A VALUATION BASED APPROACH FOR SUSTAINABLE UTILIZATION OF KHUBELU WETLANDS IN LESOTHO

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By

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A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of Master of Integrated Water Resources Management) of the University of Dar es Salaam

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CERTIFICATION

We, undersigned, certify that we have read and hereby recommend for acceptance by the University of Dar es Salaam a dissertation entitled: ***A Valuation Based Approach for Sustainable Utilization of Khubelu Wetlands inLesotho***in Partial fulfilment of the requirements for the degree of Master of (Integrated Water Resources Management)of the University of Dar es Salaam.

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DECLARATION

AND

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I**, Masetsabelo Cecilia Moqekela,** declare that this thesis is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

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DEDICATION

I dedicate this work to my loving husband Teboho Moqekela who has always been supportive in all aspects throughout my study and to my son Sets'abelo Moqekela. God bless you.

LIST OF ABBREVIATIONS

CB	Cost Benefit
CI	Cash Income
CVM	Contingent Valuation Method
DEO	District Environment Officer
DoE	Department of Environment
DoS	Department of Statistics
DRRM	Department of Range Resources Management
DWA	Department of Water Affairs
ECC	Environmental Coordinating Committee
EFE	External Factor Evaluation
EIA	Environmental Impact Assessment
Gas	Grazing Associations
GDP	Gross Domestic Product
GFV	Gross Financial Value
IFE	Internal Factor Evaluation
KC	Khubelu Catchment
LHWP	Lesotho Highlands Water Project
MDGs	Millennium Development Goals
MoAFS	Ministry of Agriculture and Food Security
MoLGC	Ministry of Local Government and Chieftainship
NEAP	National Environmental Action Plan
NEC	National Environmental Secretariat
NFV	Net Financial Value

RMAs	Range Management Areas
SPSS	Statistical Package for Social Science
SWOT	Strengths, Weaknesses, Opportunities and Threads
TAC	Technical Advisory Committee
TEV	Total Economic Value
USGS	United States Geological Survey
WTA	Willingness to Accept
WTP	Willingness to Pay

ABSTRACT

The open-access nature of wetlands often leads to failure in appreciation of the important values of wetlands in decisions relating to their use and conservation. Khubelu catchment wetlands are part of those wetlands undergoing degradation in Lesotho. The study aims to determine the contribution of economic values of Khubelu wetlands to the local communities for their sustainable management. This has been achieved through the use of integrated environmental assessment framework applying three methods of valuation (market price, substitute cost and contingent valuation). Market price and substitute cost methods were used for valuation of those goods that people derive value from their direct use while the willingness to pay (contingency) method was used for assessing value of goods that people have never, and probably will never use, like biodiversity. Methods of data collection employed included: questionnaire survey, key informants interviews, and focus group discussions. The identified goods and services provided by the wetlands and their values to the local community are: recharging of ground water (US$ 540,617), provision of water (US$ 173,143), forage for grazing animals (US$ 6643), medicinal plants (US$ 5429), wild vegetables (US$ 3751), thatching grass (US$ 2900) and biodiversity services (US$ 51,814). The annual Total Economic Value (TEV) of benefits from Khubelu wetlands is estimated as US$ 784,537. The legal, policy and institutional Frameworks in the management of Khubelu wetlands are strong and well designed to meet opportunities as well as to defend against threats. These wetlands play an important role to the Khubelu communities and the nation as a whole and should therefore be managed sustainably.

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CHAPTER ONE

INTRODUCTION

1.1 General Introduction

Wetlands are productive ecosystems providing several functions that are of value to the community within which they occur. They are a resource to several goods and services that have a pecuniary value not only to the people who live close to the wetland (in terms of water, fish, reeds and wildlife), but also to those distant from the wetland such as communities located downstream of the wetland (MEA, 2005). The ability of the wetlands' contribution to livelihoods is related to their effectiveness in maintaining ecosystem functions which is a result of their distinctive hydrological characteristics (Chuma *et al*., 2009).

Despite their importance, wetlands throughout the world are degrading at a shocking rate due to many anthropogenic activities such as agricultural management and urban development (Syphard and Garcia, 2001).There has been reported disappearance of a portion equal to the current world's wetlands through conversion to agricultural utilization. For example, in the case of the United States,87% of wetland distruction has been attributed to agricultural growth (Schuyt and Brander, 2004). The open-access nature of wetlands often results in undervaluing the wetlands in decisions relating to their use and conservation (Bardecki, 1998). A chief factor that contributes to the damage of wetlands is that those who make decision often have limited indulgence and appreciation of the economic worth of the wetlands (Schuyt, 2005).

This lack of understanding of economic values of wetlands prompted world leaders to come together and formulate a strategy to protect wetlands, both for the present and future generations. This meeting resulted in the RAMSAR Convention. As a result of this convention on wetlands, management of wetlands has been pushed to higher positions in national governments' agendas, with more emphasis on conserving the wetland's values by ensuring their sustainable utilization.

The Ramsar Convention defines wise use of wetlands as the preservation of the wetlands' ecological character which can be achieved by implementing different ecosystem protection approaches, with a particular aim of sustainable development (Chuma*et al*., 2009). The Convention led to initiatives such as the Millennium Development Goals, amongst which of particular relevance to this topic are MDG 1 and 7. Those address eradication of extreme poverty and hunger, and ensuring environmental sustainability respectively. These are further highlighted in the Sustainable Development Goals as reported by UN (2015). Whereby SDG 1 (End poverty in all its forms everywhere), SDG 2 (End hunger, achieve food security and improved nutrition) and .SDG 15 (Protect, restore and promote sustainable use of forests, combat desertification and halt and reserve land degradation and halt biodiversity loss).

Sustainable development comprises three pillars: social development, economic development and environmental protection at all levels(UN, 2002). As far as SDG1 and 2 (eradication of extreme poverty and hunger) is concerned, wetlands ensure water availability thereby assuring food production and hence households' income

derived from both agricultural activities and harvesting of natural resources. Wetlands contribute a lot in ensuring environmental sustainability (SDG15) though maintenance of vital ecosystem services and balancing of exploitation of resources.

The African continent is claimed to be home to the most biologically diverse ecosystems on the globe (UNEP, 2010).Wetlands, with their plenty supply of fresh water, fertile soils, and high productivity, play a pivotal part in the African economy but they are still facing a thread of degradation. Identification and application of efficient incentives to the local communities who solely depend on wetlands for their livelihoods while safeguarding wetlands functions, values and attributes is considered the major challenge for wetlands conservation in Africa (Tiega, 2007).

This piece of work contends that irrespective of their significance, anthropogenic events and the changing climate are destroying wetlands at a rate far more than has ever been recorded. Though Africa hosts most wetlands than other continents, it is surprising that few African governments have specific national policies and laws on the protection of wetlands and thus most depend on legal instruments from other segments such as agriculture, natural resources and energy (McCartney *et al.*, 2010). Successful wetland protection and conservation is thus affected by poor policies and a lack of suitable legislative frameworks as a result of insufficient political conviction to formalise wetland conservation (Tiega, 2007).

Natural resources extraction is another threat to wetlands in Africa. As an example, mining threatened the Wakkerstroom swamp in South Africa. Uncontrolled

overexploitation of forest resources, over-fishing, poorly planned and managed oil infrastructure development are negatively impacting the Niger Delta in Nigeria (UNEP, 2000).

Wetlands in southern Africa provide a number of ecosystem services. They are very important in maintaining the livelihoods of most poor people, the majority of whom are rural-based and depend on agriculture (Schuyt, 2005). The services provided by the wetlands include among others; provision of grazing plants for animals, water for domestic and production purposes and materials for building and craft activities (Chuma *et al.,* 2009).Crop production supported by shallow groundwater present in some wetlands is considered a source of both income and food (for example by farmers in the dambos in Malawi, Zambia, and Zimbabwe) (Schuyt, 2005).

Fishing activities carried out on wetlands, for example in Lake Chilwa in Malawi and the Lukanga swamps in Zambia provide the much needed protein in rural diets. The knowledge of the role that wetlands play in supporting lives of rural communities in Southern Africa is increasing (Masiyandima *et al*, 2004).

The wetlands in Lesotho provide services and means of livelihoods to local communities in the form of livestock grazing, medical plants and water provision services amongst others (Preez and Brown, 2011). They are the sources of Lesotho perennial rivers, including the Senqu-Orange River, a trans-boundary river, and provide services to the region in terms of maintenance of water supply and quality (Bisaro, 2007). Wetlands are most important in areas with very high rainfall

variability as they help to sustain discharges during the dry season thereby improving the availability of water. Wetlands conservation therefore has an important role to play in reducing water problems at different scales (Koeln, 1992: Reimold, 1994).

Concern about the degradation and loss of the Lesotho peat-land sand corresponding wetland functions were first published around mid-1950's (Van, 1955), and has been reinforced by each of the following observers: (Jacot, 1962:Backéus and Grab, 1995)

What seems lacking in the above cited works is the valuation of the wetlands. What added value do we receive by valuing the wetland? Economic valuation of wetland is crucial in assisting decision-makers in costing interventions related to management and conservation of wetlands.

Wetland valuation is achieved by assigning economic values to the goods and services provided by resources found in the wetland. Most of the valuation studies done in the past are static, that is, the studies are one-off studies generating a fixed value for the resource under consideration. However, when sustainability is the key concern, one has to turn to dynamic valuation to capture changes in the value of a resource over time. Economic valuation is not a panacea for decision makers in making difficult choices concerning wetlands resources management but economic valuation is concerned ultimately with allocation of wetland resources to improve human wellbeing (Lambert, 2003). Consequently, different environmental benefits of wetlands are measured in terms of the contribution they make in providing goods and services of value to humanity (Barbier *et al.*, 1997).

1.2 Statement of the problem

Despite their importance as local and regional water sources, Khubelu wetlands continue to be degraded, mainly because of uncontrolled livestock grazing and trampling, encroachment by agricultural activities mainly cultivation and overexploitation of resources (ORASECOM, 2008). One of the reasons for continued degradation of the wetlands is that wetlands users have inadequate understanding and appreciation of the economic value in terms of monetary values that these wetlands have(Lambert, 2003).Understanding the economic value of these wetlands will help the users to adjust their attitude and mindset towards sustainable utilization of the wetlands. This will also allow policy makers to carry out a Cost-Benefit activity which might be in favour of conservation of these wetlands.

1.3 Research Objectives

1.3.1 Main objective

To measure the economic value of goods and services provided by Khubelu wetlands in order to guide in decision making for their future conservation and sustainable utilization.

1.3.2 Specific Objectives

- To determine and quantify and the goods and services provided by Khubelu wetlands to the community around the wetland.
- To assess the value of goods and services provided by Khubelu wetlands to the community around the wetland.

- To assess the institutional and legislative framework for sustainable utilization of the wetlands.

1.4 Research Questions

i. Which goods and services are the local residents getting from Khubelu wetlands ecosystem?

ii. What is the value of Khubelu wetlands resources (goods and services) in its present status?

iii. Which management interventions can be put in place for the conservation of Khubelu wetlands?

1.5 Significance of the Study

Khubelu wetlands play a pivotal role to both the local community and the nation as a whole through the goods and services they provide. The absence of efficient markets for these goods and services has clouded judgement of most people and has delegated the wetlands into what can be called 'inefficient' habitats modification. This is the conversion from the land use activities with large, real, but uncapturable benefits (natural ecosystems) to those land use activities with smaller but capturable income stream (Costanza *et al*.,1989). The conversion of wetland benefits into quantifiable units can prove that indeed wetlands are extremely valuable. As indicated in the problem statement, these wetlands continue to be degraded by other land use practices despite the contribution they make to livelihoods. This study assumes that once the economic value of these wetlands is known, a case will be made to advocate for the wetlands protection by making informed decisions at the

highest level in the country. The valuation will bring about proper and sustainable utilisation of the resources derived from the wetlands, contribute immensely towards wetland management, and will contribute largely to knowledge on the value of the resource which is currently very limited.

1.6 Scope and limitations of the Study

It is acknowledged that the total economic value of the wetland is estimated by summing the direct use values, indirect use values, option values and existence values. However this study only focused on the valuation of the direct benefits, existence values and some of the indirect benefits while the other values of the wetlands were not covered due to limited time and resources and the valuation was for the present status of the wetlands. It is believed that this valuation gives clear estimates of the values of the wetlands.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definitions

Many wetland definitions have been developed for various purposes (example, ecological and management purposes).

The Ramsar convention (Ramsar, 2013) defined wetlands as: "*areas of marsh, fen, peat-land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.*"

The United States Geological Survey (USGS) defined wetland as a general term applied to land areas which are seasonally or permanently waterlogged, including lakes, rivers, estuaries, and freshwater marshes; an area of low-lying land submerged or inundated periodically by fresh or saline water.

2.2 Wetlands Overview

As food prices increase, pressure on the wetlands resources also increase as these wetlands are being utilized by urban dwellers for household food production and income generation. Services provided by wetlands at some Southern African urban areas include provision of forage for animal feeding, water for domestic use and agricultural production purposes, materials for building and craft activities (Chuma *et al.,* 2009). These important ecosystems continue to be degraded regardless of the goods and services they provide to humanity.

The common property nature of most of the natural resources contribute to their destruction in the sense that even though the preference for the resources provided by the ecosystems are strong, it is difficult to exclude those who do not pay for enjoying or using them.Taken collectively, the benefit of effective wetland ecosystem management may often outweigh that of converting the wetland ecosystems into farming areas or other uses. However, wetland ecosystem conversion is often favored because of the immediate financial benefit derived by other land users (Chuma *et al*., 2009). This has become a disturbing situation worldwide and may result in extinction of most of the wetlands' essential roles.

Various national as well as international legislations for conservation and protection of wetlands were ratified but the wetlands are increasingly becoming threatened (Bergstrom and Stoll, 1993). It is estimated that since 1900 more than half of the world's wetlands have been lost due to other land uses (McCartney *et al*.,2010). These systems are lost due to developmental activities and other land uses especially livestock grazing in Lesotho without any rehabilitation being done on them (ORASECOM, 2008). This chapter reviews the literature on the importance of wetlands in terms of the goods and services they provide, the importance of valuing wetlands and different methods used in the valuation of wetlands.

2.3 Importance of Wetlands

Wetlands provide many goods and services that support millions of people around the world (McCartney*et al*., 2010). The goods provided by the wetlands include among others rich soils for agriculture, water for domestic purposes, fish for food

sustenance, reeds for mats and thatching and some natural products harvested by the rural households (Adaya *et al.,* 1997:Brander *et al*.,2006).

Wetlands also act as important sides for recreational activities and thus enhance the tourism sector while they also have some important values like religious and cultural heritage. The wetlands also provide services such as sediments retention, flood attenuation and water purification which are of great importance to human live (Turpie *et al.,* 2006).

2.4 Wetlands Degradation

The direct drivers of wetlands degradation and ultimate loss of their value include anthropogenic activities like, infrastructure development, overexploitation of resources, and the introduction of invasive alien species (MEA, 2005). Human activities cause wetland degradation and loss by changing both the quality and quantity of water together with the flow rates and increasing pollutant inputs(McCartney *et al.,* 2010).The exploitation of both surface and groundwater resources by anthropogenic activities through the removal of water or by alteration of natural flow, chemical, and sediment regimes can pose harmful consequences for wetland ecosystems (McCartney *et al.,* 2010).

2.5 Wetlands Valuation

Valuation of ecosystem services plays an important role for government decision makers in difficult financial times where the little money available has to be spent on environmental activities (Lal, 2003). It is an essential tool which can be used in

decision making to justify public spending on conservation activities and wetland management.

