WILLINGNESS TO PAY FOR THE CONSERVATION OF A KENYAN WETLAND. THE CASE OF LAKE NAIVASHA.

BY
KAGUNDA B. G.
REG NO. C/50/7179/2001

A RESEARCH PAPER SUBMITTED TO THE ECONOMIC DEPARTMENT, UNIVERSITY OF NAIROBI, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS IN ECONOMICS.

SEPTEMBER, 2003

This research paper is my original work and has not been presented for a degree in any other university.

Benson Gaaci. Kagunda.

28/09/03

This research paper has been submitted for examination with our approval as university super visors.

First supervisor

Dr.Khalil M.

28/09/03

Second supervisor

Dr.Singh.

28/09/03

Acknowledgments

It is my wish to sincerely thank all those who assisted me towards the completion of this project. My particular gratitude goes to my supervisor Dr. Khalil and Dr. Singh who have contributed a great deal towards the development of this research project. I wish also to appreciate the assistance by Professor Mwabu G. who tirelessly devoted a lot of his time in modeling and estimation. I further wish to thank African Economic Research Consortium (AERC) in collaboration with the Department of Economics for financing my research work.

Further I would like to convey my gratitude to Joseph Macharia and Nelson Wanjama for their logistical support without whom it could have been very difficult to successfully complete the project.

Finally I would like to extend my appreciation to my entire family for their outstanding effort and encouragement throughout the development of the research project and in particular to my beloved wife Mary Wairimu for her untiring moral support she showed me throughout the development of this research paper.

The ideas expressed in this research paper are those of the author and none of the above mentioned people should be held responsible.

Dedication

To my sons
Kagunda
Kamau
kamore

CONTENT ..... PAGE NUMBER

LIST OF TABLES

LIST OF FIGURES

Accronyms

1. BV	*Bequest value*
2. CPs	*Contracting Parties*
3. CVM	*Contingent valuation method*
4. DUV	*Direct-use-value*
5. GCNP	*Grand canyon national park*
6. GCNRA	*Glen canyon national recreation areas*
7. HCS	*Hicksian consumers surplus*
8. IMCE	*Inter-ministerial committee on environment*
9. IUV	*Indirect-use-value*
10. KNEAP	*Kenya national environmental action plan*
11. Kshs	*Kenya shillings*
12. KWS	*Kenya wildlife society*
13. L.N.N.P.	*Lake Nakuru National Park*
14. MWTP	*Marginal willingness to pay*
15. NUV	*Non-use-value*
16. NWPs	*New Working Parties*
17. OV	*Option value*
18. TEV	*Total economics value*
19. TRPNR	*Tana river primate national reserve*
20. Us$	*USA Dollar*
21. UV	*Use value*
22. WTA	*Willingness-to-accept*
23. WTP	*Willingness-to-pay*
24. XV	*Existence value*

Abstract

Wetlands are among the most productive ecosystems on the earth. They allow interaction between water, soil, vegetation and light all the year round or during a great part of the year. The depth of the water is such that it allows photosynthesis to occur, making wetlands productive life supporting ecosystems. It is this association of water, light, soil and plants that typify various wetlands of Kenya that are famous for their avifauna and fisheries resources.

There should therefore be an aim to create awareness of the values, uses and threats to our wetlands. Means should be put in place to help in creating and promoting education and awareness at all levels of the society, especially among government, policy and decision makers, developers, land owners, and local communities. Another objective should entail promoting better understanding and appreciation of the functions and values of wetlands though research and monitoring and supporting community conservation initiatives by provision of technical support, linkages and mobilization.

The results showed that the local communities are willing to pay an amount of Kshs 171 per annum towards the conservation of L. Naivasha. This is an encouraging figure since if it is enforced then it would ease the governments burden towards conservation of the lake. The government and other interested parties (NGOs and local communities) should target the middle aged group since it is the one which is the most aware of the benefits of L. Naivasha conservation. Moreso, they are the most educated and have got surplus

income, their family sizes are few and hence understands more of the social economic consequences of L. Naivasha depletion.

From the study it should be recommended that sinçe most wetlands are traditional water sources and the only available grazing areas for the pastorals communities during drought. It should be advisable therefore to integrate the traditional management program. Appropriate water management including review of water abstraction rights in relation to the available water in order to ensure sustainable agricultural and urban development which takes into account the need to protect the lake and biodiversity should be taken into consideration.

SECTION ONE

1.1 Introduction

This study aims at investigating the willingness to pay (WTP) for the conservation of wetlands in Kenya. Over the years there has been a massive loss of wetlands products due to unwise use and unsustainable harvestation of both flora and fauna. Wetlands are important since they provide safe drinking water during the wet and dry seasons. They also silt dissolved and suspended materials from floodwater, protects coasts and inland areas from floodwater. They have a very productive ecosystem whose biomass production potential is rewarding if utilized sustainably. It is therefore of great importance if a critical evaluation of wetlands is done and how they can be conserved.

However, even though wetlands are important to the whole economy, increasing human pressure in Kenya has led to alterations and degradation of ecosystems, causing reduction or loss in their biodiversity, biological functions, economic, cultural and spiritual values. Myers (1992) in his article, Population/Environment linkages argued that growth in human numbers, in conjunction with growth in human consumption and growth in environmentally adverse technology, could build up a situation that eventually generates an "overshoot" outcome. That is to say, the momentum of population growth in conjunction with the environmental degradation that stems in major measure from population growth overwhelms the environmental underpinnings of agriculture. In turn, an outcome of this sort can precipitate a downturn in the capacity of environmental resources to sustain human communities at their erstwhile level.

Sub-Saharan Africa is one of the worlds poorest regions and many people live by exploiting the natural resources of its rich wetlands. Local communities have traditionally

based their livelihood on wetlands, for example fishing, river transport, poaching, wood, timber, charcoal, agriculture, etc in L. Naivasha, L. Victoria and along the coastal area. Activities resulting in wetland loss and degradation include agriculture, commercial, and residential development, road construction impoundment, resource extraction, industrial siting, processes and waste dredge disposal, siviculture, and mosquito control. The primary pollutants causing degradation are sediment, nutrients, pesticides salinity, heavy metals weeds low dissolved oxygen, PH, and selenium. Therefore, there is urgent need to educate and create awareness of their destruction and undertake actions to ensure their existence and functions. The Kenya government in its 1963 manifesto first started the importance of wetlands in Kenya on conservation of natural resources. In subsequent years several areas were designated as parks or reserves. For example, Lake Nakuru National Park (LNNP), and Lake Bogoria national reserves. Kenya ratified the Ramsar Convention[1] in 1990 and designated L.N.N.P. as the first Ramsar Site and L. Naivasha in 1995.

1.2 Statement of the problem

Over the years, there has been a massive degradation of wetlands in Kenya. These has resulted from the increasing human pressure which has led to alterations and degradation of these ecosystems, causing reduction or loss in their biodiversity, their ecological functions and economic cultural and spiritual values. Exploitation of these potentials may eventually lead to profound ecological effects on these systems. Most significant in this

[1] The Convention on Wetlands, signed in Ramsar, Iran, in 1971.It is an intergovernmental treaty, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 138 Contracting Parties to the Convention, with 1308 wetland sites, totaling 110 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance.

respect, will probably be the loss of large quantities of nutrients that would otherwise be recycled in the ecosystem. Harvesting of wetland plants will destroy the canopy structure and consequently interfere with light and temperature regimes and hence the microclimate of the wetlands. This may eventually reduce wetland productivity and the quality of the harvestable materials. For example, papyrus harvesting in L. Naivasha. (Muthuri, 1995).

However, by accessing the rate of resource exploitation in L. Naivasha, one can rightly conclude that in the next few decades the biodiversity of the lake will be non-existence. The population is exerting pressure for agricultural and housing land that has led to the degradation and loss of the catchment areas, clogging drainage and untreated sewer water that will lead to the depletion of fish, animals, and plant species.

Therefore, there is a need for conservation since if these trends continue unchecked the economic value of L. Naivasha will diminish and cause disequilibrium of the ecosystem. Various studies have been done previously concerning the economic value of L. Naivasha as a tourist destination, but little has been said about the economic value of conserving L. Naivasha as a wetland. Its only the foundation of Lake Naivasha Riparian Association which is trying to put in place a management plan for the sustainable use of the Lake and its surrounding resources. The study will therefore address the benefits derived from the Lake and basically the community's WTP for the conservation of the Lake. It will also strengthen knowledge and capacity for wetland biodiversity conservation and sustainable use by undertaking a national inventory of wetlands,

including an assessment of key threats such as invasive species, for better conservation planing. The project will also support status assessment and strengthening of legal protection of threatened species. Capacity building will focus on various stakeholders and will include using economic tools for wetland management, planning, and documenting indigenous knowledge on sustainable wetland management.

