acts of Parliament. According to Mukwada, (2000) the Environmental Management Act in Zimbabwe safeguards the environment against pollution and other forms of abuse. The Water Resources Management Act (2009) of Tanzania safeguards the water resources of Tanzania. According to Mhlanga, (1995) water acts or other suitable legislation are put in place to guide water resource managers accordingly. Mhlanga, (1995) states that according to the Water Act of Zambia, public water belongs to the state President and a minister of water is assigned to administer the Water Act. The minister appoints local water authorities or river boards who oversee the proper utilisation of water in a given river basin under the guidance of the Secretary of Water and his/her officers. Mhlanga, (1995) states that other than use of water for primary purposes , all other uses require a water right issued by a Water Court (referred to as Water Development Board in Zambia). In Zimbabwe

Mhlanga (1995) states that the water court consists of a judge assisted by two assessors. According to Phiri (2000) the water court will in the main hear and determine applications for the use of public water as well as disputes concerning abstraction, appropriation, control, diversion or use of public water. Disputes would normally arise if an objection to an application or conditions attached thereto is lodged with the water court or board by an interested third party (Mhlanga, 1995). River boards or water authorities are quite active in water court proceeding as they have to guard their interests or those of the people in their area of jurisdiction. Of particular interest is that there are provisions for pollution control and prevention although separate legislation such as Public Health and Environmental Control Acts handle this in greater depth. Acts empower authorities to take appropriate action in safeguarding resources and as a result the resources will be exploited sustainably.

2.9.5 Proper Land Use Planning

According to Mukwada, (2000) governments and municipalities should carry out land use planning and prevent the degradation of water resources through sedimentation and pollution. Huge quantities of sediments and pollutants often arise from settlements, farm lands and industrial districts. According to the World Commission on Dams, (2000) in recent years the Chinese government has paid much attention to the ecological safety of reservoirs by managing water in a sustainable manner. It has been recognised that it is necessary to change the traditional ideas and find a path suitable for the situation of China. According to Louw and Kassier, (2002) there are specific areas which can be used for cultivation and settlement to avoid sedimentation and pollution of water bodies. According to the Water Management Act (2009) of Tanzania cultivation is carried out at a specific distance from a water body so as to safeguard water resources. Also according to Dams and Development Project, (2004) due to the fact that agricultural soils were being washed into the lakes through severe erosion, water weeds were growing faster to cover the surfaces of water bodies thereby reducing the water holding capacity of lakes. These problems resulted in the introduction of the Greening Ghana Initiative. This involved serious efforts to restore the vegetative cover removed and the growing of trees where none grew in the past in an effort to protect water bodies. This helped a lot in reducing the deposition of huge quantities of sediments and pollutants which often arise from settlements, farmlands and industrial districts. Consequently these have to be properly planned and sited so that they do not cause the degradation of water resources.

2.9.6 Evaluation of Policies

There is also need to constantly evaluate policies so that obsolete policies are changed in order to achieve sustainable management of water resources for the benefit of future generations. According to Moyo (1993) policies and procedures on water resources should be evaluated and constantly monitored to ensure that they are in line with national needs and international standards. In the same vein Mhlanga, (2000), states that fines

should also be revised as sometimes they become so meagre that they actually promote pollution rather than deterring it. According to Gawler, (1997) from a movement in support of including environmental water needs in water project considerations that began in the early 1980s, South Africa has established one of the most enlightened water laws in the world and an extensive collaborating national body of water managers, engineers and scientists that are highly experienced in this field. In addition loop holes can be identified and eliminated through evaluation of policies.

2.9.7 Awareness Campaigns and Education

According to Mukwada, (2000) the attitude of viewing water as a "free good" or "limitless resource" needs to be dispelled through widespread and intensive awareness campaigns and education programmes. According to Mitchel (1990) profound attention should be given to the following:

- Communities should be provided with basic information about the link between water availability and the water cycle. This information should be disseminated at grassroots level and it should be made readily available at community resource centres such as libraries.
- Schools and colleges as well as media, including newspapers, television and radio should be used as agents for the dissemination of information about water management programmes.
- The attitudes of the public should be changed so that less water is made available for non-essential uses such as watering of ornamental gardens, filling swimming pools and ornamental pools and use of automatic car washing equipment.
- Primary health institutions should be actively involved in imparting knowledge about the relationship between health and pollution, hygiene as well as sanitation. This approach is most applicable in lower income communities

(IUCN/UNEP/WWF, 1991)

- Communities should be made aware of the role and importance of wetlands and aquatic ecosystems in the hydrological cycle as well as the means to preserve them.

These will ensure that communities will appreciate the importance of the water resources and consequently guard the resources against degrading substances. According to the World Commission on Dams, (2000), informing a community of the risks they face from pollution and what action they can take to minimise water pollution will help in water resources management. The Commission states that involving the public brings an added advantage of gaining public acceptance of plans to manage water resources sustainably. Communities if equipped with knowledge will also use water resources sustainably.

2.9.8 Research and Data Collection

This can also help in sustainable management of water resources. According to Botkin and Keller (1995) attention can be directed on:

- Research and collection of scientific data on the hydrological cycle, water utilisation, pollution and related environmental consequences should be carried out by research stations, colleges and universities. If possible collected and processed data must be computerised and made readily available to planners, water users and other stakeholders.
- The role of indigenous knowledge in resource management should be established.
- The economic value of water sources including rivers, wetlands, lakes and aquifers should be established in every country.
- Water budgeting should be carried out in any region, drainage basin. It is essential to measure or at least estimate basin inputs in the form of moisture advection and subsequent precipitation as well as outputs through river drainage. Evapo transpiration and consumptive use as well as precipitation should be determined and recorded at different times of the year. The country's water reserves should be estimated and recorded and river regimes carefully analysed .Changes in both

animal and human populations should be monitored and the corresponding demand for water noted.