The study on economic valuation of magrooves (Lal, 2003) shows that economic information is important in ensuring well-organized and sustainable use of mangroves. It is further indicated by the author that since economic status dominates government decisions, and economic advancement is often their priority, economic valuation of natural resources is encouraged.

This is further supported by The Ramsar Bureau, under the Ramsar Convention, which encourages countries to commence economic valuations of wetlands to assist environmental officials, national and physical planners to take inventory of economic effects of loss of environmental resources (UN, 2008).

The use of economic worth of different goods and services rendered by the wetlands will enable one to have a stand and be in a position to persuade vital decision makers, individuals, citizens and governments about the preservation of wetlands than when only ecological data is used. It is reported that the main reason causing extreme diminution and alteration of wetland wealth is frequently the failure to reason sufficiently for their non-market environmental worth in development decisions (Babier *et al.*,1997). Economic valuation can be an important tool to aid and improve management of global wetland resources by providing a means for measuring and comparing the various benefits of wetlands.

Table 2.1: The economic value of global ecosystem services (adapted from Costanza *et al*., 1997)

Ecosystem	**Area (million hactor)**	**Value US$/ha/yr**	**Global Value US$ trillion /yr**
Open ocean	33200	252	8.4
Coastal forests	3102	4052	12.6
Tropical forests	1900	2007	3.8
Other forests	2955	302	0.9
Grasslands	3898	232	0.9
Wetlands	330	14785	4.9
Lakes and Rivers	200	8498	1.7
Croplands	1400	92	0.1
Total annual worth of the services provided by the Biosphere			**33.3**

It is easier to compare economic value of the goods and services supported by the natural systems with those of development projects when there is a common monetary numeraire than when one has to compare the monetary contribution of development with nonmonetary measures of the contribution natural resources make to a country's well being (Babier *et al.*, 1997). Wetlands provide ecosystem services estimated to be worth at least US$14 785/ ha/yr, a substantially higher value than any other ecosystem(Tiega, 2007).The different techniques and methods of valuation are discussed under section on evaluation methods.

2.5.1 The economic values of wetlands

The concept of total economic value (TEV) is used for distinguishing and grouping the values of wetlands through its framework (McCartney *et al.*, 2010). Total economic valuation distinguishes between use values and non-use values, the latter referring to those current or future (potential) values associated with an environmental resource (Pearce and Warford, 1993). The use values are broken down

into direct, indirect and optional use values while the non use values are mainly the existence values. The framework for estimating the total economic value of wetlands is shown in Figure 2.1.

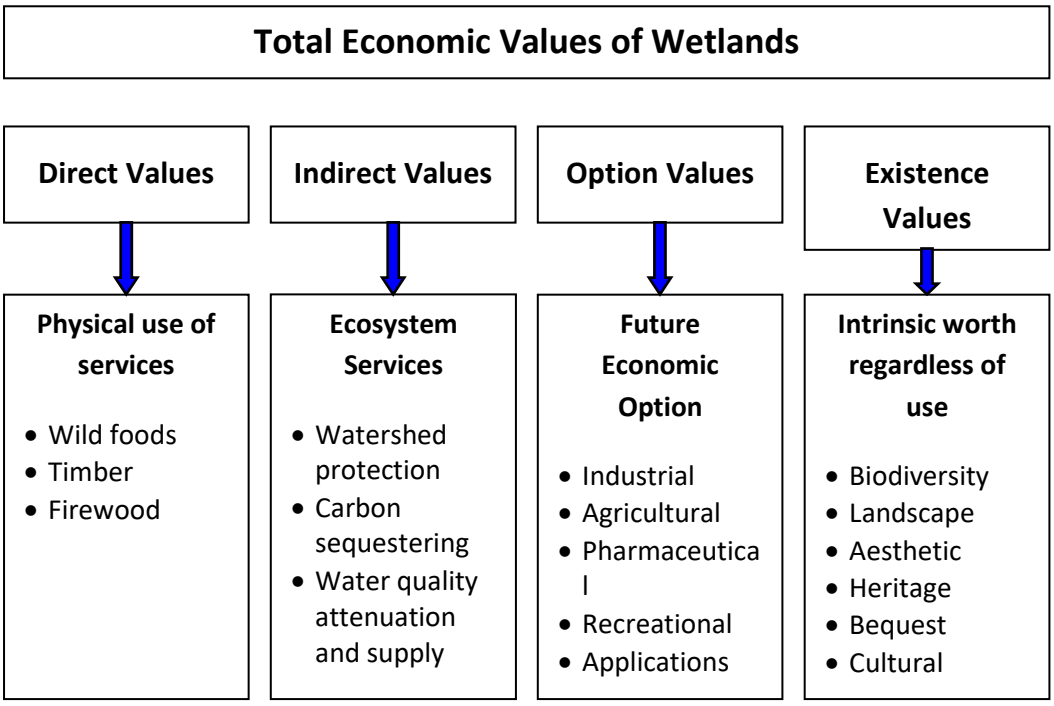

Figure 2.1: Framework for estimating the total value of wetlands (Source: IUCN 2006)

Total Economic Value (TEV) = Direct use value + Indirect use value+ Option value + Existence value (IUCN 2006)

2.6 Valuation Methods

Different methods and techniques have been developed for wetlands valuation. Non market valuation methods are used when the goods or services being valuated do not have a market value. The two broad categories of this methods are : (2) expressed preference methods which are based on what people express as their willingness to

pay for some environmental goods and (2) revealed preference methods where actual choices made by individuals are used to derive market values of a resource (Lal, 2003).

2.6.1 Expressed preference methods

2.6.1.1 Contingent valuation method (CVM)

The method is based on what people express as their willingness to pay for environmental goods. It requires a listing of the types of benefits and an estimate of the Willingness to pay for each one. The respondents are given hypothetical scenarios and asked to indicate how much they would be willing to pay to either avoid the loss or to gain some improvement in the resource. The analysis of the willingness to pay concentrates on selected categories of benefits provided by the wetlands.

In the analysis of the willingness to pay for commercial productivity of the wetland, Constanza *et al*. (1989) found it very hard to separate the effect of human effort from the effect of the intrinsic wetland productivity. Failure to make this separation results in a potentially large overestimate of the contribution of the wetlands to commercial production.

The problem with contingent valuation method is the strategic responses which may be given by the respondents in that they may overestimate their willingness to pay for the resources if they think the valuation will positively affect them and vice versa. The interviews with the respondents should be face to face and the valuation

questions should be in a willingness to pay format instead of willingness to accept and should be the referendum type yes or no rather than open-ended questions (Arrow *et al*., 1993). In this manner, willingness to pay format will yield a more truthful (lower) response than a willingness to accept format.

2.6.1.2 Energy valuation analysis method

The energy analysis valuation technique is one method used by Constanza *et al*. (1989) in their study. The technique looks at the total biological productivity of a wetland versus adjacent open water ecosystems to measure their total contributory value. The technique uses the principle that primary plant production is the basis for the food chain which supports the production of economically valuable products and thus it is converted to an equivalent economic value based on the cost to society to replace this energy source with fossil fuel as measured by the overall energy efficiency of economic production. This method was used to approximate the value of Louisiana wetland where the values ranged from US$47/acre/year for open ocean (coastal plankton) to US$914 /acre/year for brackish marsh.

2.6.2 Revealed preference methods

2.6.2.1 Substitute or proxy method

This is method is used in cases whereby the non marketed goods and services such as dyes and medicinal values are given value by using the surrogate market price of similar products or close substitutes, sold in the market place . These products must be comparable, and must have a high degree of substitution between them such that their economic values are equal (Adekola *et al*., 2006). The same method was used in

Turpie, (2003).for determining the value of fuel wood collected for consumption and was estimated by invoking prices in the market of fuel-wood, or an alternative thereof such as charcoal or kerosene. If there are apparently no marketed substitutes, then other methods may be used and such include indirect opportunity cost, where the cost of the time spent collecting and preparing those goods could be used as a proxy (Lal, 2003).

2.6.2.2 Preventative expenditures

This method function more like the willingness to pay approach in that it allows one to estimate the value of a resource by determining how much people are prepared to pay to prevent its loss or by determining the replacement cost goods of a resource once it is lost. The same approach can be used to determine the nutrient-filtering services valued by humankind, where the cost of establishing a solid-waste filtering device can be used as a proxy (Lal, 2003).

2.6.2.3 Travel cost method

The method is used to estimate the value of natural resources by determining how much people are willing to pay to visit a site especially for recreational purposes. It relies on the actual expenses incurred by the recreational user to visit the place to derive a market demand for the resource. The willingness to spend is determined through a survey among consumers and can also be established through other parameters such as time spent in reaching the site, the levels of income, the number of visitors, and the numbers of visits are considered in the analysis. After statistical analysis, the demand curves are derived which can thus be used to estimate the

Value (Hirjiet al., 2002). This method is highly subjective and may give inaccurate results, for example people may visit several sites on one trip and it may be difficult to segregate the values. On the other hand, overestimates are easily made since the visit to the site of interest may not only be the major reason for travelling to the area (Lambert, 2003).

2.6.2.4 Benefit Transfer method

This method estimates economic values by transferring the existing benefit estimates from studies that have already been completed for another location. The method is preferably applied where it is too expensive to carry out a new full study of valuation or in cases where the data available is poor; however the extrapolation can only be done for sites with the same gross characteristics (Lambert,2003). The major drawback in this method is that there is usually little opportunity to adjust wetland valuation estimates for differences in landscape and socioeconomic context.

2.6.2.5 Market valuation method

This is used when the goods and services being valuated have a market value. The market price of buying and selling wetland goods is used to estimate the value of the wetland based on the goods it provides. The economic values of these goods are estimated by considering the amount of goods consumed and sold based on their sale price in the markets (Haab, 2003).

There are mainly three methods of valuation used in this study, mainly the substitute, market price and contingent valuation methods. These methods were chosen because

they were found to be the ones most suited to the type of data collected in this study. Most of the goods collected from the wetlands have value from the local markets in Khubelu catchment hence the use of market valuation method. On the other hand, substitute method was mostly preferred for those services like water supply which do not have the direct market value from the local markets and finally the contingent valuation method was chosen to value the preparedness to pay by the Khubelu communities for the conservation of Khubelu wetlands.

The above mentioned methods of valuation were applied on data collected by different methods used in determining quantities of goods and services of wetlands. These include the consultations with wetland experts, interviews with villagers and interviews with key informers (Kyophilavong, 2011). Conversations with villagers and key informants were chosen for this research because they are more reliable compared with consultation with experts. Consultation with experts has a challenge in that experts rely on conducted studies, and this has an attendant risk of information having dramatically changed since the last study. Key informants run the risk as well of providing inaccurate information because they are not always at the wetland and can only attest to what they know and thus form an opinion that whatever they know is the case across the whole wetland but were nonetheless chosen since the information that was obtained from the interviews with the villagers needed to be verified.

2.7 Legal, Policy and Institutional Framework in Wetlands Management

2.7.1 The Legal and Policy Framework in Lesotho's Wetlands Management

2.7.1.1 International

The Government of Lesotho sanctions and observes the principles that are accepted worldwide like that of the 1972 Stockholm Declaration and that of the 1992 Rio Declaration as adopted by the United Nations Conferences. The government has also signed to observe and apply other international agreements such as Convention on Climate Change, Convention on Biological Diversity, Convention on Wetlands (RAMSAR) and United Nations Convention to Combat Desertification (UNCCD). The intention as postulated in GoL (2008) is that the country will continue to accede to other relevant internationally acceptable protocols.

2.7.1.2 Regional

The Government of Lesotho also encompasses and gives effect to the principles observed and agreed to by all SADC countries as outlined in the Southern African Development Community (SADC) Policy and Strategy for Environment and Sustainable Development, and the African Ministerial Conference on Environment (AMCEN), and other similar instruments. There is also a provision by the SADC protocol whose main is to advance the sustainable, equitable and reasonable utilisation of the shared watercourses in the Southern African Development Community Region (Sullivan and Fisher, 2010). The ORASECOM agreement also comes as an important agreement in that the agreement intends to develop a Basin Wide Plan which builds a common understanding of the water resources issues in the basin.

2.7.1.3 Local

Constitution of Lesotho 1993

Section 36 of the Constitution of Lesotho 1993is to the effect that *Lesotho shall espouse programmes calculated or aimed at protecting and augmenting the natural and cultural environment of Lesotho so that both present and future generations shall enjoy them and the country shall make an effort to pledge to all its people a comprehensive and harmless environment sufficient for their wellbeing and welfare.*

It is imperative to take cognisance of the fact that section 2 of the same constitution is to the effect that the constitution of Lesotho is the superlative law of the country and as thus any other law that is not in consonance with it will be worthless and invalid to the extent of such disharmony (GoL, 1993). The fact that there is such a section in the constitution speaks volumes about the country's seriousness on environmental matters.

National Environmental Policy, 1998

The general aim of the National Environmental Policy is to attain maintainable livelihoods for the people and the enhancement of Lesotho as a country. One of the purposes of the this policy is to make sure that the usage of the environment and natural resources and conservation thereof is for the benefit of present and future generations.

Environment Act, 2008

The introduction to the Act provides that this is an Act to make provision for the fortification, safeguarding and management of the environment and to maintain sustainable use of natural resources of Lesotho and for matters related to them. Sections 61 and 62 of the Act make provision for the promulgation of procedures and measures for protection and management of wetlands amongst others.

The National Range Resources Policy, 2014

The policy applies to range resources in their entirety, but has a section specifically devoted to wetlands. That section is to the effect that the Government shall guarantee that information on where the wetlands are located, their status, their outspread, physiognomies and functions of the wetlands is given, to promote the appreciation and conservation of this resource.

National Water and Sanitation Policy 2007

The policy has as one of its aims the suitable management of the country's water resources and the sustainable use thereof. The policy further advocates harmonization and consistency in the management and advancement of water and other associated innate resources, so as to make the most of the ensuing socio-economic benefits without compromising the sustainability of fundamental ecosystems. To realize this, the strategy proposes promotion of integrated planning, improvement and administration of water resources at diverse levels and in different sectors, and the promotion of integrated water resources management with the aim of reducing the harmful impacts of human actions and natural processes on fragile

ecosystems GoL, (2007). The guiding principle enshrined in the policy is that water has an economic value and should be treated as an economic good.

2.7.2 Institutional Framework in Lesotho's Wetlands Management

The National Environmental Action Plan (NEAP) was brought to being in 1989by the government of the Kingdom of Lesotho, and the plan gave birth to the framework for the conservation and sustainable utilisation of natural resources. Key amongst the NEAP recommendations was that an institutional framework for the management of environmental issues in Lesotho be created. Despite this good suggestion there was nothing noteworthy or any notable progress in giving effect to this recommendation until May 1994 when the National Action Plan was launched. Both National Environmental Action Plan and National Plan endorsed the need for the government to establish a national body or bodies that will be responsible for the overall co-ordination of environmental matters throughout the country.

As a direct result of the recommendation made in the 1989 National Environmental Action Plan (NEAP) to establish an institutional framework for the management of environmental issues, in 1994, the National Environmental Secretariat (NES) was formed. In the beginning, the NES was placed under the Prime Minister's Office as the principal environmental coordinating institution. Thereafter, NES was taken to the Ministry of Environment, Gender and Youth Affairs and then was moved in 2003 to the Ministry of Tourism, Environment and Culture under the Department of Environment.

The GoL (2008) brought about a new institutional structure. According to the new change by the Act, a National Environment Council (NEC), which is made of a number of ministers, several stakeholders from all sectors that are represented, and which is chaired by the Minister responsible for the environment, was established. The council is mandated with accountability to draft environmental policy, creating harmony between the policies, planning the activities of government departments and ensuring coordination among stakeholders engaged in environmental protection.