1.3 The central role of law in achieving wise use

Wise use cannot be effectively promoted without appropriate legal and institutional frameworks at local and national level. Statutory and customary laws establish principles and rules for personal and corporate conduct and determine ownership and user rights for land, water and natural resources and applicable taxation. Legislation can be used to require assessment and control of activities and development which may adversely affect wetlands, in accordance with the principle of prevention; to set standards to minimize impairment of land, water and air resources; to monitor compliance; and to punish illegal practices.

Law makes it possible to confer special status on wetlands or catchments, to require cross-sectoral planning on wetland issues and to safeguard the rights of indigenous and local communities to information and participation in wetland management. Legislation defines the rights and duties of public authorities and agencies with regard to wetland conservation and wise use, including in relation to other States, and lays down the conditions under which financial support may be provided for specific activities. Law thus establishes the framework in which scientists, planners, managers and environmental

economists make strategic and operational choices and in which communities and other stakeholders exploit wetland resources.

1.4 Objective of the study

The broad objective of the study is to investigate the economic value of L. Naivasha and look into possible ways of conserving it.

The specific objectives are,

1. To estimate the community's minimum willingness to pay (WPT), for the conservation of L. Naivasha.
2. To assess the effectiveness of gorvenments' policies in the conservation and protection of L. Naivasha.
3. To suggest policies that can be used in the conservation of threatened species (hydrohytes and mammals) in L. Naivasha.

1.5 Hypothesis

i. H_0: The local community will be willing to pay (WTP) for the conservation of the lake.

   H_1: The local community will not be willing to pay (WTP) for the conservation of the lake.

ii. H_0: There will be a relationship between willingness to pay (WTP) and the level of education.

   H_1 There will be no relationship between willingness to pay (WTP) and the level of education.

1.6 Significance of the study

No study has been done on the economic value of L. Naivasha as a wetland using the CVM methodology. Therefore, it is of great importance to investigate the applicability of the methodology in trying to solicit the communities' participation in the conservation of the lake. One advantage of CVM over other valuation techniques is the capacity of CVM to estimate non-user value. Individuals may derive utility from the existence of a recreational resource, even if they themselves do not physically visit that site. Other methods used for valuing non-market goods includes hedonic, cost benefit analysis, travel cost method and benefit transfer (price of alternatives or substitutes), and participatory valuation.

By the use of the CVM methodology, the value of the true benefits derived from wetlands ecosystem will be realized. The out come of this study, in a narrow sense, is intended to provide a base value for the Lake from the view point of people who use it for recreational purposes (user value) and a value from a societies point of view (social value). L. Naivasha will then serve as a base area of study, of which the results can be, generalized (benefit transfer) to other areas of similar nature in Kenya or Africa.

SETION TWO

2.1 Literature review

This chapter deals with problems, classifications and the importance of wetlands. It also evaluates the CVM methodology in terms of its theoretical framework biases involved and compares WTP and WTA.

L. Naivasha is a riparian wetland and its rights are;

- A riparian has the right to use the water based on the ownership of property that abuts a natural watercourse.
- Water claimed by virtue of a riparian right must be used on the riparian parcel.
- Such a right is generally attached to the riparian parcel of land except where a riparian right has been preserved on non-contiguous parcels after the land has been subdivided, Hudson v. Dailey, (1909) 156 Cal. 617.
- Riparian rights were adopted in California as a part of the English Common Law when California entered statehood in 1850. At that time, however, gold miners were already operating under their own system of prior appropriation to claim water rights.

According to the chairman of the L. Naivasha Riparian Association (LNRA) in an interview conducted by Mgendi C. and Marindi S., he stressed that LNRA is a local community taking the lead, initiating major actions, and achieving results for the long-term conservation and wise use of wetlands. It is an outstanding demonstration of how to implement two major of the Ramsar convention: conservation and wise use of wetlands for the well-being of the local community by building consensus on major issues to be addressed and increase commitment on the steps to be taken by various stakeholders. He

stressed that LNRA is a an example of a community leadership and it demonstrates that conservation and wise use of wetlands can be achieved in Africa

2.2 Problems associated with wetlands

Various methods have been used in defining wetlands. In general terms, wetlands are lands on which water covers the soil or is present either at or near the surface of the soil or within the root zone, all year or for varying periods of time during the year, including during the growing season. Wetlands generally include swamps, marshes, bogs, and similar areas[2]. The recurrent or prolonged presence of water (hydrology) at or near the soil surface is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. Wetlands can be identified by the presence of those plants (hydrophytes) that are adapted to life in the soils that form under flooded or saturated conditions (hydric soils). There also are wetlands that lack hydric soils and hyrdrophytic vegetation, but support other organisms indicative of recurrent saturation (NAS 1995).

In 1979, a comprehensive classification system of wetlands and deepwater habitats was developed for the U.S. fish and wildlife service (Cowardin et al. 1979). Under this system, wetlands are of two basic types: coastal (also known as tidal or estuarine wetlands) and inland (also known as non-tidal, freshwater, or palustrine wetlands). Including areas of marine water, the depth of which at low tide does not exceed six

[2] The federal regulation implementing section 404 of the clean water act definition. . Jurisdictional wetlands -- those that are regulated by the U.S. Army Corps of Engineers (Corps) under Section 404 -- must exhibit all three characteristics: hydrology, hydrophytes, and hydric soils (US ACOE 1987).

meters[3]. The salt water and tides combine to create an environment in which most plants, except salt-tolerant species (halophytes), cannot survive. Mangrove swamps, dominated by halophytic shrubs or trees, are common in warm climates. Inland wetlands include floodplains along rivers and streams (e.g., bottomlands and other riparian wetlands); isolated depressions surrounded by dry land (e.g., prairie potholes); areas where the groundwater intercepts the soil surface (e.g., fens) or where precipitation saturates the soil for a season or longer (e.g., vernal pools and bogs).

Theodore panayotou (1994) argues that issues related to economic development and poverty alleviation are the main preoccupations of developing countries. Hence, they do not give high priority to environmental protection except when it is realized that it is the only avenue of escaping stagnation and achieving higher economic growth rates. As the population increases, so does the demand for utilization of swamps for agricultural production. In some parts of Kenya, swampy land has been put into sugarcane and rice production and farmers have reclaimed poorly drained valley bottoms for other crops. For example, in Kisii district (Nyanza province), one of the most densely populated areas in Kenya, food scarcity forced farmers to begin reclaiming the valley bottoms in the 1970s (Muya, 1985).

Loss or degradation of wetlands and wetland products can result from weaknesses in legal regimes for land tenure and resource use. Uncertainty over title and user rights to land, water and natural resources often removes the incentive - and the financial capability - to invest in or manage these resources sustainably. Such insecurity, which is

[3] Koyo.A.Ramsar Convention, World Wetlands Day in Kenya 2nd February 2001 Nairobi Kenya

often aggravated by population growth, can in some cases increase the risk of internal or transboundary resource-based conflict. This is put more clearly by Wangari Mathai in her sentiment that, "To bribe voters, leaders turn to misuse of the national resources like allocation of forest areas, wetlands and catchment areas. That is hardly the way to promote sustainable development and protect environment[4]". Unfortunately, sources of traditional thatch are becoming scarce due to over exploitation and hence lack of replacement. Therefore, there is an urgent need to encourage sustainable exploitation of these resources.

According to Gichuki 1999, wetland loss causes a decrease in the number of species of wetland's plants that are of scientific, economic (medicine, mats) and scenic value. Wildlife species also decrease and waterfowl change their migration patterns. A decrease in the valley bottom functions of regulating the fluctuations of stream and river discharges and ground water storage are examples of hydrological impacts. Natural wetlands vegetation taps silt in water flowing through it; removal of this may increase the amount of siltation down stream (Muthuri, 1989). There may be a reduced availability of water for human and livestock consumption.

Keter 1999 argued that wetlands have been a main source of resource of water supply in Kenya. With rapid increase in population, urbanization and industrialization, the huge demand for water has stressed wetland areas. This development change, if not managed, may continue to stress wetlands and in the process, alter the quality and quantity of the

[4] Wangari Mathai in implementing sustainable development-, the green belts movement.

resource base. Pesticides and fertilizers used in agricultural industry are major sources of pollutants of water through leaching or run-off. In wetlands, these pollutants could have serious adverse effects on the diversity and productivity of the biota. In Kenya, wetland ecosystems that are threatened by increasing agricultural activities include the coastal mangrove belt, inland lakes, and marshes. (Gitonga, 1999).