According to Mukwada, (2000) training is also important in water resource management. In order to build the nation's capacity to manage its water resources effectively, its citizens especially water users and planners should be trained in water management skills. Schools, colleges, universities, the private sector as well as communities at large should be involved in the training of water users. Areas covered in the training include:

- Development of water sources
- Preservation and controlled use of water
- Linkages between water availability and the environment
- Collection and analysis of data on water sources

According to Botkin and Keller, (1995) as far as formal training institutions are concerned water management should be treated as an integral component of multidisciplinary courses as Geography, Environmental Science. However, water management should also be included in other disciplines as Economics, Agriculture, Engineering, Biological Sciences and Social Sciences. On job training can be given to workers who are already operating in those fields where interaction with water is inevitable for instance social work and community services. According to Dams and Development Project,

(2004), in China some research work was conducted to mitigate pollution of dams and methods of purification of polluted water bodies. Advances in information and modelling have also paved way for increased flexibility in dam and reservoir management. This enabled dam operators to reduce deposition of sediments and pollutants (World Commission on Dams, (2000). These advances are particularly important in a time when demands on water resources are increasingly complex and the trade-offs between uses must be understood and manipulated to achieve sustainable management of water resources.

A lot of management strategies can be adopted to manage water resources sustainably. This is necessitated by the fact that water is precious but is a limited resource. If it is not managed well many problems will crop up. For instance if we pollute our water resources, shortages of clean, fresh water ,spread of water related diseases and high costs of water treatment as well as high medical costs will be rife. Water management requires the involvement of the stakeholders (Mukwada, 2000).

2.9.9 Formulating and implementing strategic plans

Strategic plans can be used in the management of marine resources. Formulating and implementing strategic plans is one of the management measures that safeguard resources. The principles in pursuing strategic goals managing long term results include conservation and restoration of biodiversity. Conservation of species and effective stewardship of public land are essential in managing fish, wildlife and habitat resources (Washington Department of Fish and Wildlife, 2011). Enforcing rules and increasing voluntary compliance are core functions of the department in-charge of the resources. Strategic plans also aim to ensure the health of ecosystems and sustainable social and economic utilisation of fish, wildlife and habitat resources as stated by Wikipedia the Free Encyclopedia, (2012). According to the Washington Department of Fish and

Wildlife, (2011) the strategic plans also aim to earn public and staff trust and confidence. This calls for the improvement and maintenance of sound business systems, management practices and effective communications. It follows that there is need to rank resource importance and revenue impacts to the department when allocating services. In addition communications and public education efforts need to be strengthened and modernised. This will help in the management of resources.

2.9.10 Fisheries Management

Fisheries management can be used to safeguard fishery resources. Fisheries management draws on fisheries science in order to find ways to protect fishery resources so sustainable exploitation is possible (Wikipedia the Free Encyclopedia, 2009). Modern fisheries management is often referred to as governmental system of appropriate management rules based on defined objectives and a mix of management means to implement the rules which are put in place by a system of monitoring control and surveillance. Fisheries have been explicitly managed in some places for hundreds of years. According to Wikipedia the Free Encyclopedia, (2009) the Maori people of New Zealand had prohibitions against taking more than could be eaten and about giving back the first fish caught as an offering to the sea god. It is stated by the Directorate of Fisheries, (2005) that starting with the 18th century attempts were made to regulate fisheries in the North Norwegian fishery. This resulted in the enactment of a law in 1816 on Lofoten fishery which established in some measure what has come to be known as territorial use rights (Wikipedia the Free Encyclopedia, 2005). Fishing banks were divided into areas belonging to the nearest fishing base on land and further subdivided into fields were the boats were allowed to fish. The allocation of the fishing fields was in the hands of local governing committees usually headed by the owner of the onshore facilities which the fishermen had to rent for accommodation and drying fish.

Closely related to fishery management is catch quotas. It is one of the management strategies that can be employed. According to Wikipedia the Free Encyclopedia, (2009) individual fishing quota limit the total catch and allocate shores of that quota among the fishers who work that fishery. Fishers can buy, sell or trade shores as they choose. A large scale study in 2008 provided strong evidence that the quota system can help to prevent fishery collapse and even restore fisheries that appear to be in a decline (Wikipedia the Free Encyclopedia, 2009). So the study seeks to find if this system of management is in use at Lake Kariba.

2.10 Conclusion

The chapter discussed the socio-economic benefits of resources to the local communities. Of particular emphasis were the benefits of dams on riverine communities. There are benefits derived from the construction of dams in an area. Projects can at times not benefit those close to them so there is need for closer consideration of the benefits to locals for sustainable management of the resource.

Chapter Three: Research Methods and Materials

3.1 Introduction

This chapter is concerned with the discussion on methods, instruments and sampling procedures used in the research.

3.2 Research Design

In this research a survey research design was used. It was more suitable for such a study because it collects information from a large pool at once. The information was collected from one suburb of Nyamhunga Township in Kariba Town. As it is cross sectional, its advantage is that it reaches different age groups.

The design was both quantitative and qualitative. It was quantitave as it has emphasised on using statistical techniques (Mayhem 2006). Being quantitative the research was concerned with objectivity and accurate measurement of variables. It aided exploratory and discovery oriented research. Therefore the design was quantitative in one way. Quantitative data was collected through use of questionnaires.

The design was also qualitative because it was also dealing with general information. It aimed to clarify meaning of social actions and situations. The goal of the research was to produce intensive authentic descriptive accounts of experience and action. According to Mayhem (2006) qualitative research is concerned with meaning rather than with measurement. The emphasis on the subject understanding, communication and empathy rather than the prediction and control and it is a tenet that there is no separate, unique real world (Mayhem 2006). It is generally based on empirical research which is transferable.

Therefore the research was both qualitative and quantitative.

3.3 Research Instruments

In the research, instruments used were questionnaires, interview guides and observation guides.

3.3.1 Questionnaires

Questionnaires were administered to residents of Nyamhunga One with five hundred and fifty six households. Fifteen percent of the population was used which is 82 households. This was viewed as a representative sample. This was so as it gave a general and true picture of the whole population. One suburb was selected due to time and financial constraints since the research was self funded. Questionnaires were personally administered from one household to another. This ensured that questionnaires were returned.