There is also the Department of Environment created under section 9. This department is the executive arm of the council and the main agency accountable for the management of the environmental affairs. The DoE has been put in place of the National Environmental Secretariat. While the DoE is now the only agency provided for by law as a reviewer of EIAs, it may call upon a Technical Advisory Committee (TAC) to review and advise it on any environmental plans and EIAs for major projects and activities, as listed in the schedule of GoL (2008). The law does not say anything about decentralizing or outsourcing the administration of the EIA process in Lesotho.

The Environment Act also make provision for the creation of an Environmental Coordinating Committee (ECC), which is mandated to make certain that there is optimum cooperation and coordination among the line ministries and other organizations dealing with environmental protection and management (section 11 of the Act).

Furthermore, there is provision for a District Environmental Officer in every district of the country which has the role of promoting environmental awareness in the district and reporting on matters relating to the sustainable utilization of natural resources (section 12 thereof).

The GoL (2008) also established a tribunal that will hear appeals against decisions of the competent authority. It will be composed of three members: a legal practitioner who shall chair the tribunal, an individual with a degree in environmental law, and a person with experience in environmental issues.

Once the Institutional and Legal frameworks have been established, SWOT analysis is used to determine their performance as in Sopha (2013), where this approach has been used for the analysis of stakeholders involved in the use and management of XeChamphone Wetland in Uganda. The results of the study indicated that local communities with different socio-economic background prefer different management activities. The same approach was also used in Bory (2009). For the analysis of instruments regarding the protection of soil from the Central project (Urban SMS).

CHAPTER THREE

METHODOLOGY

3.1 Description of the Study Area

The Khubelu catchment is situated in the north eastern highlands part of Lesotho. The catchment is a drainage basin of Khubelu River which is the tributary to Senqu – Orange River. This is a south flowing river in Mokhotlong district with its sources of Phofung (Mont-aux-Sources) and Sekhong (Mount Amery) having altitude of over 3000m above sea level in the north of the catchment (ORASECOM, 2008).The Khubelu catchment, as measured at Tlokoeng covers a total area of 852 $km^2$with the mean annual evapotranspiration of approximately 920 mm and the average annual rainfall of 1168 mm measured at Oxbow (ORASECOM, 2008).

The wetlands in the Khubelu catchment are of the palustrine category and are mainly found in the northern part of the country at the altitude above 3000m and they are part of the rangelands. The population of the catchment was approximately 20,000 people in 2006. The major socio economic activities in the catchment include mining, farming (both crops and livestock)(ORASECOM, 2008).The wetlands have scanty vegetal cover dominated by shrubs, Oxalis sp., Geumcapensi (Geumcapensi), short sedge grasses, Helichrysumchionosphaerum, carex, Festuca and FestucaCaprina which is an indication of degradation(Orange-senqu Report, 2008). A healthy wetland is characterised by abundance of Carex sp., Scirpus sp. and Merxmullerasp (Credit Valley Conservation, 2010).

The study was conducted within the Khubelu Catchment in Mokhotlong district shown in Figure 3.1.

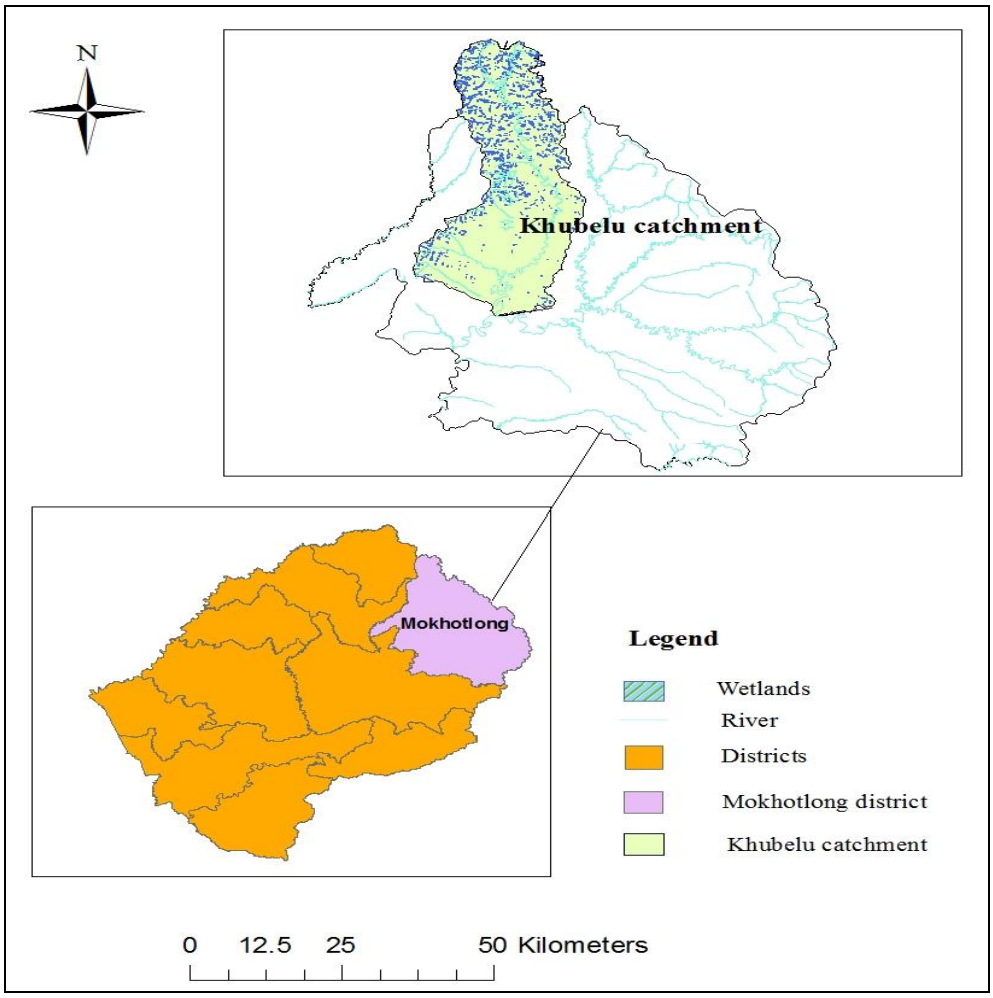

Figure 3.1: Map of the study area

3.2 Research Design

This research was conducted from December 2015 to April 2016 using quantitative research methods. Both primary and secondary data were used as sources of data for this research. Primary data was collected through questionnaire administration and

informal interviews with key informants. The secondary data was collected from government ministries and nongovernmental organizations.

3.2.1 Questionnaire Administration

A total of 200 structured questionnaires were conducted to gather information on the goods and services collected from the wetlands by members of the two grazing associations in Khubelu catchment. These group of people were chosen because they are the ones directly involved in the use and management of rangelands and hence wetlands in the catchment. The questionnaires were developed and pre-tested before use to ensure validity of information to be collected.

3.2.2 Key Informant Interviews

These were used to gather information on the overall management of the wetlands. The interviews were conducted with the local chiefs and some government officers from the DWA, MoLGC, DoE, DRRM and MoAS. The interviews were important in giving the overview of wetlands management practises and major challenges encountered in the management of the wetlands.

3.3 Methodology based on objectives

In order to achieve the objectives of the study, various methods and tools were employed as discussed hereunder. Both primary and secondary data were used as sources of data for this research.

3.3.1 Determination and quantification of the wetlands benefits (goods and services)

Primary data on the resources collected from wetlands, calculable economic information on domestic utilization of wetland ecosystem good, data on the services provided by the wetlands and the influence of those products on the total household income generation was collected by means of structured questionnaires. Aspects like demographic characteristics such as age and sex, socio-economic matters like education levels, employment status, and sources of income for the respondents were also covered in the questionnaires.

The questionnaires were administered to the members of the two grazing associations and some herders found in Khubelu Catchment. Samples were taken mainly from the associations members in 18 villages covered by the study area because they are the ones who are involved in the use of the wetlands since these wetlands are far in the cattlepost areas situated in the high altitudes far from the villages. Grazing associations (GAs) in Lesotho are given the powers by the principal chiefs to manage the rangelands (GoL, 2014) from which most of the wetlands in Lesotho are found.

A total of 200 questionnaires were administered and informal interviews with the responsible officers from the MoLGC, DoE, DWA and the DRRM were also conducted in order to verify some of the information gained from the questionnaire surveys. Initially, an experimental assessment was done in Mapholaneng village to experiment the questionnaires for correctness and soundness. This gave room for some corrections in the questionnaires. Secondary data on the population of the study

area and livestock numbers were collected from the DoS and the office of the Principal Chief respectively although the livestock statistics were from 1990 to 2000. To determine the required sample, the number of questionnaires which needed to be completed to be representative of the overall population using or benefiting from the wetland was obtained from Equation 3.1.A total of 399 questionnaires were found to be the required sample size and only 50% of the required sample size was achieved due to inaccessibility of the study area and time limitations.

$$n = \frac{NZ^2*P*(1-P)}{Nd^2 + Z^2*p*(1-p)} \qquad (3.1)$$

(Source: Carvalho *et al*, 2009)

Where,

n =sample size

N=total number of households

Z=confidence level (95% level Z=1.96)

p =estimated population proportion (0.5, this maximizes sample size)

d=error limit of 5 % (0.05)

The respondents were asked to give a list of goods and services they obtained from the wetlands as covered in the questionnaires. The benefits derived by the community from the wetlands have been identified and quantified in terms of direct use values, indirect use values and existence values and non use values. All this information aided in the quantification of goods and services from the wetlands.

3.3.2 Valuation of the identified goods and services

This was attained by using different methods following the framework for total economic value of wetlands shown in (Figure 2.1) from IUCN (2006).The benefits or services of the wetlands extend beyond the wetlands themselves. It is therefore ideal that the economic valuation in this study is based on the entire Khubelu Catchment, which is sustained by the wetlands within the catchment.

The data collected from the survey on the identified and quantified goods and services from the wetlands was first coded to prepare it for analysis. The data was statistically analyzed using Statistical Package for Social Sciences (SPSS) and the statistics used for the analysis are the sum, mean, frequency and percentages. SPSS is one of the most widely used programs for analysing statistics in social sciences. The statistical analysis was performed on the household characteristics that is, gender, age, household size and household income.

The analysis was also performed on the quantity of goods and services obtained from Khubelu wetlands on annual basis. The economic value of these goods was then estimated and expressed using three indicators, Gross financial value (GFV), Net financial value (NFV) and Cash income (CI) in Maloti (M) (Lesotho currency) as shown in equations (3.2, 3.3, 3.4, 3.5 and 3.6. adapted from Adekola, 2006)and then converted to US$ based on the exchange rate of a dollar (1 US$= M 14) in February 2016.

$$GFV = TQH \times P \quad \text{..... (3.2)}$$

Where,

TQH - is the total annual quantity harvested (or produced) and P is the average price per unit of product at which a resource/commodity was sold at the market.

TQH =

$$TQH = \frac{\sum_{i=1}^{m} HCi}{n} xPPH \quad \text{.....(3.3)}$$

Where

HCi is the quantity of product collected by household i.

PHH = percentage of households participating in the activity

$$PHH = \frac{m}{n} xN \quad \text{.....(3.4)}$$

Where,

m = number of households in the sample participating in the activity

n = total number of sampled households

N = total number of households in the population (N=10,084)

NFV= GFV x CST……(3.5)

Where

CST = total costs of collection / production. Costs were estimated based on all monetary inputs going into the harvesting and use of each good/service of the wetland.

CI = QSD × P …… (3.6)

Where,

QSD is the total quantity of product sold.

3.3.2.1 Direct use values of the wetland

The direct use values were achieved through the use of revealed preference methods mainly substitute method whereby the value of similar products, or close substitutes, sold in the market place was used as surrogate market price for the particular goods. Data about market price of buying and selling wetlands goods was collected during the focus group discussions with the community members and by means of informal interviews from the local markets. The economic value of these goods has been estimated by considering the amount of goods consumed and sold based on their sale price in the markets (Haab and McConnel, 2003).The total economic value of the direct benefits of a wetland was then calculated by summing up the individual goods provided by the wetlands.

3.3.2.2 Option value

The existence values were estimated using contingent valuation methods through the determination of willingness to pay by the Khubelu communities. The data on willingness to pay was also analysed using SPSS and the statistics used were frequency, sum and the mean. Information on non use or existence value of the wetland (that is, things such asbiodiversity and aestheticity) was collected by means of a structured questionnaire from the communities close to the wetlands.

The willingness to pay is mostly used for giving value to those benefits that a market worth cannot be attached to, particularly inherent worth benefits such as biodiversity and cultural heritage (Lambert, 2003). In this particular study the respondents were interviewed on their willingness to pay for conservation of the wetlands, by asking them how much they would be willing to contribute to the project or programme aimed at conserving the wetlands. Open ended questions were used to assess the willingness to pay by the respondents.

The results of this exercise enabled estimation of the existence values of the wetlands by using equation 3.7.

Twtp = Mean WTP* Population..... (3.7)

Where

Twtp: Total of willingness to pay (wtp) in the community/population

Mean WTP: mean of sample willingness to pay (wtp) in the community

Population: No. of people in community

3.3.2.3 Indirect use value(recharge function)

Wetlands in Lesotho are known to be major sources of rivers. The wetlands function as surface water storage whereby they function like sponges storing water and slowly releasing it(McCartney and Acreman, 2009).The stored water in wetlands facilitates groundwater recharge which contributes to the baseflow of surface water systems particularly during dry periods or drought. Baseflow is the portion of stream flow that comes from the sum of deep subsurface flow and delayed shallow subsurface flow (Lee and Rasley, 2002).The secondary time series flow data from the Tlokoeng

hydrometric station was acquired from the Department of water affairs. This station is located at the outlet of the wetlands on the Khubelu River and hence measures the outflow from the wetlands.

The stream flow data was used to determine the baseflow using the Hydro Office program BFI +3.The hydro Office program is the programme that analyses and separates baseflow from total catchment discharge. The program allows the user to choose from eleven methods of baseflow separation and results can be analysed in either a table or graphical form (Gregor, 2010). This programme was chosen because of its simplicity and uses readily available data as opposed to other methods that require USGS data.

Khubelu stream flow time series data for thirty years was fed into the programme and local minimum method was chosen for the separation of base flow. The local minimum method estimates base-flow values for each day between local minimums by linear interpolations. This is achieved through the use of recursive digital filters. The recursive digital filters are routine tools in signal analysis and processing (Zhang *et al.*, 2013). They remove the high-frequency quick flow signal to derive the low-frequency base flow signal through the use of Equation 3.3.

$$q_{f(i)} = \alpha q_{f(i-1)} + (q_{(i)} - q_{(i-1)})\frac{1+\alpha}{2} \quad \text{.....(3.8)}$$

Where: $q_{f(i)}$= filtered quick flow for the i^{th} sampling instant

α α_q=filter parameters

q_i=original stream flow for the i^{th} sampling instant

$q_{(i-1)}$= original stream flow for the previous sampling instant to i

Trend analysis for the rainfall in Khubelu catchment was also done in order to see if the rainfall had any impact on the baseflow trends observed for the period of analysis (30 years). This was done by plotting the rainfall data against time on Microsoft excel spread sheet. The data analysed was the average annual rainfall for the period 1980 to 2010.

The economic value of the recharge function of the wetlands was then estimated using the substitute method whereby the rates used by the water utility company in Lesotho were used to calculate the cost of water lost.