Maltibly (1986) analyzed the major causes of wetland loss and degradation and grouped them into human and natural threats. Human threats include;

1. Direct
   i. Drainage for crop production, timber production, and mosquito control.
   ii. Dredging and stream channelization for navigation channels, flood protection, coastal housing developments and reservoir maintenance.
   iii. Filling for dredged spoil and other slid waste disposal, roads and highways and commercial, residential, and industrial development.
   iv. Construction of dikes, dams, levees and seawalls for flood control, water supply, irrigation, and storm protection.
   v. Discharge of materials (e.g. pesticides, herbicides, other pollutants, nutrients loading from domestic sewage and agricultural runoff, and sediments from dredging and filling, agricultural and other land development) into waters and wetlands.
   vi. Mining wetland soils for peat, coal sand, gravel phosphate, and other materials.
2. Indirect
   i. Sediment diversion by dams, deep channels, and other structures
   ii. Hydrological alterations by canals spoil banks, roads and other structures.

iii. Subsidence due to extraction of ground water, oil gas, sulphur and other minerals

The natural threats include subsidence (including natural rise of sea level), drought's, hurricanes and other storms, erosion, and biotic effects.

In Kenya environmental challenges includes lack of a comprehensive national policy management and conservation of wetlands. Inadequate institutional arrangement, especially a head institution legally mandated to develop and manage wetland resources. The use of activities that threaten sustainable utilization, conservation, and absence of integrated management plans suitable for sustainable multiple use of wetlands coupled with poor management of wetland resources accelerate the loss of wetland.

Other threats to native biodiversity in Kenya include the lack of a comprehensive policy for biodiversity conservation, and poor understanding of the concepts and principles of biodiversity. Moreso, there is poor information coordination and management and dissemination mechanism. Kenya lacks adequate mechanism for assessing and monitoring the status of biodiversity over time. There is also shortage of resources, including funds, qualified personnel, and equipment dedicated to biodiversity research and inventory.

Gichuki et al (1997) recommended that for a sustainable and wise use of wetlands there should be a creation of a district biodivesrsity management policy and incorporate principles of ecosystem management in land use policies and regulations relating to utilization of natural resources. Research should be promoted and supported outside the

current protected areas, establish more biological reserves with sustainable human use, increase public awareness of the importance of biodiversity, evaluate the significance of advances in biotechnology and establish mechanisms of biodiversity information exchange between key agencies.

Kiwazi et al (1995) did a research in the loss of wetlands in Uganda. He found that one of the major ways to conserve wetlands is to develop policies and guidelines for sustainable use of wetlands through a better understanding of their traditional uses. This is because traditional management systems are based on indigenous knowledge and practices passed on from generation to generation. This are the ideas that requires to be promoted and applied during wetlands management planning, there is consequently need to protect a variety of potential use options for wetlands, improving them to fit with the existing trends in resource management.

Studies conducted in Busia and Rakai districts revealed that in the 1940's agriculture, firewood collection, fishing and fruit tree collection were negligible while water, grass, sand, and papyrus use were very important. The study suggests the need for continued use of improved management practices in wetlands, which have been categorized as vital and threatened. These are the ones which provide at least one known essential good, service, or attribute without an alternative that is practically or economically viable

L. Victoria has experienced eutrophical problems. This is attributable to pollution due to an expanding population, a rapidly developing technology, and increased industrial and

food production. Pollution from non-point sources can significantly influence an ecosystem. Okung and Opanga (2001), found four parameters responsible for pollution namely nitrogen, phosphorous, silicon (silica) and suspended solids.

The principal threat to native biodiversity in Nakuru district has been the excision of large tracts of natural forests and woodland for agricultural and human settlements, the results of which are large-scale habitat degradation and loss. The clearing of land for agricultural development, coupled with improper land use practices such as overstocking and the introduction of exotic plant and animals species, has accelerated habitat degradation, while the establishment of permanent settlements has increased environmental pollution in various parts of the district. Gichuki (2002) argues that wetlands in T.R.P.N.R. are currently experiencing major environmental problems. There is high turbidity, which causes siltation of the lakes and the rivers. These changes in water quality could have negative impacts on wildlife and local people who depend on the water. Local people have strong attachment to wetlands and the associated resources, especially fisheries and water edge plants.

2.3 Classification of wetlands

According to the Kenya national environmental action plan (KNEAP), prepared in 1994 a substantial proportion of Kenya's water resources is found in wetlands, which cover 2 to 3% of the country's surface area (see figure 2). These wetlands are diverse in type and distribution. Wetland classification should be done in line with respective national development plans. Research on wetlands should explore the functions of each type of wetlands, its ecological status and agricultural potential that can be exploited without

impairing its functions and carrying capacity. Institutional perception on the values, functions and utilization of wetlands should be harmonized. This could then be followed with formulation of wetlands, promulgation of regulations to govern wetland use and capacity building for monitoring and control of wetland utilization. Wetlands can be classified under several categories according to their biological and physical characteristic. The main categories include estuaries, open coasts, floodplains, freshwater marshes, and lakes, peat-lands and swamp forests. This can further be analyzed by the use of the table 1 below.

Table 1
Classification of wetlands in Kenya

Wetlands within conservation areas in Kenya	Amboseli	C	
	Chyulu	D	
	Kora	D	
	Lake Nakuru	E	
	Mount Elgon	A	B
	Mount Kenya	A	B
	Saiwa Swamp	C	
	Mzima Springs	D	
National Reserves	Boni	D	
	Dondori	D	
	Lake Bogoria	E	
	Losai	D	G
	Tana River Primate	D	
National Marine Reserves	Kiunga	G	
	Watamu	G	
	Kiunga	G	
	Watamu	G	

The above table can be explained as below

Biotic Communities
A ⇒ Agro-alpine glacier and moorland
B ⇒ Highland moist forest
C ⇒ Permanent swamps
D ⇒ Ground water, Riverine forest or floodplain
E ⇒ Grassland
G ⇒ Mangroves
(Source: Government of Kenya, 1990,)

2.4 Future Ramsar sites

Some wetlands within and outside the conservation areas are suitable as Ramsar sites as they are important wetlands for avifauna. The table below shows Ramsar sites, conservation areas, non-conservation areas and reasons for their suggestions.

Table 2
Future sites and reasons for suggestions.

Conservation areas	L. Amboseli	A	C	E	F		
	L. Bogoria	A	C	E			
	Mzima springs	A	C	E			
	Tana river delta	A	B	D	E		
Non-conservation areas	Bura irrigation project	A	G				
	Crater lake-Naivasha	A	E	F	G		
	Kano plains-lake Victoria	A	G				
	Kiambere and Masinga dams	A	G				
	L. Baringo	A	E				
	L. Elmentaita	A	E	F			
	L. Magandi	A	E				
	L. Naivasha	A	C	E			
	L. Ol Bollossat	A	E	G			
	L. Turkana	A	E	F			
	L. Victoria	A	D	E	F		
	Lorian swamp	A	C	E	F		
	Tana Delta	A	B	C	D	E	F
	Yala swamp	A	B	C	D	E	

Reasons for their suggestion

A- Bird life especially water fowl

B- High biodiversity/endemism

C- Water catchment/control

D- Riverine forest

E- Tourist values

F- Special habitat

G- Bird shooting control

(Source Government of Kenya, 1990)

2.5 Conflicting sectoral policies, laws, taxes and institutional priorities

Wetlands are directly or indirectly affected by a large number of sectoral activities, ranging inter alia from marine transportation and port and harbor construction through fisheries and forestry to domestic and foreign trade and investment. Side effects of non-wetland activities include hydrological changes from water abstraction or watercourse regulation and water-borne pollution from agriculture, industry or urban centers (OECD 1996).

Wetlands present particular challenges to legislators as they cover a wide range of habitat types (e.g., caves, peatbogs, inland deltas, and coral reefs) and are dynamic systems subject to spatial and temporal variation. Their common characteristic is the seasonal or permanent presence of water: maintenance of their ecological character depends on water supply of appropriate quantity and quality. This is rarely reflected in law and planning which usually treat wetlands like any other kind of natural area.

Law applicable to wetlands has often developed in an ad hoc way and may be characterized by gaps, overlaps and inconsistencies, fostering uncertainty amongst wetland owners, users and implementing agencies. There may be exclusive reliance on regulatory approaches, which present logistical difficulties for enforcement and leave little incentive for stewardship by communities or individuals. Implementing regulations may be issued late (or not at all) or establish techniques and standards which do not respond to actual threats. Statutory law may fail to take account of customary law and practices on access to/ use of wetlands and wetland resources.