Questionnaires were used as they allowed for the provision of information without knowing who provided it. The information provided was likely to be accurate. The questionnaires targeted heads of households and where they not available other people above eighteen years of age were targeted. This was done as the respondents above eighteen years are able to provide accurate information unlike those younger than this age. In the questionnaire open ended questions were limited for people not to take a long time on the questionnaire. Processing of data is also easy if open ended questions are limited. This made people more cooperative as the questionnaire did not take much of their time. The questionnaire gathered information on activities engaged in by the Nyamhunga community for survival, managerial strategies as well as demographic data. That is what the people do for a living, demographic data in terms of gender and age groups together with strategies used by authorities which affect them negatively.

Advantages of questionnaires administered by the researcher

a) There is a higher response level than for postal questionnaires.

b) They provide a chance to clarify questions.

c) From the positive feedback you get about the questionnaire you can adapt the questionnaire design in order to get more relevant information for the research question.

Despite the disadvantages the questionnaires were administered by the researcher in order to be able to collect them after some time that is three days after delivering them. This ensured that most of the questionnaires were returned.

3.3.2 Interview Guide

The interview guide was used to compliment information provided by questionnaires. The use of the interview guide ensured elaborate answers or the appropriate answers as people could ask for clarifications where they did not understand. Those who were interviewed were officers from the national parks and wildlife management department and the human resource management of Lake Harvest and Lake Crocodile Farm. These people were chosen because they have much needed information on the lake as they are involved in administration of organisations. The officer from national parks provided information on dam construction, purposes and strategies as well as fishing trends. Human resource personnel provided information on company operation and employees of the companies that is how many employees are employed by each company and what each company offers to the community at large besides employment. The key informants are very much aware of the socio-economic benefits of the lake to the community at large.

Advantages of Interviews

a) It affords a higher degree of flexibility to the researcher. In this case the interviewer can clarify questions and or answers not clearly understood.

b) It has less non response error since it is more difficulty to say no in front of the researcher than where the researcher is not there.
c) It allows one to gather a lot of information in a short time as compared to other methods.

The interview method was used in the research despite some of its shortcomings. It was used for key informants that is Human Resource Managers of companies operating in Kariba.

3.3.3 Observation Guide

The observation guide complemented information provided from the other instruments. What was observed were activities carried out by companies and individuals within the lake and in the community. The researcher observed people who were fishing and at which points. People selling wares were also observed with the view to determine if they can be classified as benefits of the lake to the Nyamhunga residents. This included the community at large. For other general public, what they do at the dam site and its surroundings was also observed.

3.3.4 Sampling

The population to be sampled was the whole of Nyamhunga One. This suburb has five hundred and eighty six households as of January 2010. Nyamhunga One was purposively sample due to financial and time constrains. The information used above was obtained from the town council housing department.

The random sampling method was used to select households. Cards representing were put in a hat and picked randomly until the required number was selected for administration of questionnaires. The method was used because it reduced bias as every

household had an equal chance of being selected. Fifteen percent of the population was used due to financial constraints that are eighty seven households.

Advantages of random sampling technique

a) It is by far the most familiar type of probability sampling.

b) Simple random samples are selected in such a way that each member of the study population has an equal chance of being selected.

The random sampling technique was used. The random sample may be quite useful whenever we sample the population that is smaller for which a suitable listing is available and where the geographical dispersion of the sample elements is not a problem. This was the case with this study.

3.3.5 Data analysis procedure

The collected data was coded. It involved reading the interviews and field notes transcripts looking for relationships, themes and concerns relevant to the context. The data was sorted, categorised and coded that is transforming the data into machine readable items. Manageable issues were selected for analysis, that is, those related to the benefits of the lake to the residents of Kariba Town.

After coding the data was captured in Microsoft Office Excel. The study was predominantly exploratory, consequently the statistical analysis was predominantly descriptive. Frequency distribution tables were used to summarise the data for the categorical variables and means and standard errors were used for summarising the quantitative continuous variable like income and average fish price variables. The chi squared test was used to test for associations between employment and involvement in fishing activities. Bar charts and frequency tables were conveniently used to display the

data. The SAS v9.2 software was used for the analysis and any tests for statistical significance were carried out at a 5% level of significance.