3.3.3 Assessment of Institutional, Legal and Policy Framework for Sustainable Utilization of the wetlands

Secondary data from projects documents, policy documents, development plans and other relevant literature was used to assess the current legal and institutional framework regarding the utilization and conservation of Khubelu wetlands. This was achieved by firstestablishing a knowledge base of relevant laws and institutions, evaluating the knowledge base established using swot analysis and recommending necessary legal and institutional changes to promote wetland conservation and wise use (Ramsar, 2010).

SWOT analysis is the analysis of the strengths, weaknesses, opportunities and threats of any institution or organization. (Ghazinoory*et al*., 2011). In this study, the analysis done was on the legal and institutional framework meant for the conservation and management of the wetlands in Lesotho as summarized in Figure 3.2 and 3.3.

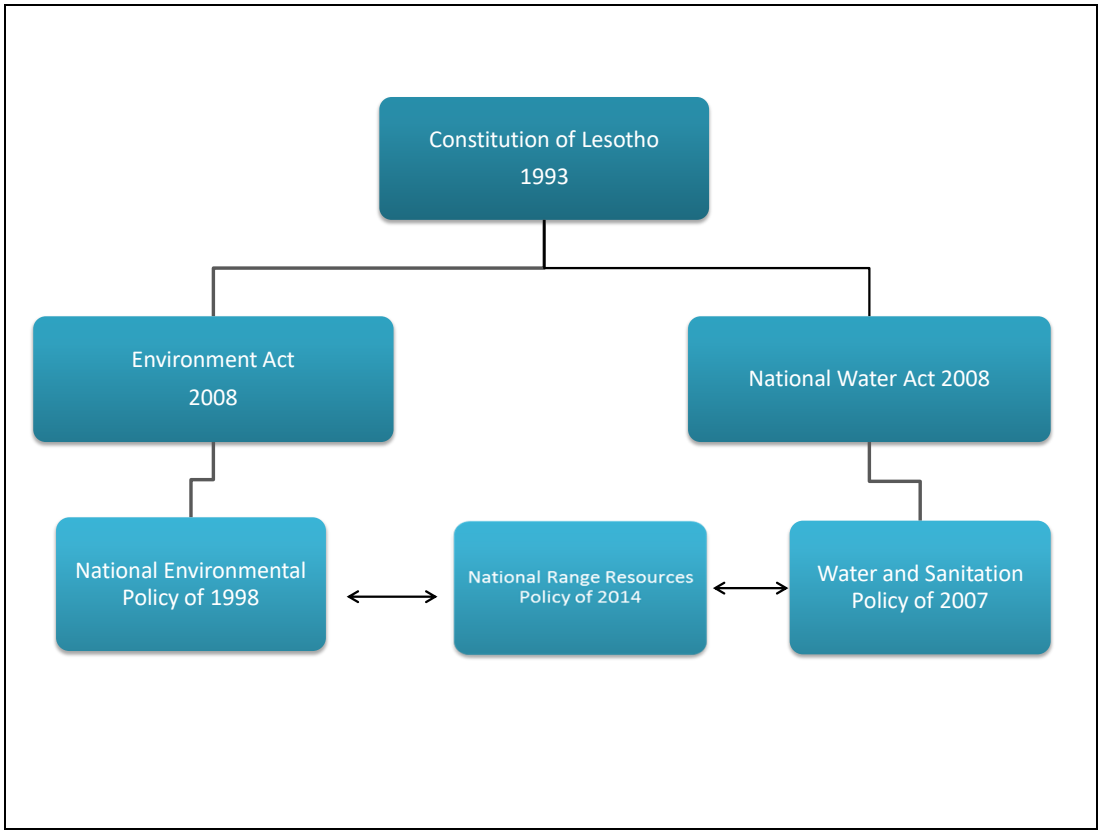

Figure 3.2: Flow chart for the Legal and Policy frameworks in Lesotho wetlands management

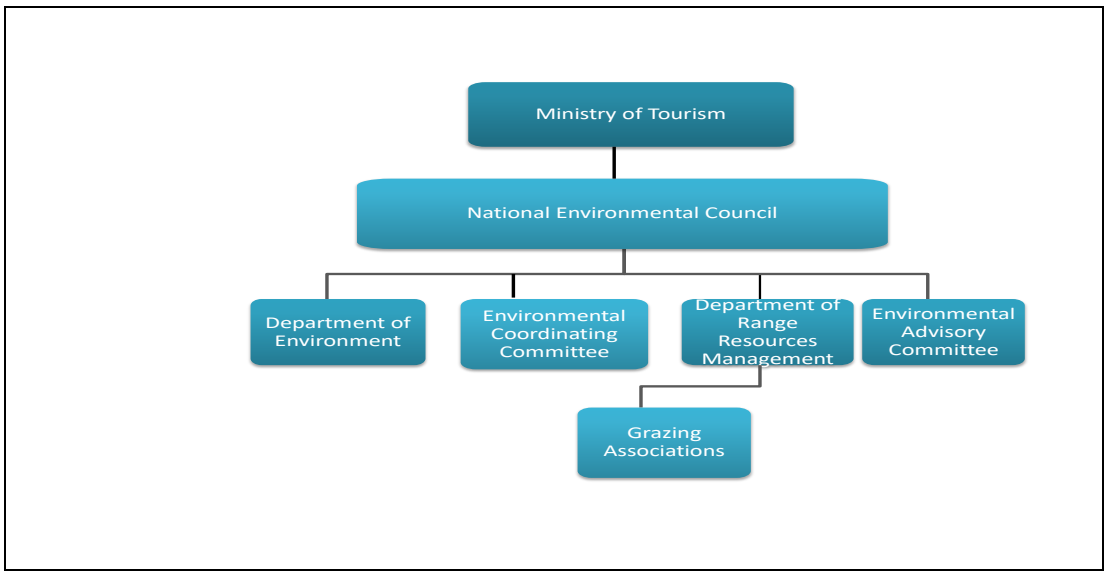

Figure 3.3: Flow chart for the Institutional framework in Lesotho wetlands management

The strengths and weaknesses are the internal factors that affect the performance of an organization while the opportunities and threats are the external factors. The internal factors were assessed by considering all the factors that either positively or negatively affect the management of the wetlands within the catchment while the external factors were assessed by considering all the factors that affect the management of the wetlands nationally.

The results of the analysis were then subjected to the internal and external factor evaluation matrix which rates the performance of the internal and external factors thereby enabling proper development of the management interventions to be put in place for the conservation of the wetlands. The internal and external factor evaluation matrices tools were used to summarize the information from SWOT analysis.

Internal Factor Evaluation (EFE) is a stratagem instrument used to evaluate the firm's internal environment and to disclose its strengths as well as weaknesses while External Factor Evaluation (EFE) is a strategy tool used to examine an organization's external environment and to identify the available opportunities and threats. With EFE the ratings in external matrix refer to how effectively the frameworks' (both legal and institutional) present stratagem responds to the opportunities and threats, while with IFE the evaluation in internal matrix exposes strength or weaknesses each factor is in the frameworks. The matrices are composed of the weights, ranks and weighted scores together with the total weighted score for the factors under

consideration. The weights assigned in the 0 (low importance) to 100 (high importance). The number indicates how important the factor is to an organization.

These weights have the same meaning in both the internal and external Factor Evaluation Matrices. On the other hand, the scores in external matrix show how efficiently an organization's existing strategy reacts to the opportunities and threats. The numbers vary from 4 to 1, with 4 meaning a superior response, 3 -above average response, 2 – average response and 1 – poor response (David, 2009). The scores in internal matrix show the strength or weakness of each factor is in an organization and the numbers vary from 4 to 1, where 4 means a major strength, 3 – minor strength, 2 – minor weakness and 1 – major weakness (David, 2009).

Total weighted score is simply the sum of all individual weighted scores (see Appendix 1 and 2). The overall score of 2.5 is an acceptable score that an organization should get if the performance of the factors under consideration is favorable to the success of an organization (David, 2009). In external evaluation, a score below 2.5 indicates that entity's stratagems are not well suited to take advantage of the opportunities and defend against threats while in the internal evaluation, a low score indicates that the institution is weak against its competitors (David, 2009).

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Household Characteristics

This section gives an overview of the respondents which enabled good judgement on the responses they gave during the questionnaire survey. Information on the gender, education level and age of the respondents enable one to have a better understanding of the population being dealt with. Questionnaires were administered to 200 households in face to face interviews representing 4000 households in the 18 villages that make up the two community councils of the study area.

The results in Table 4.1 shows that there were a high percentage of male respondents (73%) interviewed as opposed to that of female respondents (27%). This was attributed to the fact that in most families, male responded to the questions because they are the ones involved in the daily use of the wetlands especially because these wetlands are a bit far from the villages.

Table 4.1: Gender of the respondents in Khubelu community

Gender	Frequency	Percent
Female	52	27
Male	146	73
Total	200	100

Most of the respondents were above 54 years (46.5%) followed by 36-44 range of age as shown in Table 4.2. The results from the questionnaires further show that 80% of the respondents stayed more than 16 years in their respective villages. This

increases the certainty of the results in that at least the people who were interviewed are elderly people who know more about the wetlands in the study area.

Table 4.2: The age range of respondents in the Khubelu catchment

Age of respondents	Frequency	Percent
18-26	16	8
27-35	27	13
36-44	45	22.5
44-53	19	9.5
54 and above	93	46.5
Total	200	100

The results in Figure 4.1, show that at least (60%) of the respondents attained primary education, 10.5% secondary education, 10% attained university degrees while 19.5 % never attained formal education giving a very low literacy levels in the study area (most of the people could neither read nor write).

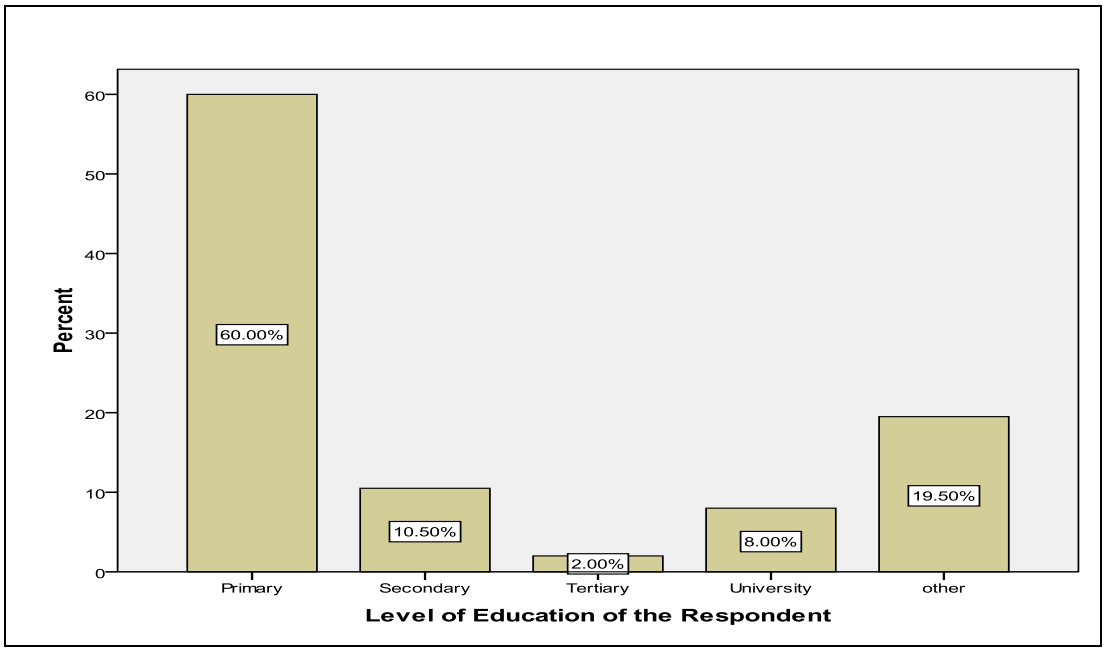

Figure 4.1: The literacy level of the respondents

The results of the analysis further reveal that (61.7%) of the respondents mainly depend on the sale of Livestock and Livestock products for income generation, 18.4% are employed while 9.93% depend on the sale of harvests from the fields and the other 9.93% get their income from other small duties (wage labour) as indicated in Figure 4.2. These results indicate that the respondents mainly depend on livestock for their livelihoods.

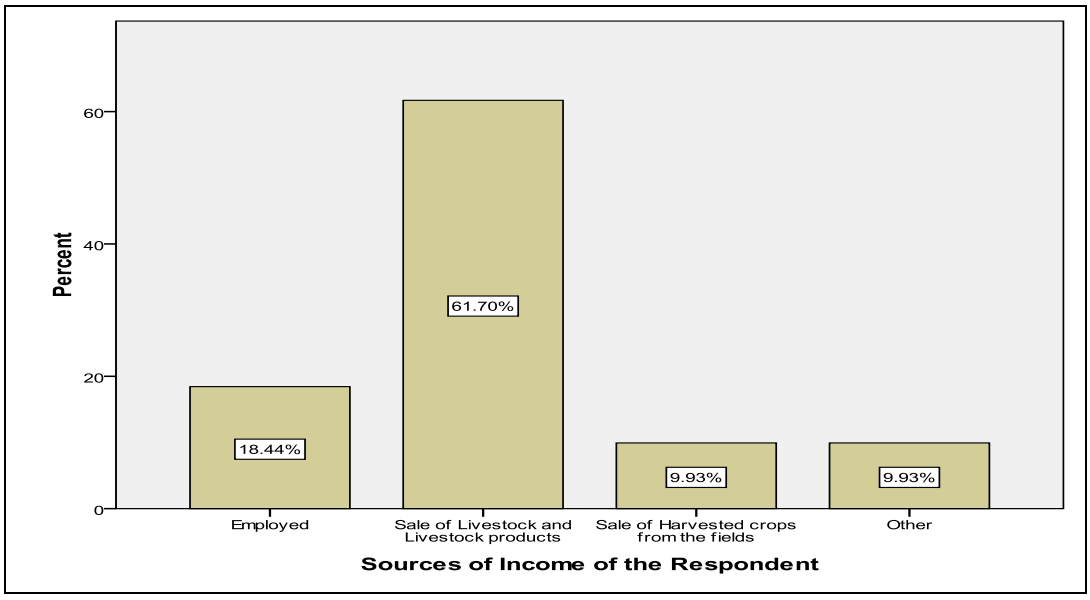

Figure 4.2: **The major income sources for the respondents**

4.1.1 Livestock statistics of the respondents

The data used for livestock statistics is the one obtained from the respondents during questionnaire survey as the secondary data from DoS was only from the period 1990 to 2000 hence could not give accurate results. The results collected from the survey were used instead of the ones collected from the DoS with the understanding that the survey results at least give the recent statistics of livestock numbers. The analysis

shows that 43% of the respondents in the study area mainly depend on livestock and livestock products for a living. The respondents indicated that they earn their income from livestock sales and through the sale of wool and mohair making livestock the most important source of living in the study area. Table 4.3 summarizes the type and number of livestock of the respondents in the 18 villages sampled.

Table 4.3: Total and mean number of livestock fed or watered on Khubelu wetlands

Livestock types	Cattle	Sheep	Goats	Horses	Donkeys
Sum	767	6600	2087	180	205
Mean	7	60	19	2	2

4.2 Quantity of goods and services obtained from Khubelu wetlands

4.2.1 Pasture for grazing Animals

Khubelu wetlands are mainly used as grazing fields by the local communities as well as those people who come from far places within the country. The total usable forage within the wetland area is 106112kg/ha as per the 2014 vegetation monitoring by the Department of Rangeland Resources Management. The total number of livestock for the interviewed households stand at 757 cows, 6600 sheep, 2087 goats, 180 horses and 205 donkeys as shown in Table 4.3 and all the households owning livestock could ascertain that their livestock do depend on the wetland for forage on annual basis.