Wise use can be hampered by poor design or operational weakness of the administrative authority responsible for national implementation of Ramsar. Examples might include an authority that works in isolation from national focal points for other biodiversity-related treaties to which the country is party, has no regular communication with relevant public and private sectors or technical personnel, such as environmental impact assessment specialists, or has no cooperative arrangements with neighboring countries for joint management of shared wetlands or wetland species

Wetlands can only be conserved and wisely used by protecting them against drainage and infilling and maintaining the regime of their feedwaters throughout the ecological unit formed by the watershed, catchment or river basin. Catchment should be broadly interpreted to include upstream water supply, downstream hydrological connections between flood plains and rivers and groundwater flows.

National legislation rarely provides a basis for a comprehensive approach to catchment-scale planning and integrated management, due to serious institutional constraints. Catchment boundaries differ from political boundaries: a watercourse may flow through several jurisdictional units such as districts, autonomous provinces or sovereign States. Each unit will probably have its own rights and duties in respect of territorial planning and water resource management. The position may be particularly complicated in federal countries where jurisdiction over wetlands and resource management is divided between national and subnational governments.

2.6 Importance of wetlands

Wetlands are among the world's most productive ecosystems but are also highly sensitive to exploitation, Maltiby (1986). Some wetlands can produce up to eight times as much plants as an average field; wetlands silt dissolved and suspended materials from floodwaters; maintaining water quality; wetlands protect coasts and inland areas from floods.

Wetlands have played a significant role in man's civilization. The floodplains of the lower Nile valley and delta have supported large human population for 6000 years. The swamps are associated with complex fishpond ecosystems in Czechoslovakia have been human management since 13thcentury AD. Aquatic macrophytic in freshwater wetlands are increasingly being recognized as the most productive plants communities (westlake, 1975) Thompson et al, 1979, Muthuri et al, 1979. Although they cover 1% of the land surface they contribute as much as 5% of the total primary production during the dry seasons, African wetlands are used extensively for livestock grazing. Cattle follow the flush of grass growth on the drawdawn zones and, as the plains around wetlands dry out, cattle wade into permanent swamps to graze on wetland plants such as phragmites, echinochoa, vossia and panicum (Howard-Williams, 1973).

Kareri 1999 argues that the presence of and interaction with, those diverse ecosystems have to some degree influenced the life, culture and history of the peoples living in or near wetlands. Wetlands are known to filter water from catchment by retaining solid waste and eroded sediments from catchment areas. They reduce impacts of flooding, speed flow, and hence store water while releasing it slowly. Wetlands function as a

natural storage for water; vegetation may reduce the rate of evaporation allowing reasonable discharge of water into rivers and lakes. Since the water in wetlands is very shallow, it is saturated with dissolved oxygen. This provides optimum conditions for biodegradable matter to be broken down by aerobic means before it enters a river or lake. Swamps reduce the salinity of influent water, especially during periods when the flow is reduced. Wetlands are associated with water borne diseases as well as vector borne diseases like bilharzia and malaria. (Mungai 2001).

The functional role of wetlands as an ecosystem in the environment is important, but is not fully appreciated. They are very productive ecosystems whose biomass production potential can be rewarding if utilized sustainably. Their multiple contribution to water bodies include recharge, storage and discharge of ground water, provision of nutrients that sustain primary productivity forming the basis of food chains; acting as filters of polluted water and silt etc. Wetlands are utilized on both seasonal and long-term basis through grazing, direct harvesting of plants material and fishing. They form important habitant for fish breeding as well as other forms of life. They are major water resources for industrial, domestic, livestock and agricultural uses and also functions as natural water reservoirs and regulators as well as providing opportunities for recreation, tourism and cultural ceremonies. (Session paper, Kenya government, 1996).

2.7 Contingent Valuation Methodology (CVM) Framework

2.7.1 Introduction

CVM is a procedure of estimating the value of non-market goods such as clean air or water. The basic assumption is that although the markets for these goods are not well

defined in usual economic terms, they do exist. The CVM enables the market for such a good to be simulated and described and then asks individuals what they would be WTP for that good or what they would be WTA as compensation if this good is lost or unavailable. The ultimate aim of a CVM study is to obtain an accurate estimate of the benefits of a change, in the level of provision of a good. Economic theory underlying CVM is the basic welfare analysis. A CVM satisfying the basic welfare criterion can be used to generate WTP functions for a large and diverse set of consumer goods. Krutilla and Fisher (1975) also refer to WTP as relative preferredness whereas WTA is referred to as sell by Russel (1982). This can provide an estimate of the benefits, which may be used for many planning and policy activities dealing with environmental goods. Contingent valuation is the only method which is capable of establishing general environmental values (FWR, 1994).

2.7.2 The theoretical framework underlying CVM

Modern welfare economics operationalises a variant of the Pareto Criterion by trying to find ways of placing a monetary value on the gains and losses of a provision of a private good such as mangroves in a wetland. This is based on two key assumptions. These are; that the economic agent (consumer *i*), when confronted with a possible choice between two or more bundles, must have preference for one over another and that the consumers actions and choices is to maximize overall level of satisfaction or utility[5]. Both of these assumptions have implications for the CVM, which is unique among benefit measurement techniques for its ability to obtain a detailed distributional information.

[5] for an extended discussion of this issue see Mitchell and Carson (1989) and Hausman (1996).

Additionally, CVM is consistent with the consumer sovereignty assumption. According to the consumer sovereignty assumption, consumer's spending behavior in a market is a sufficient signal of consumer preferences for various goods. The reason why an individual holds these preferences are of no economic importance. The criterion used by welfare economics is to assess a given policy by judging whether a particular policy is effective for Pareto improving (improving one good without detriment to another), basically in public goods. However, in practice, the compensation test of Pareto improvement is not in widespread use because compensation is rarely paid for losers. For such a criterion to be implemented, those who gain from a policy change need to compensate those who lose. CVM provides the only way of directly measuring both WTP and WTA. Depending on which Hicksian Consumer Surplus (HCS) measure a researcher wants to obtain, the elicitation question of the CVM survey is phrased in terms of either WTP or WTA. The monetary measure of a change in an individual's wellbeing due to a change in environmental quality is called the Total Economic Value (TEV) of the change in the environmental quality. This measures people's preferences for changes in quality of the good in question. Valuation as such is anthropocentric in that it is of preferences held by people, and, the value of something is established by an exchange transaction.

TEV of a resource can be desegregated into constituent parts consisting of;

1. Use Value (UV) and

2. Non- Use Value (NUV)

1. Use Value (UV)

a) Direct use value (DUV), such an individual makes actual use of a facility, for example visiting a recreation area to fish and is willing to pay for this use.

b) Indirect use values (DUV), where benefits are derived from ecosystem functions.

c) Option Values (OV), which is an individual's WTP for the option of safeguarding a facility, for use at some future date.

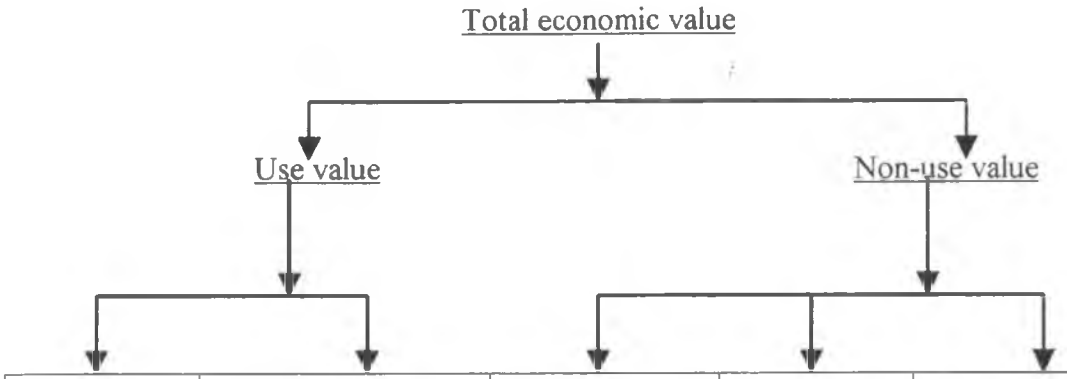
2. Non- use value (NUV), on the other hand have proven both difficult to define and measure. NUV can be subdivided into;

   i. Existence Value (XV), which measures WTP for some 'moral', altruistic or other reason and is unrelated to UV or OP.

   ii. Bequest Value (BV), which measures an individual's WTP to ensure that their heirs will be able to use a resource in the future.

So, TEV = UV + NUV = (DUV + IUV + OV) + (XV + BV)

Figure 1
The figure below shows an economic taxonomy for environmental resource valuation.