3.5 The Study Area

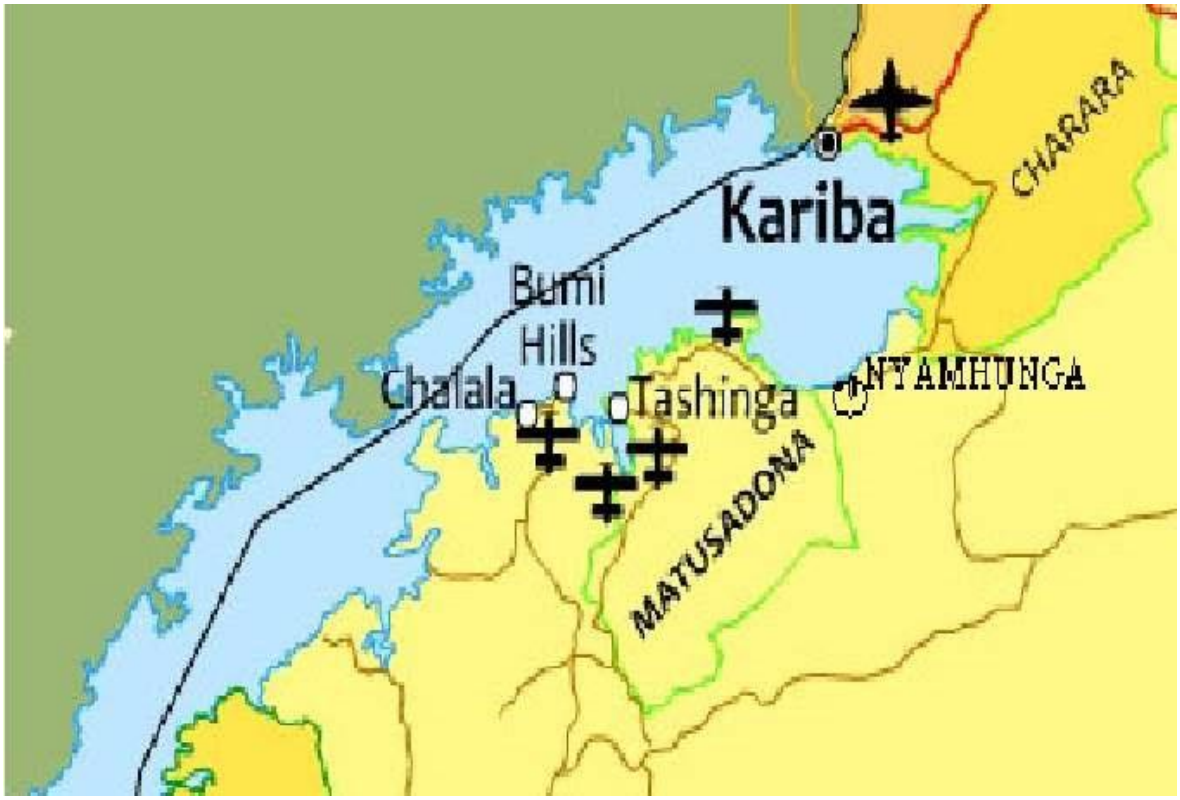


Fig 3.1 Map Nyamhunga in relation to Lake Kariba

Kariba dam was constructed on the gorge of the Zambezi River in Mashonaland West province on the Zimbabwe-Zambian border. It is in Kariba District. Kariba dam is located $16^0$31'S $28^0$48'E. Its advantage is that there is a gorge which made possible the damming of the Zambezi River and also that the Zambezi River is big. Water is always available as the Zambezi River passes through the equatorial belt hence the people of Kariba will always have a reliable water source. This means that Nyamhunga community is endowed with abundant water making it a benefit.

3.6 Delimitation of the Study

The research investigated the socio-economic benefits of Lake Kariba to Nyamhunga residents. It was restricted to Nyamhunga One, Lake Harvest, Crocodile Farm and the parks and wildlife management department. The location has an advantage of a reliable water source. The research is only concerned with the positive effects of the lake to the local community.

CHAPTER 4: RESEARCH FINDINGS

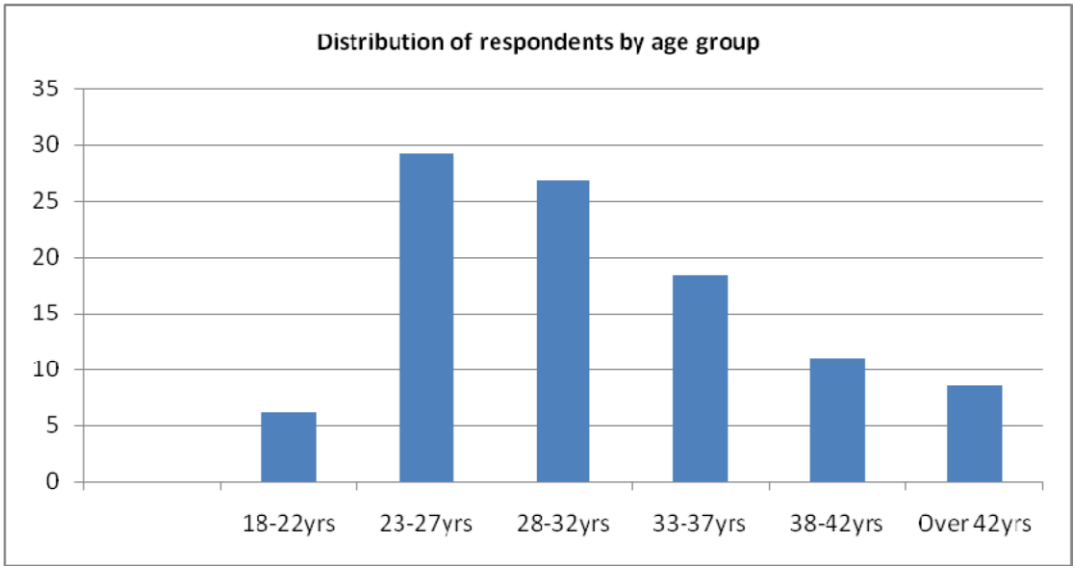
4.0 Introduction

This study was carried out with the central objective of establishing the socioeconomic benefits of Lake Kariba to the residents of Nyamhunga Township as well as the management strategies that are in place. To achieve this, data were collected from 82 residents of Nyamhunga township.

4.1 Sample Description

The data were collected using a structured questionnaire and the research units were households represented by a single member of the household. This member was not necessarily the head of the household. These respondents were classified by gender, age, employment status and length of stay in the township. 74.1% of the respondents were currently formally employed. The majority of them were males (85.4%) and the average length of stay in the township was found to be 14.6 years with a minimum and maximum stay of 1.5 years and 37 years, respectively. The distribution by age group is shown in the bar chart below. From that bar chart, it is clear that most of the respondents were between 23 years and 32 years old, representing 56.1%. The least represented age group was the
18-22 years, which represented 6% of the respondents.

Fig 4.1 Bar graph showing distribution of respondents



Gender distribution of the sample.

Table 4.1Table for gender distribution

Gender	Frequency	Percent
Female	12	14.63
Male	70	85.37

In terms of gender distribution of the sample, the majority of the respondents were males. Eighty five percent of the respondents were males while fifteen percent were females. The frequencies were seventy and twelve respectively.

Population distribution by age

Table 4.2 Distribution by age

Age	Frequency	Percent
18-22yrs	5	6.1
23-27yrs	24	29.27
28-32yrs	22	26.83
33-37yrs	15	18.29
38-42yrs	9	10.98
Over 42yrs	7	8.54

The majority of the respondents were those aged between 23 and 27 years followed by the 28-32 years that is twenty nine and twenty seven percent respectively. This was followed by the 33-37 years, 38-42 years, 18-22 years and the over 40 age groups in descending order.