There are several concerns on this issue. Livestock owners claimed that most members of the community graze their livestock on the rangeland throughout the

year instead of following a grazing plan which restricts overuse of the area by giving the area time to recover that is, according to the grazing plan. The wetlands areas have been allocated for grazing for the dry months of the year being May to August when most of the rangelands have dried up but instead, most of the farmers graze their livestock on the wetlands throughout the year thus causing a lot of degradation on the wetlands.

The average livestock ownership per household is estimated as 7 cows, 60 sheep, 19 goats, 2 donkeys and 2 horses as presented in Figure 4.3.

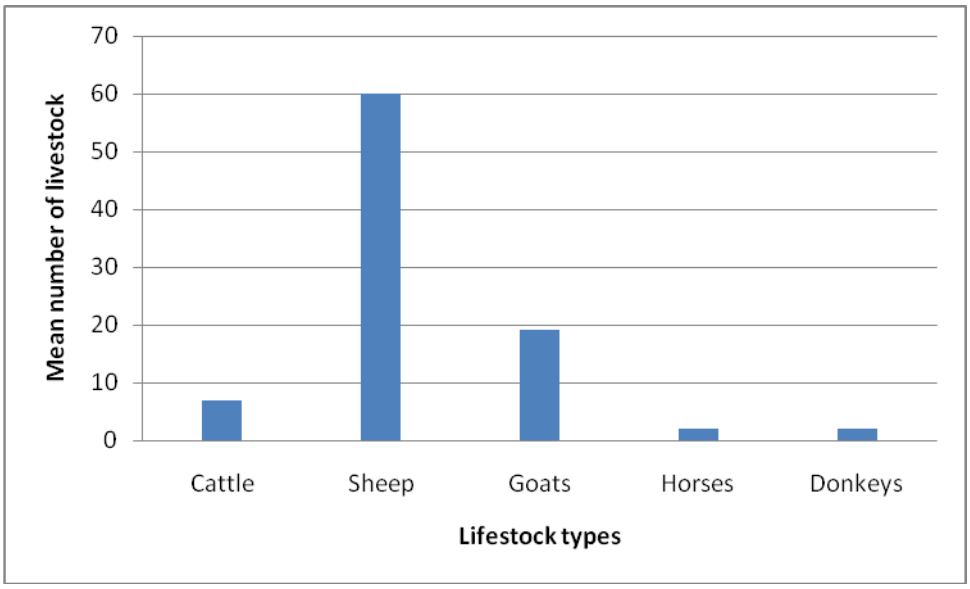

Figure 4.3: Average number of livestock per household in the study area

These values were used to estimate the amount of forage provided by the wetlands areas for grazing. Different types of animals have different daily forage demands hence this study adapted the use of Animal Unit (AU) equivalents to estimate daily

forage demands for different types of animals. An animal unit is defined as one cow that weighs 450 kg or the equivalent in Sheep, goats, horses or donkeys (GoL, 1980). This legal Notice further indicates that 1AU consumes approximately 3% of its body weight per day hence the consumption rates for different types of animals has been determined as 13.5 kg/day,2.7kg/day,10.8kg/day,2.7kg/day and 13.5kg/day for cattle, sheep, donkeys, goats and horses respectively. These values were then multiplied by the average number of each livestock type (Figure 4.3) to find the annual consumption. The amount of forage consumed by different livestock types per annum has therefore been determined as 34,493 kg/yr, 59,130 kg/y, 7884 kg/yr, 18725 kg/yr and 9855 kg/yr for cattle, sheep, donkeys, goats and horses respectively as shown in Figure 4.4.

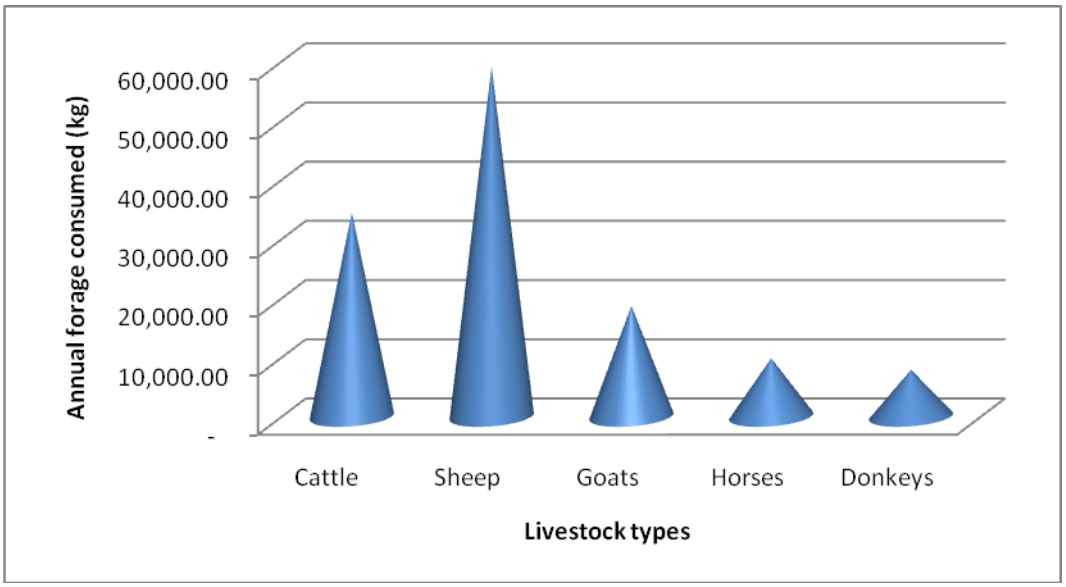

Figure 4.4: Annual average forage consumed by different livestock types

4.2.2 Water Collection

The major uses of water identified are drinking, bathing, cooking and mostly for livestock purposes. The herders in the cattle posts use water from the wetland mainly for cooking and livestock drinking. Water for household consumption is mainly obtained from the springs and stand pipes within the villages. This is because the wetlands are often far from the villages and required travel on horseback to the wetlands where most of their cattle post huts are located.

The respondents indicated that even though the water obtained for households' consumption is mainly from nearby springs and stand pipes, the wetlands still serve as important sources of water especially during dry spells. On average, the herders indicated that they use 5 liters of water per day, which gives the estimate of 294,840l of water collected directly from the wetland annually for domestic purposes. The amount of water consumed by different livestock types annually is indicated in Figure 4.5. The Average water consumed by different types of livestock with different water demands is estimated at 216,986 liters annually.

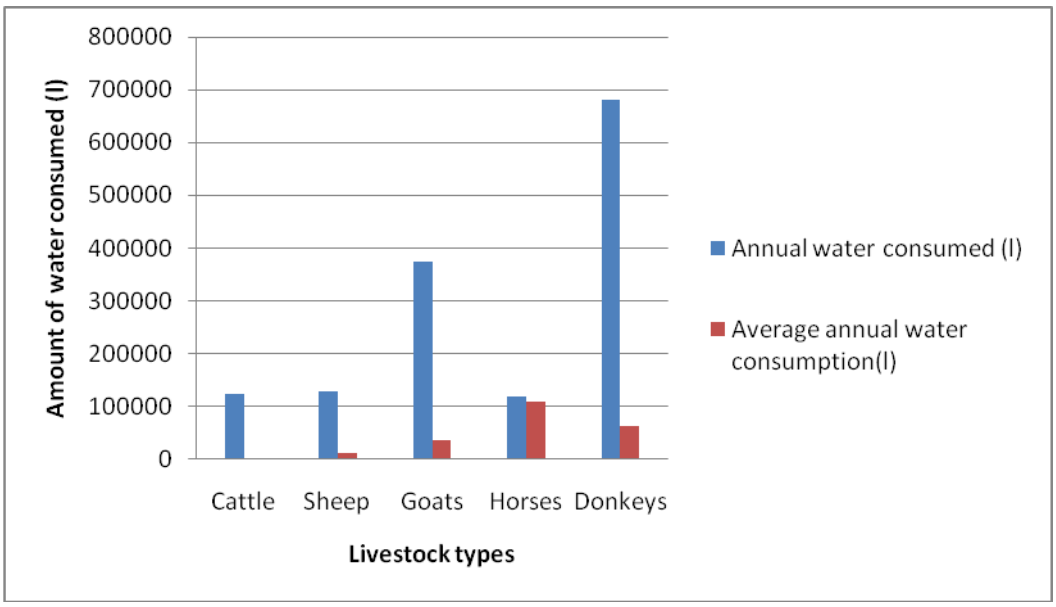

Figure 4.5: Amount of water consumedby different livestock annually

4.2.3 Contribution of baseflow from the wetland

The results of baseflow analysis in Figure 4.6 indicate that there has been a decrease in baseflow from 1980 to 2010 (time frame for the analysis). This decrease is further shown in Table 4.4.

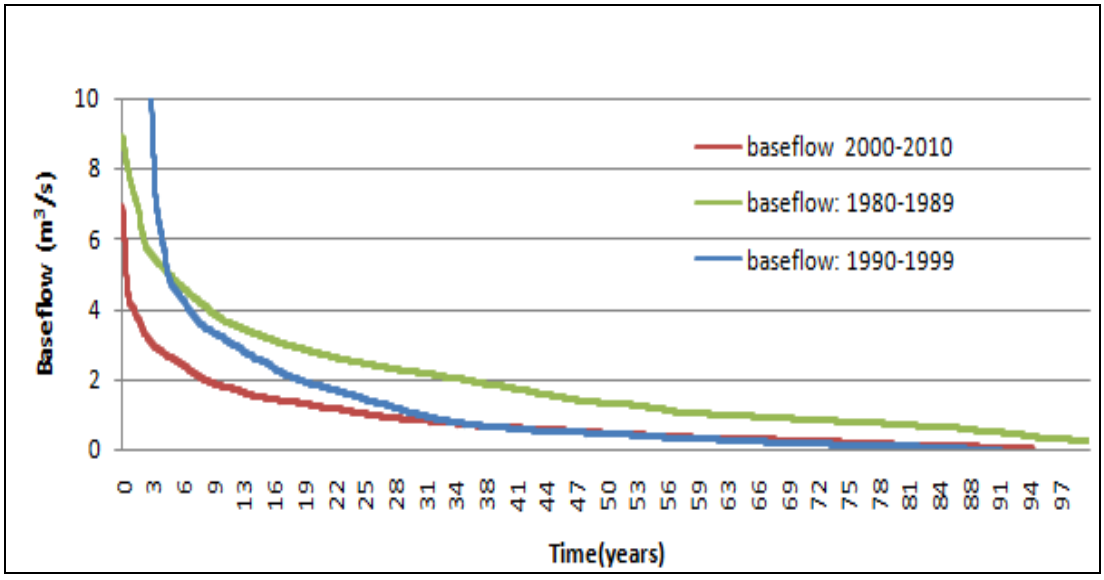

Figure 4.6: Baseflow duration curves for the for Khubelu flows

The results in Table 4.4 indicate a decrease in baseflow from 1980 to 1999 and then an increase from 2000 to 2010. The increase from 2000 to 2010 may be attributed to the fact that there have been catchment management interventions that have improved the wetland recharge capacity. The percentage of time that the flow was equalled or exceeded 90% of the time (Q_{90}) is regarded as the base flow value since it indicates the low flow values.

The difference of the Q_{90} value of 0.6 m^3/s from 1980 to 1989 and 0.2 m^3/s from 2000 to 2010 gives a decrease of 0.4 m^3/s .Then dividing this value by the 30 years period gives a decrease of 0.01 m^3/s each year from 1980 to 2010 with the assumption that the rate of decrease is constant through the entire period. This gives a volume of 315360 m3/yr lost per year due to the degradation of the wetlands.

Table 4.4: The changes in base flow for different times of analysis

Period	**Discharge (m^3/s) that was equalled or exceeded for the indicated percentage of time**								
	90	80	70	60	50	40	30	20	10
1980-1989	0.6	0.7	0.95	1	1.2	2.2	2.2	2.8	4
1990-1999	0.01	0.2	0.3	0.4	0.5	0.95	0.95	1.2	1.8
2000-2010	0.2	0.3	0.4	0.5	0.6	1	1	1.7	3.8

Several factors may have led to this decrease mainly the anthropogenic activities taking place in the catchment, and climate change. Climate change has been regarded as the major factor which may lead to a decrease in the flows (Jin, 2009). Climate change may lead to increased temperatures which increases evapotranspiration lowering water levels and high rainfall variability which increases storm water runoff hence more water lost and less water stored in the wetlands (Jin, 2009). However

these factors could not be attributed to the observed decrease since the analysis of rainfall trends in the catchment Figure 4.7 indicates that there is no significant change in rainfall over the period of analysis.

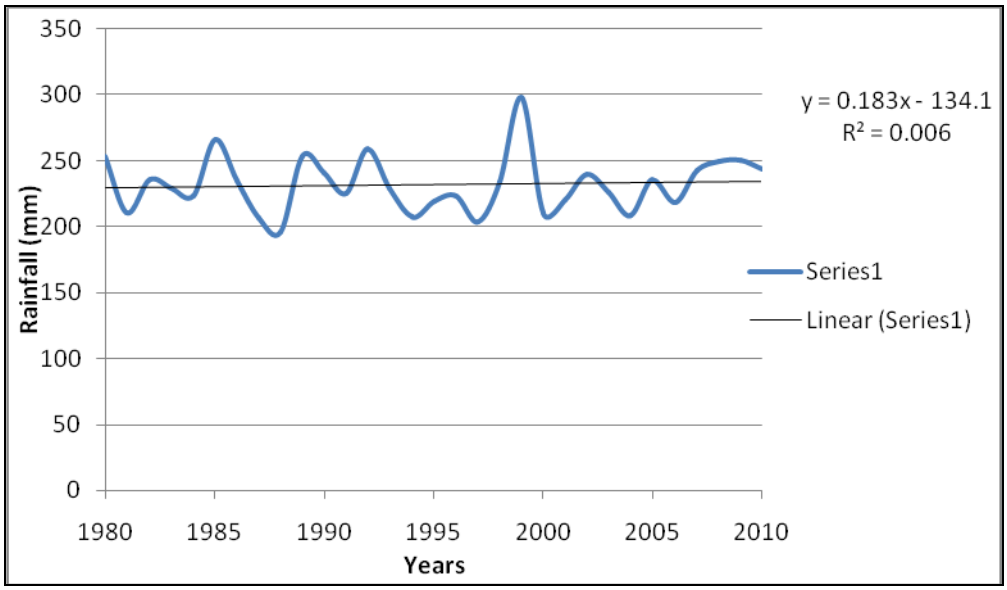

Figure 4.7: Trend analysis for rainfall in Khubelu Catchment

Furthermore a consistent trend in the relationship between rainfall, ET and runoff has been reported in the catchment (ORASECOM, 2008). The decrease in base flow can therefore not be a result of these factors. Anthropogenic activities such as overgrazing and over harvesting of the wetlands resources are therefore regarded as major factors which have caused this decrease. If a recharge wetland is drained, the water resources into which groundwater discharges will definitely receive less inflow, thereby changing the hydrology of a watershed (Brinson, 1993).

4.2.4 Annual harvest of medicinal plants, wild vegetables, thatching grass and fuel wood

Most of harvested goods from the wetlands include medicinal plants, wild vegetables, thatching grass and fuel wood. Looking at Figure 4.8, wild vegetables are one of the major goods collected from the wetland while medicinal plant collection is lower. On the other hand Figure 4.9 shows that there are more bundles of thatching grass collected as opposed to those of firewood. Firewood is the least collected from the wetlands and this is because most of the respondents indicated that they get their firewood from the forests in the mountains.