Direct use	*Indirect use*	*Optional use*	*Bequest values*	*Existence values*
Raw materials and physical products used directly	Ecological functions which maintain and protect natural and human systems through services	Premiums place on maintaining a pool of wetlands species for future use.	Use and non-use values left for heirs (inheritance values)	Intrinsic value of wetlands species and areas regardless of their current or future use possibilities.
Examples food, Biomass, Water, Transport, Fuelwood, Etc.	Examples water flow, water flow, water recharge, flood control, storm protection, etc.	Examples leisure, water use, phamaceutical, industrial, commercial, etc.	Examples	Examples aesthetic, heritage, cultural,

The questions that are asked are usually in the form of a bidding game involving "yes/no" answers to questions regarding maximum WTP and minimum WTA. (Cheng'ole, 1995). Econometric techniques are then employed to find the mean bid values of WTP. This is also supported by Rubinfield and Pindyck (1989) who add that the most direct way to obtain information about demand is through direct interviews in which consumers are asked how much of a product they might be willing to buy at a given price, and vice-versa.

2.7.3 Biased estimates of value

Bias exists in CVM responses if there are systematic understating or overstating of the true value. These bias may result from; strategic bias where the respondent may understate their WTP for welfare-improving change because environmental goods are typically non-excludable in consumption (the free-rider problem). There is the design bias that arises from the way the questions are presented to individuals, the order in which it is presented, the question format and the amount and the type of information presented. Mental account bias is also prevalent which arises due to the fact that the respondent may not be aware or had not even heard of the good in question thereby by giving wrong information of the could be the price of the benefit of the wetland. There is also the aggregation bias, where there may be problems in aggregating individual valuation responses. Analysts will often wish to summarize respondents' answers to valuation questions in terms of the mean WTP for the good or service, or develop an aggregate benefit estimate for a community or region. Payment vehicle bias- a number of studies have found that WTP varies depending on whether an income tax increases or entrance fee is used as a payment vehicle (method of payment for the good).

2.7 Willingness-to-pay vs willingness-to-accept

The task of valuation is to determine how much better or worse off individuals are (or would be) as a result of change in environmental quality or provision. Economists define the value of a change in terms of how much of something else (usually expressed as an amount of money) an individual is WTP to get this change or how much they would be WTA in order to permit the change to occur. The question to be asked is which measure of value WTP or WTA should be used for benefit estimation. Until recently, it was assumed that in most practical situations the difference between these measures would be small so long as there was an absence of strong income effects. Willig (1976) developed a precise analytical expression of the size of this potential difference, and showed that in a wide variety of markets situations, this divergence between WTP and WTA would be very small. However a substantial body of empirical evidence has recently been developed that provides convincing evidence that WTP and WTA measures are often quite different as shown in the table 3 below.

TABLE 3
Disparities between willingness-to-pay and willingness-to-accept

Study	WTP	WTA
Hammock and Brown (1974)	247	1044
Bradford,Knetsen and Mauser 1973)	22	93
Sinelair (1976)	35	100
Bishop and Herbelin(1979)	21	101
Brookshire,Randall and Stoll (1980)	32	207.07
Rowe,d'Arge and Brookshire (1980)	6.85	113.68
Knetsen and Sindein (1983)	1.28	5.18
Abala (1989)	84.4	284479

All figures are in current year dollars except the ones by Abala which in Kshs

Source: extracted and modified from Pearce and Markandya (1994).

In the table it can be seen that those WTA measures are at least three times greater than those of WTP. These findings are consistent with those of controlled experiments by Knetsch (1990). He found that the WTA: WTP ratio to be 77:1 initially and stabilized at 61:1 in successive experiments. These results signal to a controversy between economics principles and the real world. If consumers are rational and symmetric in their decisions and want to be just as well off as before, the choice between benefits and loss from a certain reference point would be valued equally. In other words there is no reason for the existence of differences between compensating variation and equivalent variation. Compensating variation is the measure of what a consumer is willing to pay to secure a price fall so as to leave him as well off as before. On the other hand, equivalent variation is a measure of the amount that a consumer would need to be paid to forego a price fall so as to be as well off as before the new price. Theoretically, the two are equal showing that consumer choice behavior is symmetry. Recently, Hanemann [1992] has offered another

explanation for the divergence between WTP and WTA measures of economic value. He has shown that such differences are consistent with economic demand theory when there are few or poor substitutes for the goods or services in question and when these goods or services are highly valued by individuals. These conditions are likely to be true for many environmental goods. In summary, good economic analysis will require good judgement on the question of whether to use WTP or WTA measures of economic value.

2.9 Related studies using CVM methodology

McConnell et al 1989 used the CVM methodology to measure the value of improvements in water quality in Barbados and Uruguay. They found that mean WTP to be $14 per year in Uruguay, which was less than one percent of the median family income. While in Barbados, the WTP for the lifetime of services was estimated to be $178.

Studies carried out to quantify how the value of fishing in Glen canyon national recreation area (GCNRA) and rafting in Grand canyon national park (GCNP) would change with more even base flows as compared to peaking power. Visitors were surveyed in the mid 1980s. The economic effects were substantial representing changes of $2 million annually (Bishop et al 1989)

A CVM has been used in federal energy regulatory commission (FERC) deliberations over the level of minimum instream flow conditions to attach to 50 years operating licenses. However, the CVM was able to male a difference whether to permit construction of the dam or not. According to Dr. John Duffield the permit application was rejected (Duffield 1992)

Loomis and Feldman 1995 did a CVM study of the economic benefits alternative flow releases over Shos hone falls on the Snake River. Their intentions is to evaluate whether the gains in recreation benefits from more water passing over the fall is worth the power foregone from not running that water through the turbines. The results found that in the months of summer it's economically efficient but in winter its not.

Relevant to the current study MacMillan et al (2001) valued the biodiversity landscape and recreation benefits from native reforestation and found that Scottish publics were WTP $35-$53 p.a. for reforestation and of a woodland depending on location and a small but significant proportion of respondents preferred a moorland landscape.

Studies have shown a significant WTP by visitor's, residents and the public for biodiversity and landscape benefits of the ESA policy (Hanley et al 1996, Willis et at 1995 Willis and Garrod 1993). The pay was between $20-$30 p.a. in additional tax depending on the sample population and the technique used.

Studies have also shown a significant WTP to preserve important Scottish habitats or landscape such as mountainous Mar lodge estate (one-off WTP $15-30) per respondent (Cobbing and Slee 1992). Or the flow country (one-off WTP $10-30) per respondent (Hanley and Craig 1991).

2.10 Limitation of the study

Majority of wetland products has no market prices at all, therefore valuation of the lake resources posed several difficulties, such as lack of knowledge regarding value and utility of some lake functions and the difficulties in isolating the benefits of interrelated

functions. Other issues such as the value of biodiversity, cultural significance etc raise intractable questions of measurement[6]. The kind of questions to be used will pose problems since respondents tended to understate WTP for fear of being compelled to pay the same in the future. Respondents may find some tradeoffs difficult to evaluate, because they are unfamiliar. Moreso, when presented with a large of tradeoff questions, respondents may lose interest or become frustrated. It is also noted that by only providing a limited number of options, it may force respondents to make choices that they would not voluntarily make and therefore the contingent choice may extract preferences in the form of attitudes instead of behavior intentions.

2.11 Literature overview

The literature review has shown beyond any reasonable doubt that the wetlands are really in great danger. There has been a great overexploitation of wetland resources leading to loss of biodiversity. The local communities has great over reliance on wetland resources e g. pastoralist especially during the drought periods. Fishermen trying to eke their daily living have resorted to using unrecommended methods of fishing leading to depletion of fish species.

As it has been noted that wetlands are among the nations most scarce and valuable natural resources, then there should be wise use and sustainable management of wetlands. Wise use and sustainable management should be at local, national, regional, as well as at international levels. The main activities noted to cause wetlands impairment includes hydrologic alteration, urbanization (including development), marinas/boats, industry

[6] Gima deffer, economic valuation of environmental goods in Ethiopia. A CVM study of the Abiyata-Shalla lakes national park may 1998

(including industrial development), agriculture, silviculture,/timber harvest, mining, atmospheric deposition among others. The Ramsar convention recognizes this paradigm and requires that contracting parties meet those obligations.

Gatani et al (1997) noted that the conservation of biological diversity is important for three basic reasons, ecological stability, economic stability, and social responsibility. Human beings are part of the biodiversity and are the ones that are largely responsible for managing and to a large extent damaging the natural environment. As such they have the moral responsibility of conserving their natural environment and passing it on to the next generation with pride (bequest value).