Livelihood strategies of the respondents

Table 4.3. Livelihoods of respondents

What do you do for a living?	Frequency	Percent
Contract employee	7	8.54
Dependent	2	2.44
Formally employed	60	73.17
Self employed	13	15.85

The majority of the respondents were formally employed and they constituted seventy three percent of the sampled population. This was followed by respondents who were

self employed and contract workers who constituted sixteen and nine percent respectively.

The link between the livelihood strategy of the respondents and the lake

Table 4.4. Link between livelihood strategies and the lake

Is your livelihood linked to the lake?	**Frequency**	**Percent**
No	23	28.05
Yes	59	71.95

From the study seventy two percent of the sampled population indicated that their livelihood strategies were directly linked to the lake. The minority of the sampled population indicated that their livelihood strategies were not linked to the lake. They constitute twenty eight percent of the sampled population.

4.2. The Association between formal employment and engagement in fishing

Table 4.5. Association between formal employment and fishing

	Are you formally employed?	
	Frequency	**Percent**
No	22	26.8
Yes	60	73.2

The above table shows that the bulk of the respondents who engage in fishing activities are formally employed. Seventy three percent of the respondents who were into fishing activities were formally employed. The minority of the respondents who involve themselves in fishing activities were not gainfully employed. The respondents who were

not employed and are into fishing constitute twenty seven percent of the respondents involved in fishing.

The chi-squared test for independence was used to find the relationship between formal employment and engagement into fishing. The contingency table for testing this association is given on the next page..

Table 4.6. Contingency table

Frequency **Percent** **Row Pct** **Col Pct**	**Table of employment by fishing**			
	Employment	**Fishing**		
		no	**Yes**	**Total**
	No	17	5	22
		20.48	6.02	26.51
		77.27	22.73	
		27.87	22.73	
	Yes	44	17	61
		53.01	20.48	73.49
		72.13	27.87	
		72.13	77.27	
	Total	61	22	83
		73.49	26.51	100

Frequency Missing = 1

This table shows that 22 (26.5%) of the respondents were involved in fishing activities and of these, 17 were in formal employment and constituted about 77.3% of those involved in fishing with the remainder not being employed. The test for the significance of the association between these two variables shows that there is no significant association between employment and engagement in fishing activities (Chisq=0.219; p=0.6395). This suggests that whether one is employed or not does not say anything about his/her involvement in fishing activities.

4.3. Activities that the residents feel were stimulated by the lake

The researcher identified fishing, tourism, irrigation and gardening as activities that could have been stimulated by the lake. On asking the residents, it came out that the majority of them believe that fishing (92.6%) and tourism (79.3%) were stimulated by the lake. However, only 57.5% feel that besides fishing and tourism, the lake also stimulated the use of irrigation in farming while only 22.2% feel that the lake stimulated gardening. This suggests that the residents of Nyamhunga do not really attribute their gardening activities to the existence of the lake but acknowledge that fishing and tourism are closely linked to the existence of the lake. Besides the activities identified by the researcher, the respondents also added transport, electricity, employment, game viewing, infrastructural development, fishing, water sport and aquaculture.

On ranking these activities in order of importance, the residents identified power, tourism, water, employment and irrigation as the central activities, in that order. The tables showing the residents' ranking of these benefits are given below. 44.4% of the respondents ranked power as the most important first position benefit, followed by tourism with 22.2% then fresh water (13.6%). Exactly the same benefits were identified as the second position benefits with power still being the most important (30.3%)

followed by water (26.3%) and tourism (19.7%). For the third position benefits tourism was top of the list with 31.3%, followed by water (23.9%) then tourism (13.4%). For the fourth position benefits, tourism was first with 35.6%, followed by employment (17.8%) then irrigation (11.1%). Note that in these rankings only the first three activities are discussed, the rest of the rankings can be seen from the tables below.

First position benefit table

Table 4.7. First position benefit

Benefit 1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Aquaculture	1	1.23	1	1.23
Irrigation	2	2.47	3	3.7
Employment	10	12.35	13	16.05
Electricity	**36**	**44.44**	**49**	**60.49**
Tourism	**18**	**22.22**	**67**	**82.72**
Transport	3	3.7	70	86.42
Fresh water	**11**	**13.58**	**81**	**100**

Second position benefit table

Table 4.8. Second position benefit

Benefit 2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Aquaculture	4	5.26	4	5.26
Fishing	1	1.32	5	6.58
Irrigation	1	1.32	6	7.89
Employment	7	9.21	13	17.11
Electricity	**23**	**30.26**	**36**	**47.37**
Water sport	1	1.32	37	48.68
Tourism	**15**	**19.74**	**52**	**68.42**
Transport	4	5.26	56	73.68
Fresh water	**20**	**26.32**	**76**	**100**

Third position benefit table

Table 4.9. Third position benefit

Benefit 3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Aquaculture	3	4.48	3	4.48
Game viewing	1	1.49	4	5.97
Infrastructure development	1	1.49	5	7.46
Irrigation	7	10.45	12	17.91
Employment	6	8.96	18	26.87
Electricity	**9**	**13.43**	**27**	**40.3**
Tourism	**21**	**31.34**	**48**	**71.64**
Transport	3	4.48	51	76.12
Fresh water	**16**	**23.88**	**67**	**100**

Fourth position benefit table

Table 4.10. Fourth position benefit

Benefit 4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Aquaculture	2	4.44	2	4.44
Fishing	1	2.22	3	6.67
Gardening	1	2.22	4	8.89
Irrigation	**5**	**11.11**	**9**	**20**
Employment	**8**	**17.78**	**17**	**37.78**
Roads	1	2.22	18	40
Tourism	**16**	**35.56**	**34**	**75.56**
Transport	2	4.44	36	80
Water	9	20	45	100

4.4. The residents' consideration of benefits in comparison to people farther away from the lake

Most of the respondents believe that local residents of Kariba are better off compared to those who stay farther away from the lake. This belief was expressed by 91.3% of the respondents. They indicated that they benefit from the natural beauty of the place, uninterrupted power supply, good business, cheap protein, employment, fresh water for household use and a generally improved quality of life. However, they also highlighted some issues that could be hindering them from enjoying the full benefits of their proximity to the lake, namely, lack of financial resources and equipment, strict control,

corruption in the issuing and extension of permits and lack of consultations with the people in decisions concerning use of the resources. As interventions, they suggested formation of cooperatives, granting of bank loans, free fishing or cheaper licenses.