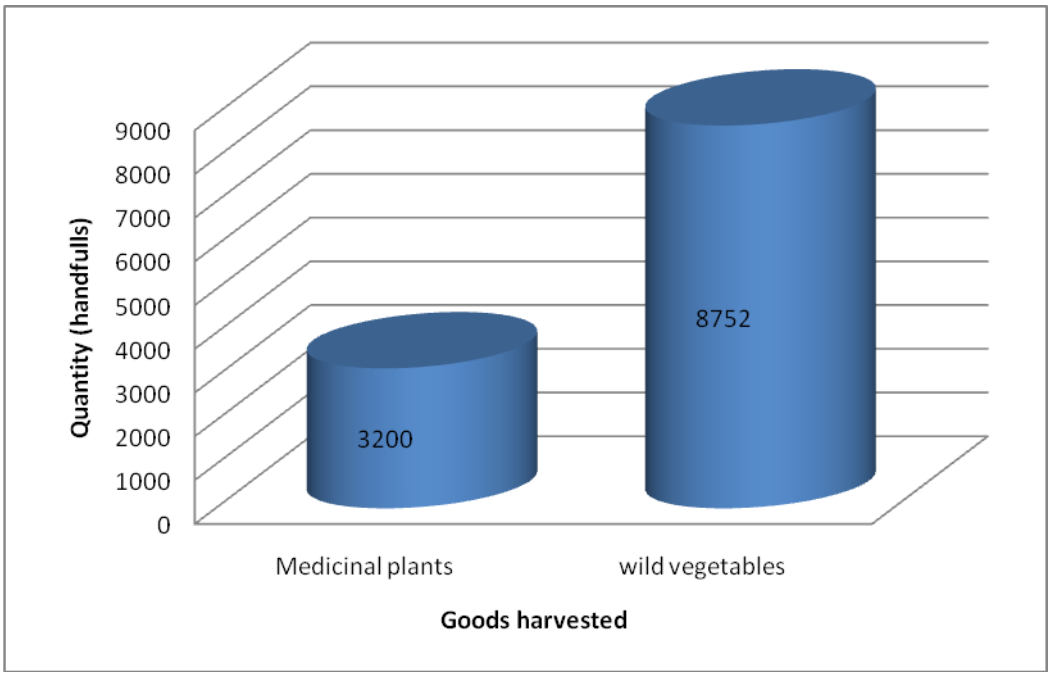

Figure 4.8: Summary of medicinal plants and wild vegetables collected from the wetland

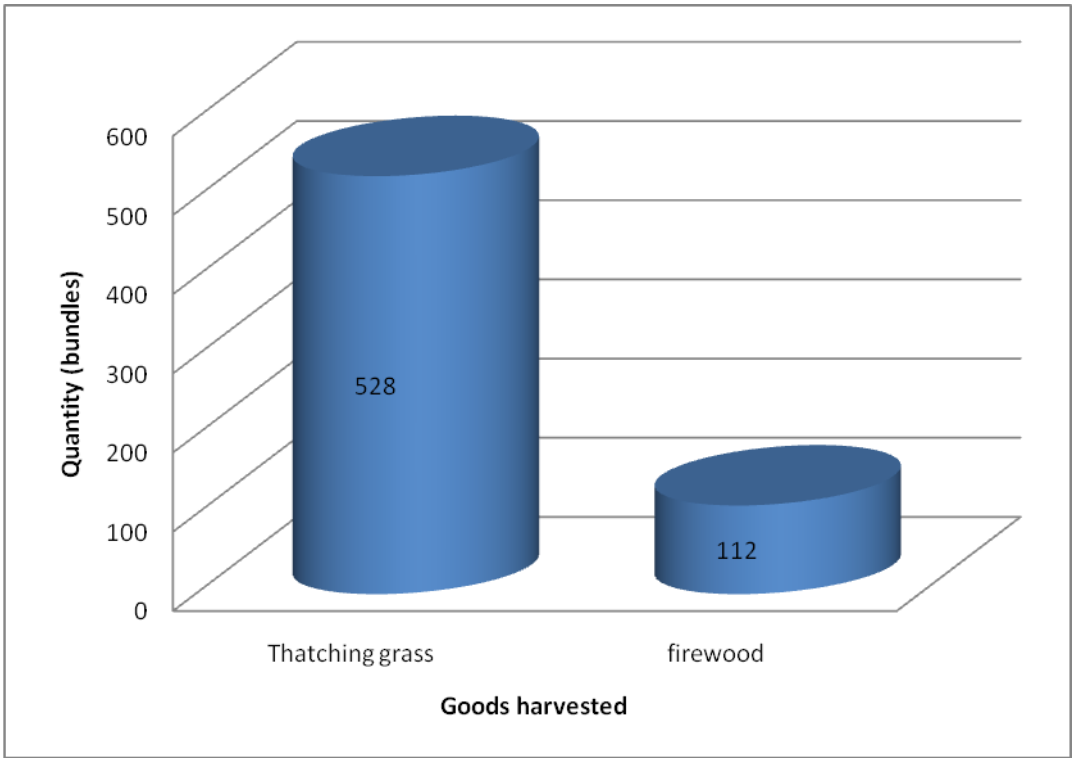

Figure 4.9: Summary of thatching grass and firewood bundles collected from the wetland

4.3 Economic value of the Goods and services obtained from Khubelu Wetlands

4.3.1 Economic value of grazing

It has been very difficult to estimate the value of grazing from the wetland since there was no reported sale of forage from the wetland .The value was estimated from using the local farm feeds prices where 70kg bale of forage was sold at M50.00 (US$3.57) during the previous season of drought when most of the farmers had to buy feed for their livestock.

Table 4.5: Estimated harvest and Economic Value of grazing from Khubelu Wetlands

Total Annual Average forage Harvested (kg)	Total Annual Average forage consumed (kg)	Total Annual Average forage sold (kg)	Gross Financial Value (GFV)	Net Financial Value(NFV)
130,086.00	6,735,286.5	0	M 93,000.00	M 93,000.00
			US$6642.90	US$6642.90

The annual GFV from grazing has been estimated as M93, 000 (US$6643) as shown in Table 4.5. There was no reported sale of forage by the respondents hence there was no cash income from the forage. The cost of labour incurred for herding has been neglected since the farmers indicated that they look after their livestock themselves. The Net Financial Value is therefore equal to the Gross Financial Value

4.3.2 Economic value of Water

The value of water collected from Khubelu wetlands was estimated by considering an alternative source of water (with a market value) which could be used in case the wetland ceases to provide the water due to continued degradation. The research considered the cost of drilling a borehole as an alternative source of water. According to the information from the Department of Water Affairs Lesotho, the Government drill boreholes at a cost of M6000 (US$ 428) at a maintenance cost of M1000 (US$71.42) for the citizens while private companies drill a borehole at a cost of M30000 (US$2143.86). The cost of drilling a borehole by the government was used in this research.

A total of 300 people as well as 276 heads of livestock (cow equivalents) can be sustained buy one borehole each (IUCN 2002). The table below summarise the cost of boreholes needed for supply of water for Khubelu community. The Economic value of the water provisioning service of the wetland is US$ 173,143 as shown in Table 4.6.

Table 4.6: Costs of drilling a borehole for Khubelu communities

Population	Total number of individuals	Number of boreholes required	Cost of Providing boreholes (M)	Cost of Providing boreholes (US$)
Human Population (Households)	4000	13	26,000	1857
Livestock Population	108,000	391	782000	55,857
Total	112,000	404	2,424,000	173,143

4.3.3 Economic value of medicinal plants

Only15% of the respondents indicated that they collect medicinal plants from the wetland and when they do it is only for subsistence use whereby they are used for animal healing. The respondents indicated that they collect medicinal plants for both subsistence use and selling at the mountains because that is where most of the herbs are found. The mean number of handfuls of medicinal plants harvested from the wetlands annually is 193 handfuls and a handful of medicinal plants is sold at M10.00 (US$0.7) from the local markets. This amount was used to estimate the value of medicinal plants from Khubelu wetlands. The table below summarizes the value of medicinal plants from Khubelu wetlands.

Table 4.7: Average and total cost of medicinal plants from Khubelu wetlands

Statistics	Quantity of medicinal plants harvested annually by respondents (handfuls)	Annual cost of medicinal plants (M)	Annual cost of medicinal plants US$
Sum	32800	328000	23,429
Mean	193	1930	138

The GFV of medicinal plants is indicated in Table 4.7is M328000 (US$23,428.57). The cost of time spend in collecting the medicinal plants is negligible since this is done by the herders while they are taking care of the livestock hence the NFV of medicinal plants from the wetland is therefore equal to the GFV and there is no CI since the medicinal plants are not harvested for selling.

4.3.4 Economic value of wild vegetables (direct use value)

Only 16% of the respondents collect wild vegetables from the wetlands. These are mainly herders residing in the cattle post areas. This is because the wetlands are a bit far from the villages and one would have to travel a long distance to the place. Most of the respondents therefore indicated that they collect wild vegetables at the fields and this is usually carried out together with firewood collection. On average 44 handfulls and a sum of 8752 handfulls of wild vegetables are collected from the wetlands.

Table 4.8: Summary of quantity and cost of wild vegetables

Statistics	Quantity of wild vegetables harvested annually by respondents (handfuls)	Annual cost of wild vegetables (M)	Annual cost of wild vegetables US$
Sum	8752	52512	3751
Mean	44	440	3143

On average 44 handfuls and a total of 8752 handfuls of wild vegetables are collected from Khubelu wetlands annually giving the economic value of M52512 (US$3751) as shown in Table 4.8. The wild vegetables therefore have the GFV of M52512 (US$3751.) which has the same NFV since the cost of time spend collecting wild vegetables is negligible because this is done together with other duties like firewood collection and herding.

4.3.5 Economic value of thatching grass (direct use value)

Thatching grass is one of the important wetland resources in Africa (Turpie, 2000). It is known for its importance in the making of handicrafts but most importantly for thatching. This was witnessed by the herders who indicated that they use the grass for thatching in the cattle post areas while most of the respondent's use wheat straw, which is collected from the fields after harvest for thatching. A bundle of thatching grass is sold at M50.00 (US$2.14) within the Khubelu catchment. On average 5 bundles and a total of 528 bundles of thatching grass are collected from Khubelu wetlands annually. The monitory value of thatching grass collected from the wetland (Table 4.9) is M40600 (US$2900).

Table 4.9: Summary of quantity and cost of thatching grass

Statistics	Quantity of thatching grass harvested annually by respondents (handfuls)	Annual cost of thatching grass (M)	Annual cost of thatching grass US$
Sum	812	40600	2900
Mean	5	250	18

4.3.6 Economic value of firewood (direct use value)

Fire wood collection from the wetland is minimal due to the fact that fuel wood from the wetland is normally wet hence most respondents collect fuel-wood from the mountains as well as nearby fields after harvesting time. Only 6% of the surveyed households collected firewood from the wetland and this mainly comprise of herders residing in the cattlepost areas close to the wetland.

The fuel wood collected was measured in terms of bundles and an average of 66 bundles and a total of 112 bundles of firewood are collected from the wetlands annually. On average a bundle of firewood measures about 60cm in diameter and about 200cm long and these measurements vary from household to household and from village to village. A bundle of firewood is usually sold at M30 (US$ 2.14) by the local residents and this has been identified as a source of living for some household. The GFV value of firewood collected from Khubelu wetlands is M3360 (US$240) as shown in Table 4.10. This is the same as its NFV as there are no extra costs associated with the collection of firewood.

Table 4.10: Quantity and cost of Firewood Annually Harvested by Respondent

Statistics	Quantity of fuel wood harvested annually by respondents (handfuls)	Annual cost of fuel wood (M)	Annual cost of fuel wood US$
Sum	112	3360	240
Mean	66	1980	141

4.3.7 Economic value of Biodiversity (existence value)

The existence value (biodiversity value) was estimated by the use of contingent valuation method through the determination of willingness to pay by the respondents for the protection of biodiversity and the willingness to accept once off compensation for the forgone benefits from Khubelu wetlands. Contingent valuation is a technique originally and most widely used in the area of environmental economics to estimate the public‘s willingness to pay for improvements in environmental quality (Mitchell and Carson, 1989).

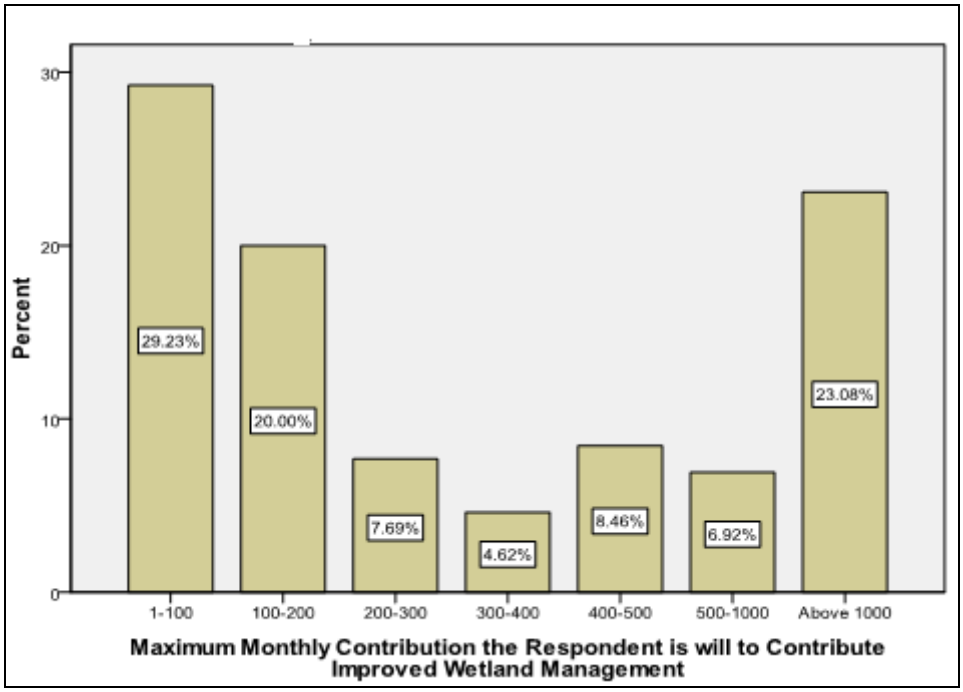

Figure 4.10: Chart of willingness to pay by the respondents

From Figure 4.10, (29.23%) of the respondents are willing to pay the cost in the range M1-100 (US$ 0.071-7.14) while 23.08% are willing to pay above M1000 (US$ 71.42). Only 4.6% of respondents are willing to pay the amount in the range M300 – 500 (US$ 21.42-35.7) but generally all the respondents are prepared to give something of value for the preservation of biodiversity in Khubelu wetlands. The mean willingness to pay was found to be M 36.27 (US$ 2.6) as shown in Table 4.11.