SECTION THREE

3.1 Methodology

The variety of empirical approaches used to value environmental amenities, whether examining contingent or actual behavior or market prices, have typically been based on a particular ad hoc theoretical structure. A general modeling structure must include the possibility of consumer substitution across activities and locations; it must also include site or activity specific levels of environmental quality. Individual utility is thus specified;

i. As a function of levels of activities, $A_1 \ldots\ldots A_i \ldots\ldots A_n$, where the subscript denote different activities

ii. As a function of a composite commodity X, "unaffected" by activity specific environmental quality; and

iii. As a function of environmental quality for each activity, $Q_1 \ldots\ldots Q_i \ldots\ldots Q_n$, where we take increases in Q_i as increasing environmental quality.

Utility is then a quasi-concave function,

$$U = u(A_1, \ldots\ldots, A_n; Q_1, \ldots\ldots Q_n; X) \quad \textbf{[3.1.1]}$$

Where,

1. $\dfrac{\partial U}{\partial A_i} = U_A^i \geq 0$ and

2. $\dfrac{\partial U}{\partial Q_i} = U_Q^i \geq 0$ and

3. $\dfrac{\partial u}{\partial X} = U_x \geq 0$

So utility is increasing in A_i, Q_i, and X.

Different possible levels of environmental quality can be achieved either by varying Qi for a specific activity, Ai, which can occur over many sites, or by defining a site-specific activity, in which case different Qi's are associated with different sites.

The budget constraint, which specifies the consumers' optimization problem, is:

$$Y - \sum_{i=1}^{n} P_i A_i - X \geq 0 \quad \text{.....[3.1.2]}$$

i. That is income [Y] minus the sum of expenditures on activities [$\sum_{i=1}^{n} P_i A_i$].

ii. P_i is taken as the price of activity i.

iii. X is non-negative.

For a given vector of environmental quality, the household will then choose to allocate activities such that [3.1.1] is maximized subject to [3.1.2], which in turn implies that:

$$\frac{U_A^1}{U_A} \leq P_i, \left[\frac{U_A^1}{U_x}\right] A_i = 0, A \geq 0 \quad \text{.....[3.1.3]}$$

$i = 1,2,\ldots\ldots\ldots\ldots,n$

To get the marginal willingness to pay (MWTP) for environmental quality for a particular activity we set equation [3.1.1] equal to a constant and get total differential. Then take the total differential of equation [3.1.2], setting $\partial Q = 0$ for all $i \neq 1$, $\partial P_i = 0$ for all i, and by using [3.1.3] we obtain,

$$\frac{U_Q^1}{U_x} = -\frac{dY}{dQ_1} \quad \text{.....[3.1.4]}$$

Expression [3.1.4] gives the change in income, necessary to offset a change in environment quality for activity 1.

In the case where prices of activities do not change in response to a change in environmental quality, the MWTP can be determined by setting equation [3.1.1] equal to a constant and totally differentiating the resulting expression by equation [3.1.3]. Assuming $\partial Q_i = 0$ for all $i \neq 1$ and that $\partial P_i = 0$ for all i, to obtain;

$$\frac{U'_Q}{U_x} = -\left[\sum_{i=1}^{n} P_i \frac{dA_i}{dQ_i} + \frac{dX}{dQ_i}\right] \quad \text{.....[3.1.5]}$$

This gives the marginal willingness of consumers to pay for environmental quality.

3.2 Empirical model.

Assume that WTP can be expressed as,

$$y^*_i = \sum \chi'_i \beta + u_i \quad \text{.....3.2.7}$$

Where, $\beta' = [\beta_1, \beta_2 \ldots\ldots\ldots\ldots \beta_k]$ vector of parameter estimates

$X_i' = [1, \chi_{i2}, \chi_{i3} \ldots\ldots\ldots\ldots \chi_{ik}]$ a vector of regressors

U_i is an error term with mean zero and variance σ^2 $N(0, \sigma^2)$

In equation 3.2.7, y^* is not observable, as it is a latent variable. What is observable is an event represented by a dummy variable y defined by

$y = 1$ if $y^* > 0$, and

$y = 0$ otherwise 3.2.8

From equation 3.2.7 and 3.2.8 we can derive the following expression:

Prob. $(y_i = 1) = \text{Prob.}\ (u_i > -\Sigma X_i\beta_i)$

$=1-F\ (-\Sigma X_i\beta_i)$ 3.2.9

Where F is the cumulative distribution function for u_i and Pr $(y_i\text{-}0/\beta,\chi_i)=F\ (-\Sigma\chi'_i\beta)$

The observed values of y are the realization of the binomial with probabilities given by equation 3.2.9 which varies depending on χ. Thus the likelihood function could be given by

$$L = \prod_{y_i=0} \left[F(-\Sigma X'_i\beta)\right] \prod_{y_i=1} \left[1-F(-\Sigma X'_i\beta)\right] \quad \text{.....3.2.10}$$

Which can be written as,

$$L = \prod_{y_i=1} \left[F(-\Sigma X'_i\beta)\right] \left[1-F(-\Sigma X'_i\beta)\right] \quad \text{.....3.2.10}$$

And the log-likelihood function for expression 3.2.10 and 3.2.11 can be simplified as

$$l\ (\beta) = \log L(\beta) = \sum_{i=0}^{n} \gamma_i \log \left[1-F(-\Sigma\chi'_i\beta)\right] + (1-\gamma_i) \log F\ (-\Sigma\chi'_i\beta) \quad \text{.....3.2.12}$$

The functional form imposed on F in equation 3.2.10 or 3.2.11 depends on the assumption made about 'u' in equation 3.2.7, which are the basis for the distinction between logit and probit (nomit) models. The probit model will assist in giving information of how income, age and family size affect the probability of WTP in relation to the education level, household head, and sex of the respondent.

The factors thought a priori, to influence individual WTP values are represented by vector χ in equation [3.2.7] They are defined as,

INCOME = Income of an individual per month

AGE = Age of an individual

FASIZE = Size of a house hold

EDLEVEL = Education level of the respondent

SEX = Sex of the respondent

HSEHEAD = household head

Apart from the first three variables (explanatory variables), all others are dummy variables taking the value of 1 or 2. The explanatory variables are expected to have positive signs while the dummy variables are expected to have a positive or a negative sign depending on the respondents' status. The variables are defined as,

EDLEVEL: 1 = None

2 = Primary

3 = Secondary

4 = Tertiary

5 = University

SEX: 1 = Female

2 = Male

HSEHEAD: 1 = Not the household head (No)

2 = The household head (Yes)

To specify the monetary values specified by the individuals we will use the a general model of the form,

WTP = f (income, age, hsehead, sex, edlevel,fasize).....[3.2.13]
Then the model will use a multplicative model of the form,

$$\mathbf{WTP = \alpha INCME^{\beta 1} .AGE^{\beta 2} .FASIZE^{\beta 3} .}e^{X} \text{.....}[3.2.14]$$

Where;

e = is the exponential

X= A vector of all the above dummy variables.

X = β_4HSEHEAD+β_5SEX+β_6EDLEVEL

Taking the natural log of equation [3.2.14] will get a log- linear function of the form;

InWTP=α+β_1In(INCOME)+β_2In(AGE)+β_3In(FASIZE)+β_4HSEHEAD+β_5SEX+β_6EDLEVEL+*e*...[3.2.15]

The estimation of equation [3.2.15] will give elasticity's with respect to the quantitative explanatory variables while the coefficients attached to dummy variables will give their respective differential intercepts, showing how each of the retained categories relate to the base variable, the one that has been dropped. The explanatory variables affect the dependent variables (individuals WTP).

3.3 Data type, sources and methods of collection

The data to be used will be sorely primary. Open ended, closed questionnaires will be used to solicit the data required. Data will be collected using random sampling. At least 300 questionnaires will be collected. Appendix one will elicit responses on background information that will be used to check expected relationships. The second part will look into the wetland's degradation while the last section will look into the individual's willingness to pay.

3.4 Methods of data analysis

The analysis will take the format of tables, charts and graphs to illustrate simple relationships between WTP and conservation outcomes. More complex relationships such

as WTP for Lake Naivasha conservation and choice of conservation activities will be investigated using regression methods. The data was screened by the use of the Stata software. Then use the Probit model and the maximum likelihood functions above to estimate the results.

SECTION FOUR

4.1 Area of study, background and location

Lake Naivasha is situated in Nakuru district, Rift Valley province, in Kenya. It has an elevation of 1, 880 meter's above sea level. The wetland system was designated as a Ramsar site in 1995 and has an area of 30,000 hectares and comprises a shallow freshwater lake indicating that it has an underground outlet and a deeper Crater Lake. The lake is immensely valuable to people as a source and store of water. The wetland supports more than 20,000 water birds, including over 1% of the population of coot Fulica cristata (see figure 3).