Are locals benefiting from the lake

Table 4.11. Benefits with regards to locals

Do locals benefit from the lake?	Frequency	Percent
No	7	8.54
Yes	75	91.46

The majority of the respondents feel that the locals or the residents of Kariba are benefiting more than people who do not live in close proximity to the lake. The respondents with that perception are ninety one percent. On the contrary some respondents though in the minority feel that locals are not benefiting from the lake. Nine percent had the feeling that locals are not benefiting from the lake.

4.5. **How the residents benefit**

Table 4.12. Benefits of residents

How do they benefit?	Frequency	Percent
Natural beauty	1	1.22
Business	1	1.22
Food	7	8.54
Funds	1	1.22
Jobs	26	31.71
Knowledge	1	1.22
Livelihood	2	2.44

Cheap fish and electricity	10	12.20
Not sure	2	2.44
Not fully benefiting	1	1.22
Business opportunities	2	2.44
Good standard of living	16	19.51
Natural resources	11	13.41
Fresh water	1	1.22

Thirty two percent of the respondents felt that they were benefiting through employment while twenty and thirteen percent felt that they were benefiting through good living standard and natural resources respectively. Nine percent and twelve percent felt they were benefiting through food products and cheap fish and electricity respectively.

Accessibility of recreational facilities to residents

Table 4.13 Accessibility of recreational facilities

Do you have access to recreational facilities?	**Frequency**	**Percent**
No	22	26.8
Yes	54	73.2

Seventy three percent of the residents felt that the recreational facilities were accessible. However twenty seven percent felt that the recreational facilities were inaccessible.

Frequency of enjoying recreational facilities

Table 4.14 Frequency of enjoying recreational facilities

How often do you enjoy the recreational facilities?	Frequency	Percent
Daily	4	4.88
Fortnightly	11	13.41
Monthly	13	15.85
Rarely	24	29.27
Occasionally	12	14.63
Quarterly	2	2.44
Regularly	7	8.54
Weekly	9	10.98

Eighteen percent of the respondents visit recreational facilities daily and fortnightly. Respondents who visit recreational facilities monthly were sixteen percent while fifteen percent visit occasionally. Nine percent visit regularly while twenty nine percent rarely visit recreational facilities.

4.6. Accessibility of game meat to residents

Table 4.15. Game meat accessibility

Do you have access to game meat?	Frequency	Percent
no	71	86.6
yes	11	13.4

In as far as game meat is concerned most of the sample population felt that game meat is inaccessible. Eighty seven percent felt that it is not accessible. Contrastingly thirteen percent of the sample felt that they have access to game meat.

Respondents involved in fishing activities

Table 4.16. Respondents not in fishing

Are you into fishing?	Frequency	Percent
No	61	74.39
Yes	21	25.61

With regards to involvement into fishing, the majority of the sampled population are not into fishing. Seventy four percent of the sampled population are not involved in fishing while twenty six percent is involved in fishing activities.

Reasons for not fishing

Table 4.17. Reasons for not fishing

Reason for not fishing	Frequency	Percent
Lack of equipment	1	1.6
Lack of finance	11	18
Not good at fishing	3	4.9
Not applicable	17	27.9
Not interested	4	6.6
No permit	2	3.2
Scared of crocodiles	1	1.6
Too busy	22	36.1

Most of the respondents are not fishing because they are too busy to engage in fishing. They make up thirty eight percent of those not involved in fishing. Thirty two percent

have not given reasons as to why they are not involved. Fifteen percent cited lack of finance as reason for not involving in fishing while five percent are just not interested. Four percent of respondents not involved in fishing are not involved as they are not good in fishing.

Average fish catches

Table 4.18. Fish catch

Average fish catch	Frequency	Percent
10	2	2.5
100	1	1.25
1000	2	2.5
1200	1	1.25
1800	2	2.5
20	2	2.5
25	1	1.25
30	4	5
3500	1	1.25
5000	1	1.25
70	1	1.25
7000	1	1.25
Na	61	76.25

The majority of the respondents were not aware of the fish catches that is seventy six percent. For those involved in fishing five percent catch thirty kilograms of fish. Three percent catch ten kilograms and the other three percent catch twenty kilograms. The other three percent catch one thousand and eighty hundred kilograms. The maximum catch of seven thousand is caught by one and a quarter percent of the respondents.

Fish prices

Table 4.19. Fish prices

Average fish price in $/kg	Frequency	Percent
1	1	1.22
1.5	1	1.22
1.8	1	1.22
2	10	12.2
2.5	1	1.22
3.5	1	1.22
5	5	6.1
5.5	1	1.22
Na	61	74.39

The fish prices range between a dollar and five dollars fifty cents per kilogram. Two percent of the respondents sale fish at prices ranging from a dollar to one dollar fifty cents. Thirteen percent of those in fishing sale fish at between one dollar eighty cents and two dollars per kilogram of fish. Eight percent of the respondents sale their fish at prices between two dollars fifty cents and five dollars per kilogram. One percent sale fish at five dollars fifty cents. This means that fishing provide the unemployed with a livelihood strategy as they were making a living out of fishing. For those employed it brings a supplementary fund which means they have more money. This translates to an improvement in the standard of living of residents.

Trends in fishing

Table 4.20. Trends in fishing

What is the trend in fishing?	Frequency	Percent
Decline	18	26.09
Not interested	1	1.45
Not applicable	41	59.42
Increase	7	10.14
Seasonal	1	1.45
Stable	1	1.45

Sixty percent of the respondents are not aware of the trend in fishing and these selected not applicable and not interested as their responses. Twenty six percent of the respondents feel there is a decline in catches while ten percent feel there is an increase in catches.