Table 4.11: Statistical results for willingness to pay

Statistics	**Amount(M)**
Sum	7253
Range	96
Mean	36.27
Stud deviation	44.7

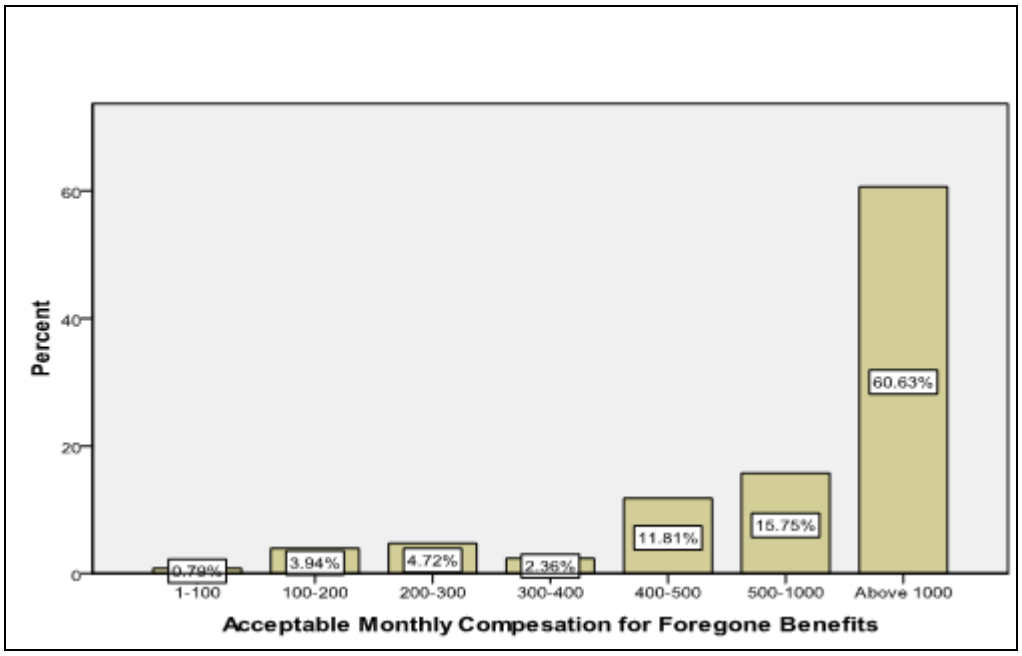

Figure 4.11: Chart of willingness to accept compensation by the respondents

Figure 4.11 shows that about 61% of the respondents were willing to accept above M1000 (US$ 71.42) for the forgone benefits if they were denied access to the wetland for some time.

The results revealed by the two charts (willingness to pay and willingness to accept compensation) indicate that the respondents do understand the importance of the wetland in their lives hence why all the respondents who used the wetland for different purposes are willing to pay for its improvement. The fact that the wetland is really important in the lives of the respondents is further indicated by the willingness to accept compensation by the respondents whereby most of them are willing to accept above M1000 (US$71.42) for the foregone benefits if they were to stop using the wetland.

The expectation is that the willingness to pay and willingness to accept values would be the same to reveal importance of the wetland that is, the respondents would be willing to spend the same amount of money with the amount they are willing to accept but this was not the case. Empirical studies suggest that the willingness to accept is usually higher than the willingness to pay because community members often attach value to the things they have more than those things they do not possess (Tiega 2007).The mean willingness to pay for the conservation of biodiversity in Khubelu wetlands is M36.27(US$2.59), Table 4.11 and the total willingness to pay by the community is estimated at M725400 (US$ 51814.29).

4.3.8 The economic value of the recharge function of the wetland

The amount of water lost as a result of the degradation put in monitory terms gives an estimate of M 7,568,640.00 (US$ 540,617.14). This was determined by multiplying the amount of water lost annually for the period of analysis by the rates of a water utility company of M 18/m^3(US$ 0.57/m^3) in Lesotho. This amount is the estimated cost of degradation of the wetlands. This implies that if the degradation in the wetlands continues, the base flow would also degrease leading to shortage of water in the Khubelu River especially during the dry season. This would badly affect both the environment and the livelihoods of people locally as well as nationally.

4.3.9 Total Economic Value of Khubelu wetlands

The concept of total economic value of wetlands was used to estimate the total economic value of Khubelu wetlands. The total economic value of Khubelu wetland is estimated as M79,101,271.60(US$784,536.72**)** per annum with the highest

contribution coming from the recharge function followed by water supply function then biodiversity function, grazing, medicinal plants, wild vegetables, thatching grass and firewood respectively (Table 4.12). This is an estimate of the amount of money that the local communities gain from the wetlands annually. Figure 4.12 gives a summary of the percentage contribution of each of the goods and services to the Total Economic Value.

This can however be recorded as an underestimate since the benefits were only considered at the local level. The amount would even be higher if the analysis was done at national level, for instance, Khubelu River which is the major river in the catchment contributes to flows that recharge phase two of Lesotho Highlands Water Project which is a multi millionaire project hence the value would even be higher. On the other hand, the economic value from livestock was only estimated from grazing meaning livestock products like wool and mohair, meat, milk and other uses of livestock like ploughing by the local communities were not considered and this would increase the total economic value of the wetland.

Table 4.12: Estimated Total Economic Value of Khubelu wetlands

Types of goods obtained from the wetlands	Average quantity of goods harvested	Method of valuation used	Net Financial value (NFV)	
			Maluti (M)	**US$**
Grazing	130086kg	Market price and literature review	93000	6643
Recharge function	315360m^3	Market price	75,686,400	540,617
Water supply	24,163,440 l	Replacement cost and literature review	2,424000	173,143
Biodiversity	-	Contingent valuation	725400	51814
Thatching grass	5 bundles	Substitute cost	40600	2900
Medicinal plants	193 bundles	Market price	76000	54289
Wild vegetables	44 handfulls	Market price	52512	3751
Fuelwood	66 bundles	Substitute cost	3360	240
Annual TEV			**79,101,272**	**784,537**

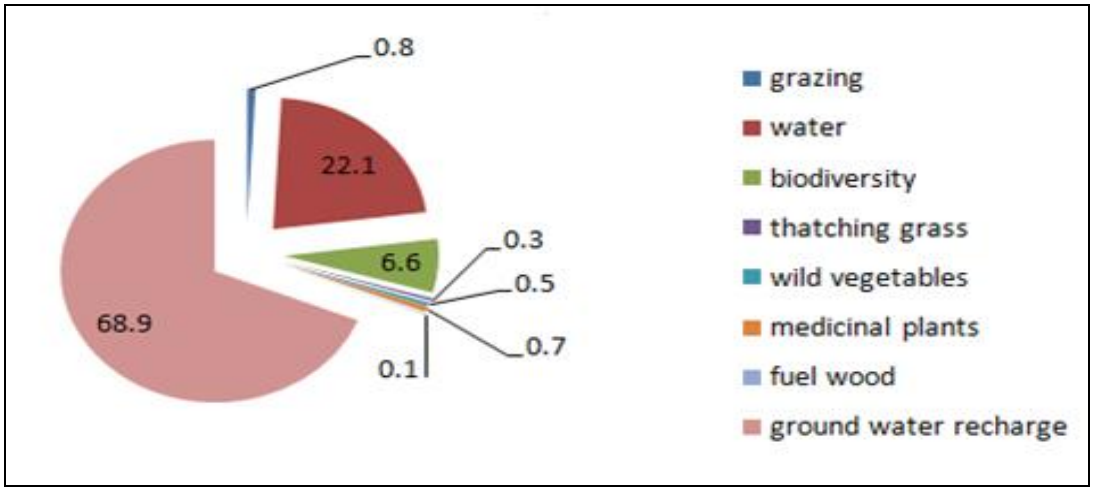

Figure 4.12: Percentage contribution of different goods and services to the total economic value

4.3.10 Comparison of the results with other studies

The valuation of Lets'a-la-Letsie wetland was the first attempt in the valuation of the wetlands in Lesotho. The second study conducted on valuation is the research on the valuation of Khubelu wetland covered in this research. Different goods and services identified in Letsa-la-Letsie wetland were: pasture for grazing animals, firewood, craft production, water supply, hunting and farming as major goods and services provided by the wetland. These are more or less the same as goods and services identified from Khubelu wetlands with the exception that for the Khubelu wetlands, one of the services identified is the recharge function of the wetlands. On the other hand, hunting was not one of the (services) activities identified in Khubelu wetlands.

The Total Economic Value of Letsa-la-Letsie was estimated as US$ 220/ha/yr (Lannas, 2009), while that of Khubelu wetlands is estimated as US$ 784,537/yr (US$ 9208/ha/yr). Khubelu wetlands therefore have a higher economic value compared to Lets'a-la-Letsie wetland. This may be attributed to the fact that different values were identified which have different economic value, for example the recharge function of Khubelu wetlands had the higher economic value compared to other values identified in the same wetland. The recharge value for Letsa-la-Letsie was not determined hence the big difference in the total economic value of the two wetlands.

4.4 Assessment of institutional and legal framework for sustainable utilization of the wetlands

The purpose of this section is to assess the status of Lesotho Legal and institutional framework as regards wetland protection. This has been achieved by following the

Ramsar guidelines for reviewing laws and institutions to promote the conservation and wise use of wetlands. This is because sometimes either the legislation or the institutions are the real challenges to realisation of efficient management of wetlands. The section does this by first analyzing the policy and legal frameworks that regulates or applies to wetland protection and second by outlining the institutional framework that deals with Khubelu wetlands. The SWOT analysis of both frameworks was then conducted to come up with the strengths, the weaknesses, opportunities and threads encountered as shown in Table 4.13.

4.4.1 Internal appraisal (strengths and weaknesses)

Strengths

There are the two grazing associations in the Khubelu Catchment; these associations are the overseers of rangelands and wetlands management. This shows stakeholder inclusion. These grazing associations are provided for by legislation thus giving them powers to ensure proper management of wetlands.

Involvement of the local communities and other relevant stakeholders on issues related to wetlands which brings a sense of ownership and hence effective involvement of stakeholders in the management of the wetlands. This ensures that the community protects the wetland as they feel it belongs to them and do not see it as belonging to the national government

One other strength is the presence of the Letseng Diamond mine which gives financial support towards management of Khubelu wetlands through its community

social responsibility programmes. The framework provides for stakeholders at different levels, as a result there are different departments representation of the Mokhotlong district whereby field officers are deployed across all level thereby enabling good coordination from local communities to the district and finally the national level.

Weaknesses

Despite presence of grazing association, these grazing associations do not have technical expertise within them which hinders them from applying proper wetlands management interventions lack of clear demarcation areas between chiefs has caused conflict between communities thus leading to overgrazing in areas that are under dispute which leads to soil erosion and hence continues wetlands degradation as associations are unable to control such areas. Lack of technical experts on wetlands management in the Khubelu catchment is another setback. Though there are officers from different ministries at different levels it is not uncommon to find that most of them have not been to any training relating to wetland management.

The boundaries of the Khubelu wetlands are not known which makes it hard for the assigned officers to ensure proper management of the wetlands. At times a month's task can take up to a year or more to complete because of bureaucracy involved. Lastly, there is no specific team dealing with wetlands management in the Khubelu catchment as the officers deployed in the districts have multiple responsibilities. These officers are answerable to different ministries which just happen to have as

one of their tasks something related to wetland management issue. This results in loss of proper attention on wetlands issues in the district.

4.4.2 External Appraisal (Opportunities and threats)

Opportunities

Lesotho enacted an all-encompassing environmental Bill 2000 that provides for efficient measures such as EIAs and development of guidelines for preservation, enhancement and management of the wetlands (FAO, 2002). These institutions are creatures of statute. That puts the institutions at an elevated level and gives them legal power to execute mandate of their offices without hindrance.

The GoL (1969) and GoL (1999) restrict the use of wetlands, (FAO, 2002).

The National Biodiversity Strategy explicitly calls for the design of measures that will enable the protection of threatened habitats and ecosystems such as the alpine bogs and mires and the afro-alpine ecosystems of highest mountains of the sub-region. Inventories and assessment of key mires, rehabilitation measures, scientific research, reduction of grazing pressure, and integrated watershed management are some of the measures to be taken in order to achieve this objective. The strategy goes further by proposing sustainable range management alternatives such as the establishment of GAs and RMAs. This approach to range management reduces pressure on the wetlands through improved range productivity in the surrounding areas. The GAs are constituted by the law under GoL (1980).

Presence of the Environmental Act 2008 which make provision for the promulgation of procedures and measures for protection and management of wetlands amongst others presents one opportunity for wetlands management.

Presence of the national GoL (2007) which advocates harmonization and consistency in the management and advancement of water and other associated innate resources, so as to make the most of the ensuing socio-economic benefits without compromising the sustainability of fundamental ecosystems. The policy proposes promotion of integrated planning, improvement and administration of water resources at diverse levels and in different sectors, and also advocates the promotion of integrated water resources management with the aim of reducing the harmful impacts of human actions and natural processes on fragile ecosystems.

Lesotho being classed as one of the least developed countries qualifies for a number of assistance initiatives driven by international bodies as such the World Bank or International Monetary Fund. Such assistances come in the form of consultants and experts being sent to assist such struggling countries normally free of charge.

Threats

Most institution bearers are political appointees. In as much as support staff members or officers are not political appointees, they have no word against the head who executes a mandate of politicians. There is also lack of harmonization between institutions that deal with wetlands management and there are no evident demarcation lines of who does what. Weak collaboration between institutions,

duplication of efforts, and improper allocation of resources negatively affect proper implementation of different policies.

There is no incorporation of wetland development and management related training and research in programmes of existing institutions. Despite having such institutions as created by the Environmental Act 2008, that is, DoE, TAC, and DEO, it is sad that there is no single department that is solely responsible for wetland protection matters and would thus be able to give it full attention. The wetlands issues are partly incorporated in the mandates of three departments namely, DRRM, DoE and DoWA which makes it very hard for the wetlands issues to be given the priority in that there are no boundaries of which Department covers what. All these institutions are responsible for environmental affairs as a generic field.

This creates a potential for wetland issues to be sidelined by more 'important' environmental issues as per the government priorities. This weakness was aptly put in FAO (2002) where it was said that 'Analysis of all the eight reports from the region [Lesotho included] depicted a wide-ranging absence of policies that are precisely meant for improving the use and management of wetlands in the region'.
Lack of local communities participation and buy in ends up encouraging local communities to destroy the wetlands other than protecting them because there is no sense of ownership in the wetlands.

In Lesotho, farmers are discouraged by all government agencies, including the DWA of the Ministry of Natural Resources, from using wetlands for crop production and

livestock grazing. This is because wetlands are generally perceived to be environmentally sensitive systems that have to be conserved, hence the absence of effective strategies to use them for agricultural purposes. This strategy, though sound on plan, appears to have had limited application. This plainly shows that however good law a country may have, if there is lack of implementation then the law is as good as dead. This speaks volumes to the effectiveness of the institutions mandated to enforce environmental laws in Lesotho.

Most initiatives that protect the wetlands are donor funded. It is a known fact that a country cannot depend on donor funding forever as external funding always have conditions and generally of a short duration. This usually leaves programmes half done as funding is usually given per year after satisfaction that the conditions are met. Most of the time the set conditions are not met or the programme does not finish on time thus leading to unfinished programmes either because funding was withdrawn or period lapsed before the country could finish the task.

Lesotho ratified Ramsar Convention and is therefore a signatory to the convention. This has led to the designation of some wetlands (Letsa-la-Letsie and Khalong-la-Lithunya) in the country as Ramsar sites. The outstanding weakness is that the country does not have a standalone policy at national level on wetland use but instead, the country has got issues of wetlands management featuring in other policies, this state of affairs makes it very hard to implement such policies towards better management of the wetlands.

There are some areas of major weakness in legal framework of Lesotho that deals with protection of wetlands. Fragmentation is the first one that comes to mind. There are several pieces of legislation that one way or the other touch on wetlands. Laws governing wetlands in Lesotho are the Water Act, the National Environmental Management Act and the Range Management Policy. Wetlands, as is the case with many other natural resources, tend to be governed by more than one legal framework; a phenomenon referred to as legal pluralism' (Meinzen *et al.*, 2004). This is supported by other authors on the subject of legal pluralism with literature focused on customary laws, tribal laws, and social laws working within state promulgated law in a dual structure. That is the case in Lesotho because there are still tribal laws administered by local chiefs existing within the larger national framework.