The larger lake system has fringing swamps and submerged vegetation, and a riverine floodplain with a delta that acts as a sediment trap filtering out pollution. The Lake has a volume of about 50 million cubic meters at its lowest (dry) cycle to about 170 million cubic meters in its full (wet cycle). The entire wetland system is surrounded by woodland of Acacia xanthophloea. There are several hundreds of Hippopotamus amphibius. Other species of mammals, mainly living in the riparian lands, are buffalo Syncerus caffer, monkeys Colobus, and waterbuck Kobus ellipsiprymnus. Hell's Gate National Park, which has an access corridor to the lake, hosts many other species of game.

Its catchment covers about 3,000 sq km. The soils are mainly sediments of a former larger lake, which are influenced by the volcanic origins of the basin rocks and soils. Mt. Longonot forms the southern edge of the drainage basin, and Mt. Eburu forms the northwestern edge. The wetland receives surface drainage water from three perennials rivers (river Malewa,Gilgil and Karati) and several ephemeral streams.

L. Naivasha and its riparian lands are entirely state-owned. Surrounding lands are privately owned. The lake is used for tourism, recreation, water sports, fisheries, cutting of vegetation, and subsistence hunting. The surrounding lands are dominated by cultivation of flowers, vegetables, fruits, cereals, pastoralism, and tourism.

L. Naivasha does not have a national protection status. The KWS protects wildlife from Hell's Gate National Park. On Crescent Island, in the lake, there is a private game sanctuary. Naivasha Riparian Owners Association is the principal management authority of the Ramsar Site, with assistance from the government and the KWS. A community based management plan based on multiple use of the wetland is being implemented (National Report 1999).

Natural potential threats to the site are siltation due to soil erosion, and infestation by floating aquatic weeds, Salvinia molesta and Eichhornia crassipes. Human induced threats or impacts to the site are excessive water extraction, use of agrochemical by farmers, domestic or industrial pollution from Naivasha town, disturbance by human activities, illegal hunting, and excessive cutting of wetland vegetation.

4.2 Empirical Analysis and Results

The data use is solely primary. 350 questionnaires were randomly given to the respondents to fill, out of which only 264 questionnaires were received back. This is due to the fact that some respondents demanded to be given the questionnaires to go and fill them at their own leisure. This led to the problem of tracing them back. I engaged three assistants, whom I briefed on the technical issues regarding the WTP for the conservation of L. Naivasha. Two of which were well conversant with the area and who acted as

guides. The people interviewed included the farmers, fishermen, the flower companies, the geothermal companies, and business people living around L. Naivasha and its surroundings. However it proved had to collect data from the catchment areas due to time aspect and lack of finance. Some inconsistency in observed behavior is inevitable, and these are assumed captured by a random term that is added to the systematic term. Before the analyses the data was 'cleaned' by removing 'protest responses' of individuals who reject the hypothetical scenario and refuse to give meaningful answers.

From the estimated results a summary was done to get the minimum, maximum WTP. The mean (average) WTP was found to be Kshs 171 (2 decimal places) per annum, indicating that if people were to pay a minimum of Kshs (y*171) per annum will be received. This is high value considering that majority of those interviewed are low-income (peasant) group (see table 1). The minimum WTP was found to be zero while the maximum WTP was found to be Kshs 1000. The results showed that the mean education level was found to be secondary while the family size was found to be very small i.e. the family constituted of only 3 persons. Mean income was found to be Kshs 14712.

Table 4

4.2.1 The Mean (averge) of the variables.

Variable	Obs	Mean	Std. Dev.	Min.	Max.
WTP	264	170.9848	170.9729	0	1000
age	264	33.92424	9.180175	18	70
hsehe	264	1.458333	0.4992072	1	2
fasize	264	2.799242	3.345936	0	22
sex	264	1.515152	0.5007196	1	2
minco	264	14712.16	16432.96	0	185000
edlev	264	3.106061	1.041041	1	5
hseh1	264	0.5416667	0.4992072	0	1
hseh2	264	0.4583333	0.4992072	0	1
sex1	264	0.4848485	0.5007196	0	1
sex2	264	0.5151515	0.5007196	0	1
edle1	264	0.0454545	0.2086945	0	1
edle2	264	0.2537879	0.4360042	0	1
edle3	264	0.3522727	0.4785857	0	1
edle4	264	0.2462121	0.4316218	0	1
edle5	264	0.1022727	0.3035821	0	1

Where,

WTP = Willingness to pay

Edlev = Education level where, 1=none 2=primary 3=secondary 4=tertially 5=University

Sex = 1=female 2= male

Hsehead = household head where, 1=no, 2=yes

Income = individual income per month

Fasize = family size

Age = age of the respondent

Table 5

4.2.2 Relationship between dummy variables and willingness to pay

WTP	Obs	Mean	Std. Dev.	Min	Max
edlev==5	27	484.4444	281.3338	100	1000
edlev==4	65	162.6154	110.5848	0	400
edlev==3	93	146.4516	114.0523	0	600
edlev==2	67	103.1343	86.396	0	400
edlev==1	12	80	57.8399	0	150
sex ==1	128	145.2344	150.7617	0	1000
sex ==2	136	195.2206	185.3244	0	1000
hsehe==1	143	129.1608	145.6046	0	1000
hsehe==2	121	220.4132	185.555	0	1000

The results showed a direct relationship between WTP and the level of education. The higher the level of education the higher the amount each individual is willing to pay. This could be attributed by the high awareness of the value of wetlands among the literate group, and the awareness of the ecological imbalance that could be attributed by the depletion of the lake. Those with university level of education were willing to pay an average of as Kshs 484 per annum, followed by those in tertiary Khs 400, while those with education level lower than the secondary level were willing to pay the least amount towards the lakes conservation (see table 2 above). This could be due to their low level of knowledge and their failure to comprehend the repercussions of the lake depletion. The results showed that both male and female are willing to pay for lakes conservation with the male WTP Kshs 195 and the female Kshs 145 (see table 2). The male are paying a higher amount than the female may be due to the fact that they are the ones who derive a lot of benefits from the lake e.g. fishing. In determining the WTP, whether an individual is the household head or not was found to be a major determinant of how much an

individual was WTP for the conservation of the lake. Where the individuals were the house hold head they were willing to pay as high as Kshs 220 and Kshs 129 to those who were not the house hold head. These could be attributed by the fact that the household heads are the decision-makers and are aware of their budget constraints and surpluses and hence, how much they could be able to commit towards the conservation of the lake.

4.2.3 Regression Analysis

Table 6

Number of obs = 175 F (6, 168) = 31.50 Adj R-squared= 0.5126

Prob > F= 0.0000 R-squared = 0.5294 Root MSE = 0.53902

inwtp	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
inage	0.6328304	0.4569582	1.385	0.168	-0.2692897	1.534951
inhsehe	0.3994685	0.2248294	1.777	0.077	-0.0443864	0.8433234
infasize	-0.2490246	0.1216855	-2.046	0.042	-0.4892543	-0.008795
insex	-0.3115602	0.2257215	-1.380	0.169	-0.7571762	0.1340557
inminco	0 .771965	0.0921789	8.375	0.000	0.5899868	0.9539433
inedlev	0.2390947	0.1461833	1.636	0.104	-0.0494981	0.5276875
_cons	-4.63988	1.54661	-3.000	0.003	-7.693174	-1.586586

The regression results showed positive coefficients in all the coefficients apart from the family size and sex. This can be interpreted as follows:

- As age increases by one unit the probability of WTP for the conservation of L. Naivasha increases by 0.633.
- As the probability of one being the household head increases by one unit the probability of WTP for the conservation of L. Naivasha increases by 0.399.

- As income increases by one unit the probability of WTP for the conservation of L. Naivasha increases by 0.772.
- As the education level increases by one unit the probability of WTP for the conservation of L. Naivasha increases by 0.239.
- As family size increases by one unit the probability of WTP for the conservation of L. Naivasha decreases by 0.249.
- As the probability of one being a female increase by one unit the probability of WTP for the conservation of L. Naivasha decreases by 0.312.

R-Squared which shows the percentage of the variation of the dependent variable accounted for all the explanatory variables in the regression equation was found to be 0.53 and the adjusted R-Squared was 0.51. This shows that most of the variables clearly explains the variations in the model. However, it could have been advisable if other factors such as, the distance between a home and the lake, occupation of the respondent, property (land, livestock), marital status (single or married), rate of L. Naivsha degradation, benefits one derives from the lake e.t.c, were incorporated in the model to give it a better representation. Nevertheless the results are useful because the determinants of WTP can be modified by policy to influence the conservation of the lake. The model used to generate the results was highly significant, with household head, family size, monthly income, and education level significant at 10 percent level of significant. Sex and age were not significant at 10 percent level of significant since what they did not have any influence in determining the amount the respondent was WTP. The F-statistic component gives an insight into the overall fit of the model or rather it shows the joint significance of the independent variable in explaining the dependent variable,

the F-statistic is significant at 1 percent. The cook weisberg test for heterosedasticity showed that there is no heterosedasticity since the model is significant at 5 percent. Therefore we accept the null hypothesis that we have a constant variance (homoscedasticity).