4.7. How locals can benefit more from the lake

Table 4.21. Measures for residents to enjoy more from the lake

Suggested measures for locals to benefit more from the lake	Frequency	Percent
Affirmative action	14	17.07
Cheap fishing and hunting licences	30	36.59
Cooperatives	15	18.29
More infrastructural development	2	2.44
Bank loans	16	19.51
More hotels	4	4.88
Not sure	1	1.22

The majority of the residents felt that locals can benefit more if they were afforded fishing and hunting licences cheaply. Eighteen percent and seventeen percent felt residents could benefit more through cooperatives and affirmative action respectively. Twenty percent of the respondents were of the opinion that residents could enjoy the benefits more through accessing bank loans while three percent suggested that they could benefit more if more infrastructural developments were made. The other five percent advocated for the construction of more hotels while the remaining one percent were not sure of how they could benefit more from the available resource.

4.8. Infrastructural development linked to the lake

Ninety three percent of the respondents believed that the infrastructural development around Kariba was linked to the very existence of the lake itself. The types of such developments were social amenities, recreational facilities and the fishing industry. It came out that the residents actually make acceptably good use of the recreational facilities at the lake. The majority of the respondents (71%) actually made use of the facilities with thirteen percent using the facilities at least fortnightly, eleven percent weekly and fifteen percent occasionally.

Infrastructural development

Table 4.22. Infrastructural developments linked to the lake

Did the lake stimulate infrastructural development?	Frequency	Percent
no	6	7.32
Yes	76	92.68

Most of respondents were of the view that the lake stimulated some infrastructural developments. Ninety three percent feel that indeed the impoundment of the Zambezi River resulted in infrastructure being developed which could not have been realised without the lake. However seven percent felt that the construction of the lake did not stimulate infrastructural development in the area in question.

4.9. Management strategies in place

Ninety three percent of the respondents acknowledged that there are lake management strategies in place at the lake and ninety one percent found these strategies to be sustainable. The different aspects of lake management strategies mentioned by the

respondents included safeguarding breeding grounds, anti-poaching, research and controlled access to the resources.

Awareness of management strategies

Table 4.23. Awareness of management strategies

Are there any lake management strategies in place?	Frequency	Percent
No	10	12.19
Yes	72	87.81

The bulk of the respondents were aware of the management strategies and they made up eighty eight percent of the sample population. In contrast twelve percent of the respondents were not aware of the management strategies.

Management strategies which respondents know

Table 4.24. Management strategies known by residents

What are the strategies?	Frequency	Percent
Anti-poaching	20	27.78
Breeding	6	8.33
Controlling	9	12.5
Parks management	28	38.89
Issuing permits	4	5.56
Research	5	6.94

The majority of the sampled population expressed awareness of the strategy employed by the government that is having the Parks and Wild Life Management Department.

Thirty nine percent were aware of the existence of the above mentioned department. Twenty eight percent of the respondents were aware of the anti-poaching strategy followed by thirteen percent who expressed knowledge of the control strategy which takes stock of the catches to avoid over-exploitation of the resources.

Sustainability of the management strategies

Table 4.25. Effectiveness of management strategies

Are the strategies sustainable?	Frequency	Percent
No	4	5.56
Yes	68	94.44

Ninety four percent of the respondents felt that the management strategies were sustainable. In contrast six percent of the sample were of the opinion that the management strategies were not sustainable.

4.10. Conclusion

From the above results, it was found that while fishing is an almost obvious benefit of the proximity to the lake, the residents themselves do not find it to be so. This is probably due to the fact that fishing activities at the lake are controlled besides it being an expensive activity in terms of equipment requirements. However, they consider the electricity, tourism and water to be the most important benefits of their proximity to the lake. The fact that they have uninterrupted power and water supplies contributes to a reasonably better quality of life and smooth business operations. There is a general acknowledgement among the respondents that they are better off than those who live far from the lake. They also believe that while they might be benefiting from their proximity to the lake, they are not making full use of the opportunities they have. This is due to a

variety of reasons, the main one being lack of financial capital to get involved in all the business activities associated with the lake, in particular, fishing.

They also acknowledge that most of the infrastructural development in the town is linked to the lake and that there are effective and sustainable lake management strategies in place. Most, if not all, of these strategies are beneficial to the community as they are directed towards conserving the natural resources around the lake.

CHAPTER FIVE: DISCUSSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a discussion of the results generated from this study. The discussion was based on the results presented in the previous chapter. Based on that discussion, conclusions and recommendations were made.

5.1 Discussion of the results

The results show that there was no link between being employed and involvement in fishing activities. The majority of the people who were involved in fishing activities were formally employed. This was an indication that fishing is a free for all enterprise. Residents can engage in fishing activities at will provided they could afford the fishing licence fees. This means that the residents of Nyamhunga Township and in general Kariba Town benefit from fishing activities by virtue of them being close to the large water body that is Lake Kariba.

It was also clear from the results that some activities were stimulated by the lake. Ranked top were fishing and tourism. Other activities stimulated by the lake were irrigation and gardening. Transport, electricity, employment, game viewing and infrastructural development were also mentioned as activities that were stimulated by the lake. Residents acknowledged that they were benefiting most importantly through reliable power supplies, water, tourism, employment and irrigation.

It also came out from the results that residents of Nyamhunga Township and Kariba in general felt that they were better off compared to those who were farther away from the lake. This was enhanced by the natural beauty of the place, uninterrupted power supply, good business environment, cheap protein source, employment and fresh water. They believed that their quality of life was generally better than those who stay farther from the lake.

From the results, the residents also noted factors that might be hindering them from enjoying the benefits fully. They highlighted lack of financial resources and equipment for them to venture into lake related activities, especially fishing and tourism. They were

also affected by strict controls and corruption on issuing fishing permits. Residents also lamented lack of consultation on decisions regarding the resources in their locality.

Residents believed, or rather, acknowledged that the infrastructural developments in Kariba were closely linked to the lake. The developments they highlighted included social and recreational amenities and the fishing industry. The residents indicated that they were using the facilities in the area.

As far as awareness of the management strategies in place at the lake are concerned, the residents expressed encouraging awareness. They were positive that the strategies were helping in safeguarding the resources.

5.2 Conclusion

The research findings revealed that the residents of Nyamhunga Township were benefiting from the lake. They enjoyed uninterrupted power and water supply. In addition they enjoyed the beauty of the place as well as other resources related to the lake like game and bird viewing.