The Environmental Act of 2008 was an attempt to consolidate environmental affairs to be regulated at one central point. However, that attempt prejudiced some subjects of environmental law on wetlands which do not form even a chapter of the act but is only covered in what one may refer to as a mere mention of wetlands. The argument advanced here is that wetlands play a very important role that they require an entire Act dedicated to wetlands. Proper management of wetlands is largely dependent on having in place enforceable mechanisms that regulate how wetlands are used, especially the legislative framework. The legal framework should reflect appreciation for both the physical characteristics of the wetlands as well as the community and society in which they are found (Chuma *et al.*, 2009).

The majority of existing pieces of legislation like the Water Act and Environmental Act are targeted at confining utilization of wetlands to purposes of conservation and are entrenched in legislative instruments that cover the general natural resources which include water, soil and vegetation. It is sad that Lesotho missed an opportunity to rectify this in the 2008 Environmental Act despite this observation as far back as 2001 or even before. The availability of information for the public and the involvement of the civil society in environmental issues need greater attention.

Lesotho qualifies for a number of international assistance for getting its wetland laws together. It is a common knowledge that the country does not possess a lot of expertise in this field. As a result, Lesotho is forced to accept international donor assistance. The challenge however, is that such experts normally do not appreciate the legal landscape of Lesotho and tend to adopt a one-size-fits-all approach usually resulting in laws that of no or very little help to the problems of the country. Moreover international donor assistances do not necessarily come free of charge as most believe. There are always strings attached. In order to get such assistance the country must do a certain thing or cease to do a certain act or meet one or more of the qualification requirements such as ‘good governance’ as perceived or seen from the eyes of the donor.

Table 4.13: Matrix for Institutional and Legal framework SWOT Analysis

Internal Appraisal	External Appraisal
Strengths • Presence of the two grazing associations in the Khubelu catchment which are the overseers of rangelands and wetlands management. • These grazing associations are constituted thus giving them powers to ensure proper management of wetlands. • Involvement of the local communities and other relevant stakeholders on issues related to wetlands which brings a sense of ownership and hence effective involvement of stakeholders in the management of the wetlands. • Presence of the Letseng Diamond mine which gives financial support towards management of Khubelu wetlands. • Presence of stakeholders departments in the Mokhotlong districts where by field officers are deployed to the community level thereby enabling good coordination from local communities to the district and finally the national level.	**Opportunities** • Lesotho's institutional framework is considered one of the best developed and equipped to face institutional challenges • The institutions are creatures of statute • The laws dealing with wetlands contain good strategies for protection of wetlands which guarantees quality • The institutional framework structure is broad enough to allow for formation of a team dedicated exclusively to wetlands affairs. • Classed as one of the least developed countries, Lesotho qualifies for donor funds.

Internal Appraisal	External Appraisal
Weaknesses • Continued overgrazing which leads to soil erosion and hence continues wetlands degradation. • The boundaries of the Khubelu wetlands are not known which makes it hard for the assigned officers to ensure proper management • There is no specific technical team dealing with wetlands management in the Khubelu catchment as the officers deployed in the districts have multiple responsibilities which may prevent proper attention on wetlands issues in the district	**Threats** • Weak institutional setup for wetlands management and monitoring • Overlapping responsibilities within the government ministries. • Lack of technical experts in wetland management • Most of the legal documents are not clear on issues pertaining to wetland management • Poor implementation and compliance of legislation towards protection of the wetlands • Wetlands are regulated by several pieces of legislation • Poor law enforcement on issues regarding wetlands management • Lack of integrated water resources management approach in wetland exploration • Donor agencies which provide aid to most of the projects dealing with wetland come with their own mandates to serve their interests • Donor experts come with one size fits all legislations which often fail to take into account peculiar challenges in Lesotho • Drying up of donor funding

4.4.3 Recommendations on the legal, policy and institutional frameworks of Lesotho in wetlands conservation and wise use

4.4.3.1 Internal and external factor evaluation matrices

Lesotho legal and institutional frameworks scored above 2.5 in both IFE and EFE with the scores of2.93 and 2.59 respectively (Table 4.14 and 4.15). These scores show satisfactory results for performance of the frameworks since they are above 2.5 as recommended by David (2009).

Both frameworks are well designed to meet opportunities as well as to defend against threats and analysis are also strong, however effectiveness in the implementation of these good frameworks by the responsible institutions that have been identified during the SWOT analysis might be a major setback because having a good framework alone is not sufficient, in fact it is useless if no more effort is not put in. It can thus be concluded that wetland protection legal and institutional frameworks in Lesotho are sufficient to ensure proper management of the wetlands.

Table 4.14: Internal Factor Evaluation (IFE) Matrix

Strengths	weight	Ranking	Weighted score	Weakneses	weight	Ranking	Weighted score
Presence of grazing associations which are constituted by law	45%	4	1.8	Continued overgrazing which leads to soil erosion and hence continues wetlands degradation	15%	1	0.15
Involvement of Khubelu communities in wetlands in wetlands issues	6%	4	0.24	Lack of technical experts on wetlands management in the Khubelu catchment	10%	1	0.1
Presence of Lets'eng diamond mine which offer funds	4%	3	0.12	The boundaries of the Khubelu wetlands are not known which makes it hard for the assigned officers to ensure proper	2%	2	0.04
Presence of stakeholder departments in Mokhotlong district which enable proper management of wetlands	10%	4	0.4	Vandalism of hydrological equipment thus unavailability of wetland hydrological data	8%	1	0.08
Total scores	65%		2.56		35%		0.37
Overall Total weighted score							2.93

Table 4.15: External Factor Evaluation (EFE) Matrix

Opportunities	weight	Ranking	Weighted score	Threats	weight	Ranking	Weighted score
Lesotho has a well developed and equipped institutional framework which is broad enough to allow for formation of a team dedicated exclusively to wetlands	40%	4	1.6	Weak institutional setup for wetlands management and monitoring	5%	2	0.1
The laws dealing with wetlands contain good strategies for protection of wetlands which guarantees quality	5%	2	0.1	Overlapping responsibilities within the government ministries.	5%	2	0.1
Classed as one of the least developed countries, Lesotho qualifies for donor funds which may help in the protection of wetlands	5%	3	0.15	Lack of technical experts in wetland management	5%	1	0.05
LHWP phase two will attract high caliber experts that will help to strengthen the wetland institutional framework	2%	2	0.04	Most of the legal documents are not clear on issues pertaining to wetland management	5%	2	0.1
				Poor implementation and compliance of legislation towards protection of the wetlands	10%	1	0.1
				wetlands are regulated by more than one piece of legislation	2%	2	0.04
				Poor law enforcement on issues regarding wetlands management	5%	1	0.05
				Lack of integrated water resources management approach in wetland exploration	4%	1	0.04
				Donor agencies which provide aid to most of the projects dealing with wetland come with their own mandates to serve their interests	6%	1	0.06
				Donor experts come with one size fits all legislations which often fail to take into account peculiar challenges in Lesoth	1%	4	0.04
Total scores	52%		1.89		48%		0.7
Total weighted score							2.59

Having concluded that both frameworks are sufficiently strong towards off harm and to effectively take on available opportunities, it now begs the question why are the Khubelu wetlands degrading at such an alarming rate. It should be borne in mind that the initial thinking was that the wetland degradation could be attributed to the weakness of the legal or institutional framework. That is now beyond contemplation. It is suggested that the problem might lie with enforcement mechanism. For that, could be the only reasonable explanation why the wetlands continue to degrade despite such strong legal and institutional frameworks.

It is therefore submitted that resources be devoted to capacitating personnel in different spheres to ensure enforcement so as to capitalize on the available opportunities to better protect the wetlands for the current and future generation. It is also important that the key stakeholder institutions (DoE, DRRM AND DoWA) collaborate and form a technical team that will ensure implementation of the laws, policies and strategies that are in place for proper management of Khubelu wetlands and all the wetlands in the country.

The results of SWOT analysis of the institutional, legal and policy frameworks in the management of wetlands in Lesotho revealed that the frameworks are good and sufficient to ensure proper management of the wetlands with the recommendation that there is need for the enforcement and implementation of the available frameworks to ensure proper management of wetlands.

These results are more or less the same with the results of the same analysis done in Oyam district in Uganda. The results of this study (Oyam district in Uganda) indicated that the policy and legal frameworks in the management of wetlands in Uganda is adequate. The study also indicates that institutional framework in the management of Uganda's wetlands is sufficient and makes the recommendation that there is need to build more capacity for stronger collaboration among sectors (Opio, 2008). This gives more certainty to the results of the Swot analysis done for Lesotho wetlands as it can be seen that the same results have been found in some countries.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Khubelu wetlands provide a number of goods and services to the local communities. This is based on the fact that a total Economic value of US$243,919was estimated for Khubelu wetlands in their present form. The direct use values from Khubelu wetlands are pasture for grazing animals, water for livestock and domestic purposes, medicinal plants, wild vegetables, thatching grass and fuel wood. The indirect use value found is the ground water recharge function and the existence value of biodiversity was also found. The highest contribution is that of the recharge function followed by water supply, biodiversity, grazing, medicinal plants, wild vegetables, thatching grass and then fuel wood with the annual values of US$ 540,617, US$243,919, US$51814, US$6643, US$5429, US$3751, US$2900, and US$240 respectively.

The indirect use value was estimated from the recharge function of the wetland which is in turn estimated from the baseflow of the Khubelu River. This was however done in terms of the cost of degradation of the wetlands since the results of baseflow analysis indicated a degreasing trend in baseflow over time. The cost of degradation was therefore estimated as US$ 540,617.14 annually. This implies that more money would be lost if the degradation continues.

It is vital to note that these goods and services do not only benefit or affect the local communities in Khubelu but the nation as a whole. For instance the availability of

forage for livestock grazing improves livestock and livestock products especially wool and mohair which is the major contributor of the country's GDP through the sale of wool and mohair. The recharge function of the wetlands is very important in maintaining stream flows and will also ensure water availability in the new LHWP phase two, which shows the importance of conservation and protection of Khubelu wetlands to avoid the degradation. The goods and services identified together with their economic values will enable sound decision making in issues relating to wetlands management.

The legal and institutional framework in Lesotho is in favour of the protection and management of the wetlands thus continued degradation of the wetlands in the country is not a result of the poor institutional and legal framework as it has been assumed. The major problem lies with how the available institutions implement their mandates and how the available laws are enforced to ensure proper management of the wetlands.

5.2 Recommendations

i. The economic valuation of Khubelu wetlands was only limited the direct values some of the indirect use values of the wetlands leaving out valuable information on other values such as water purification, carbon sequestration and flood attenuation. These could not be achieved due to time constraints and budget limitations. There is need for thorough economic valuation of the wetland which will allow informed decision making by the government and all stakeholders in the wetlands.

ii. It has been found that Khubelu wetlands have been degrading over the years due to anthropogenic activities taking place in the wetlands. This has been witnessed by the decrease in baseflow as seen on the baseflow analysis. It is therefore important for the decision makers to train the local communities on other forms of livelihoods in order to release pressure on the wetlands and wetlands resources.

iii. Given the reported decrease in baseflow from 1980 to 2010, it is important that the Department of Water Affairs monitors the behaviour of the recharge service of the wetland and also conduct water quality tests to enhance informed decisions on the management of the wetlands

iv. More resources should be devoted to capacitating personnel in different spheres to ensure enforcement of the laws available so as to capitalize on the available opportunities to better protect the wetland for the current and future generations

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APPENDICES

Appendix 1:Questionnaire: Household survey and contingent valuation

Date:
Name of Interviewer :
Community council :
Village :

1. Demographic data

1. Sex Male [ ] Female [ ]

2. Age of respondent A. 18-26 [ ] B. 27-35 [ ] C. 36-44 [ ]
   D. 45-53[ ] E. 54 and above [ ]

3. Marital status A. Single [ ] B. Married [ ] C. Separated [ ]
   D. Divorced [ ] E. Widowed [ ]

4. Level of education of the respondent A. Primary [ ] B. Secondary [ ]
   C. Tertiary [ ] D. University [ ] E. Others, specify [ ]

5. How long in years have you been in this area? A. Less than 1 year [ ] B. 1- 5 [ ] C. 6-10 [ ] D. 11-15 [ ] E. 16-20 [ ] F. Over 21 [ ]

6. How many people live in this household? A. 1-5 [ ] B. 6-10 [ ]
   C. 11 and above [ ]

2. Accessibility to and use of Khubelu wetlands

i) From which part of the wetland do you obtain goods e.g. ? (a) Open waters [ ] (b) Swamp[ ] (c) Shores[ ] Others specify
_____

ii) What mode of transport do you use to reach the wetland?
(a) By foot[ ] (b) By horse[ ] (c) By car[ ]

iii) How long does it take you to get to the wetland?
(a) Less than 15min [ ] (b) between 15 min and 30min[ ] (c) more than 30min[ ]

iv) Which months of the year do you most often use the wetland?
Specify_____

2. Livestock

i) Do you obtain forage /pasture & water from the wetlands?

a) Yes [ ] b) No [ ]

If yes please provide information in the table below:

Livestock item	Number	Time of year

3. Water resources

i) From what sources do you get your water supply?

(a) Tap[ ] (b) Wetland[ ] (c)Borehole[ ] (d) River[ ]

ii) How long does it take to get to the water source?

a) less than 15 minutes[ ] b) 20minutes[ ] c) 1hour[ ]

iii) How many litres do you use per day in litres?

_____ Litres.

4. **Building Materials**

ii) Where do you get the building material for your house?

(a) Wetland [ ] (b) Forest [ ] (c) Mountain [ ]

(d) Other (specify _____

ii) What type of building materials do you get from the wetland?

(a) Grass [ ] (b) Timbers/poles[ ] (c) Strings and ropes[ ]

(d) Other (please specify)_____

5. Goods from the wetlands

i) Do you harvest or sell anything from the wetlands?

a) Yes[ ] b) No[ ]

If yes please fill in the table below:

Item	Units	Quantity harvested annually	Quantity sold annually	Quantity consumed annually	Price / unit

6. Contingent valuation of Khubelu wetlands (willingness to pay for non use values)
This section will determine the willingness to pay for the conservation of biodiversity in Khubelu wetlands.(It is important that the responses given on this study are only going to be used for research purposes not for any other reason).The results of willingness to pay will be used to estimate the value of biodiversity found in this wetlands.

7. Willingness to pay in order to have a better and secure access to wetland goods and services
Suppose that a locally run management scheme with international supervision was devised to maintain and improve your wetland resources i.e. ‘’double availability and security of wetland service provision’’ compared to today, so that you had more secure access to a better quantity and quality of wetland products and benefits e.g. easier access to water, fodder, fish etc.
a) How much would you be willing to pay as a mandatory (voluntary) contribution (paid by all residents) to fund a scheme for securing the success of wetland management per month?).

Payment card for eliciting WTP to secure a better access to wetland products and services

The maximum amount that you are prepared to pay per month in order to secure a better access to products and services from Khubelu wetland in (M)
Don't know, no answer Zero answer
50
100
150
200
250
300
350
400
More (please specify)…….

b) If you would not be willing to pay anything (only zero or "No answer"), why?
i. The wetlands should be protected at all costs and financed out of national and international funds.
ii. Residents have a right to use the wetlands and should not be asked to pay for it.
iii) I already pay too much tax.
v) Wetland benefits cannot be valued in money terms; I object such types of questions.

Thank you for your inputs