Despite the benefits there were some challenges which affect them. There was lack of financial resources which hinders some people from engaging in fishing activities as well as strict controls and corruption.

5.3 Recommendations

a) There is need for involvement of local communities in the management of resources. This will ensure that they are not divorced from their resources and they are compelled to take good care of them.

b) There is a great need to empower communities so that their living standard is improved. This will safeguard resources against over use.

c) It is very important that resources like dams be constructed in as many as possible areas as a way of empowering communities through activities associated with the availability of water in abundance.

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APPENDICES

APPENDIX I

QUESTIONNAIRE

I am Mark Bwerinofa, a student at Bindura University of Science Education. I am carrying out a research on the socio-economic benefits of Lake Kariba to the local people. The questionnaire has been designed for academic purpose and you are assured that the information provided will be treated confidentially. Your cooperation will be greatly appreciated.

Instructions

Fill in the spaces provided or tick in the appropriate box e.g √

Demographic Data

1. Gender Male ☐ Female ☐
2. Age 18- 22 ☐ 23-27 ☐ 28-32 ☐ 33-37 ☐
   38-42 ☐ 43+ ☐
3. State the number of years you have stayed in Kariba ……

Socio-economic Data

4. Are you formally employed? Yes ☐ No ☐

   (a) If yes, state

   Where……

   (b) How much do you earn per week?.....

   (c) If No, state what you do for a living ……

Is there any link between your livelihood strategy and the lake? Yes ☐ No ☐

If yes, how do you rate the link? ……

5. Which activities have been stimulated by the lake? Fishing ☐
   Tourism ☐

   Irrigation ☐ Gardening ☐ Others (specify) ……

6. Are you into fishing? Yes ☐ No ☐
   (a) If No state what is hindering you
   ……

   (b) If yes, what is your catch per week? ……

   (c) What is the price per kilogram? ……

7. What has been the trend in fishing? ……

8. State any other four benefits of the lake beside fishing in order of importance.

   Benefit:

   1.……
   …
   2.……
   …

3.……

4.……

9. With regards to the benefits, do you think the local people are better off than those far away from the lake? Yes ☐ No ☐

   (a) If Yes, state how?

……

(b) If No, what is the problem?

……

10. Is there any infrastructural development that you link to the lake? Yes ☐ ☐ No

    (a) If Yes, state the nature of the development

    ……

    (b) If No, state why?

    ……
    …

11. Do you have access to game meat? Yes ☐ No ☐

    (a) If Yes, what is the average price per kilogram? ……

    (b) If No, what is hindering you?

    ……
    …

12. Do you benefit from the recreational facilities in Lake Kariba? Yes ☐ No ☐

    (a) If Yes, state how often?

    ……
    …

    (b) If No, what hinders you?

    ……

13. In your opinion, are the local people fully benefiting from the lake?

Yes ☐ No ☐

(a) If Yes, specify how?

……
…

(b) If No, give reason why they are not fully benefiting……

……

14. Suggest how the local people can benefit more from the lake

……
…

……..……
…

15. Are there any management strategies in Lake Kariba? Yes ☐ No ☐

(a) If Yes, outline them

……

……

……
…

16. Do the strategies help in sustainable management of the lake? Yes ☐ No ☐ (a) If Yes, state how?

……
…

(b) If No, how can the strategies be improved?

……
…

……
…

APPENDIX II

Interview Guide for key informants

I am Mark Bwerinofa, a student at Bindura University of Science Education and I am researching on the socio-economic benefits of Lake Kariba to the local people. Your assistance will be greatly appreciated. Information provided is purely for academic purposes and will be treated confidentially. Please tick in appropriate box. You can choose more than one box on some questions.

1 Is your company commercial[C] regulatory[R]?

C ☐ R ☐

2 How long have you been operating in Kariba?

0-10 ☐ 11-20 ☐ 21-30 ☐ 31-40 ☐ 41+

3 What are the operations?

Fisheries ☐ Tourism ☐ Regulatory ☐

4 How many employees are engaged? 0-200 ☐ 201-400 ☐

401-600 ☐

601-800 ☐ 801-1000 ☐ 1001+ ☐

5 From where do you get your employees?

Kariba ☐ Makuti ☐ Nyamakate ☐ Hurungwe ☐ Chinhoyi ☐

Harare ☐

6 Any other places, please specify.

_____

—

7 Are there any other services besides employment offered to residents of Kariba?

Commercial ☐ Social services ☐ ☐ Regulatory

8 Specify the products you offer to the community. Fish and fish products ☐

Engineering equipment ☐ Recreational ☐ services

9 What are the management strategies for Lake? Polluter Pays ☐ User ☐ Pays

Anti-poaching campaigns ☐ Education ☐ campaigns

10 Any other, please specify

a)……
…

b)……
…

c)……
…

d)……
…

11 Are the strategies helping in resource conservation? Yes ☐ No ☐

12 If No, please specify what needs to be done manage the resource sustainably.

a)_____
_

b)_____
_

c)_____

_

13 What benefits is the Lake offering to people in Kariba?

Employment ☐ Recreational ☐ Cheap source of protein ☐ Water ☐ Electricity ☐

14 Any other benefits, please specify.

a)_____

_

b)_____

_

c)_____

_

15 What infrastructural developments were stimulated by the Lake? Roads ☐

Shops ☐ Health Facilities ☐ Recreational ☐ Facilities

16 Others, please specify.

a)_____

_

b)_____

_

c)_____

_

17 What is the electricity situation? Always Available ☐ Erratic ☐

18 Indicate the average cost of electricity per month? 0-50 ☐ 51-100 ☐

101-150 ☐ 151-200 ☐ 201-250 ☐ 251-300 ☐ 301+ ☐

19 What is the water situation? Always Available ☐ Time Tabled ☐ ☐ Erratic

20 What is the cost per month? (US$) 0-50 ☐ 51-100 ☐

101-150 ☐

151-200 ☐ 201-250 ☐ 251-300 ☐ ☐ 301+