The correlation results showed that family size and age are highly correlated (0.80). This may be due to the fact that there is a high probability that the older one is the higher the family size is likely to be. Others like monthly income and age, sex and household head, monthly income and family size has got a moderate correlation.

Table 7
4.2.4 The Correlation matrix.

	age	hsehe	fasize	sex	minco	edlev
age	1.0000					
hsehe	0.1785	1.0000				
fasize	0.8902	0.1350	1.0000			
sex	-0.0080	0.6186	0.0279	1.0000		
minco	0.5322	0.2663	0.5109	0.1371	1.0000	
edlev	0.1799	0.0451	0.2234	0.1136	0.3017	1.0000

4.2.5 The probit model

Table 8

Probit estimates

Number of obs =264 LR chi2(6) = 89.02 Pseudo R2 =0.4565

Prob > chi2 =0.0000 Log likelihood = -52.996183

wtp	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
age	-0.0681834	0.0487981	-1.397	0.162	-0.1638259	0.0274592
hsehe	0.3448101	0.4349012	0.793	0.428	-0.5075805	1.197201
fasize	0.0403148	0.177294	0.227	0.820	-0.307175	0.3878047
sex	0.2483477	0.3421945	0.726	0.468	-.4223411	0.9190365
minco	0.000359	0.0000805	4.459	0.000	0.0002012	0.0005168
edlev	0.3011839	0.1912976	1.574	0.115	-0.0737525	0.6761203
_cons	-0.3658947	1.292652	-0.283	0.777	-2.899447	2.167657

The results of the probit model shown above in table 4 shows that all the coefficients are positive apart from age. Age has got a -0.0682 coefficient, indicating that as one grows older and older the fewer amounts one is willing to pay towards the conservation of L. Naivasha. That is a one unit increase in age will lead to the probability of WTP for the conservation of L. Naivasha decreasing by 0.0682. Therefore, the policy makers should target the middle-aged people since the old people do not believe in the conservation of the lake. In the case of household head, the probability of being the house hold head and a male increases the probability of WTP for the conservation of L. Naivasha by 0.345. This is what we would expect since the household heads are the decision-makers and at

the same note, males do have more money in the rural areas hence a surplus that will be put towards the conservation of L. Naivasha.

Monthly income has got a very low coefficient meaning that a one unit increase in income only increases WTP for the conservation of L. Naivasha by 0.0004. The F- static component gives an insight into the overall fit of the model or rather the joint significance of the independent variables in explaining variables. For this model, the F-statistic is significant at 1%, and thus this preceding theory can be said to hold this particular set up i.e. the model has a good overall fit. The pseudo R^2 -squared was found to be 46 percent. At 5% level of significant only monthly was found to be significant, all the other variables were insignificant.

4.3 Limitations Encountered

In most cases the respondent found it difficult to answer some of the questions diligently which led to the breaking down of the questions into simplified bits leading to waste of time when explaining them. This led to further problems when analyzing since the broken questionnaires had to be brought together to form the expected results. In cases where they were supposed to state their income some tended to understate it. This is expected due to fear that one may know their wealth and hence be easy prey for thieves. It also proved hard to rank the causes of depletion according to their seriousness. This is due to the fact that the respondents found some tradeoffs difficult to evaluate but through explanations some good results were received. It was also noted that most of the responses received were in the form of preferences instead of behavior intentions. However this was sorted through 'cleaning' and removing of the biased responses.

Section Five

5.1 Policy implications

This study provides information of interests to environmentalists in L. Naivasha and any other wetlands in Kenya. From the analysis income emerged as the key determinants of peoples WTP towards L. Naivasha conservation. Majority of the people having a constant monthly income showed a high-level of WTP for the lakes conservation. The government should therefore target those people having constant income as a method of soliciting money. The study also showed that since people are WTP for the conservation of the lake then the government and other interested parties' e.g. non-governmental organizations should emphasize more on educating the public on the importance of conservation. This is so since, if the education level increases, conservation awareness also increases and this will automatically change the altitude of the peoples towards environmental conservation. The government should therefore, place a mechanism of collecting some revenues from the community that should be ploughed back towards the conservation of the lake.

The sessional paper number (1996) articulates that currently there is no comprehensive policy and legal instruments on wetlands The ministry of environment and natural resources through inter-ministerial committee on environment (I.M.C.E.) is responsible for the coordination, advisory and policy development on wetland issues. Other institutions involved are the Kenya wildlife service, regional and local authorities and non- governmental organizations. In the plight of this the government should recognize the value of wetlands and formulate national policies on the management and conservation of wetlands. The government should establish and harmonize institutional

arrangements for wetlands. The government should develop integrated management plans for sustainable and multiple use of wetlands. The government should establish and maintain an inventory of wetlands that identify, map, and describe existing wetland resources. It should also promote community participation in wetlands conservation and management and, institute environmental impacts assessment for wetlands.

It should be said that the most important strategy forward is to generate adequate scientific information through research, inventory and monitoring of wetlands. The information should be easily accessible and in a format that wetland resource managers, planners and users can apply. There is urgent need for capacity building through training of wetland users, managers, planners and scientists for sustainable management of the resources.

5.2 Lessons learned

- There should be importance of reviewing national regulatory frameworks and using technical guidelines.
- Laws and administrative practices should be used to curb further damage and encourage wetland rehabilitation.
- There should be clear designation of under-represented and internationally important wetlands and the establishment of an international wetland's network that is qualitatively different from the Ramsar List.
- There should be many mechanisms to promote wetland conservation and wise use, including biodiversity strategies and environmental policies. These guidelines are intended to encourage contracting parties (CPs) to develop new working parties

(NWPs), review the success of governments and partners in their development and implementation, and foster the sharing of experience.

- Great importance should be given to communication, education and awareness in ensuring effective local community involvement. The local community should be engaged in electing representatives, consulting with local communities to review and revise management plans, and delegating wetland management tasks. This effective participation requires, inter alia: developing and implementing incentives for wise use, building confidence and trust based on mutual respect and effective communication, ensuring flexibility and adaptability in responding to individual cases, ensuring continuity through an iterative process, enabling legislative frameworks, securing adequate funding, and generating high-level political support.

5.3 Conclusion

From the study it can be concluded that there should be wise use of the resource, using the resource in a sustainable way, sort of maximum development without damaging the base. Since the community around L. Naivasha, offers a sufficient number of people who recognizes the benefits of preserving the biodiversity, especially the most educated, as shown in Table 5, and at the same time promoting necessary economic growth, the government and other stakeholders should utilize this opportunity and effect a conservation program. The government should put a minimum WTP of Kshs 171 that should go directly towards the conservation program. The government should also be a front runner in all-administrative, financial, education, creating awareness of dangers involved through the degradation of L Naivasha. The government should also with political problems (especially clearing the vegetation around the lake to give way to

cultivation land) and lead the community towards the conservation of the lake. Social and economic factors are the main reasons for wetland loss and should be of central concern in wise use programs. Such programs should involve public and private institutions in addition to the wetland conservation agency where such institutions have relevant expertise; activities affecting wetlands should be governed by the precautionary principle where knowledge of ecological constraints of a wetland system is not available. It is true that, many people have changed their negative perception of wetlands, and tremendous progress has been made towards a true recognition of their important functions and values. Nevertheless, more has to be done at all levels society to make decision makers and the public further aware of the importance of wetlands for biodiversity conservation and peoples well-being.

References

1. Abala D.O., (1984), "An empirical study of the willingness to pay for Nairobi national park."
2. Agresti, A., et al. (2000) "Random-effects modeling of categorical response data," Sociological Methodology 2000, Vol 30 27
3. Barbier B. E. (1989) "Economics, natural- resource scarcity and development: Conventional and alternative views, Earthscan, London.
4. Barbier B. E., Bockstael N., Burgess C. J. and Strand I. (1993) "The timber trade and tropical deforestation in Indonesia" London environmental economics center IIED 3 Endsleigh street, London, WC1H ODD
5. Barbier B. E., Burgess C. J. And Markandya A. (1991) "The economics of tropical deforestation. AMB10 Vol. 20 No.2 Earthscan, London.
6. Bergstrom J, Stoll J and Randall A (1989) "Information effect in contingent market" American journal of agricultural 71:685-691.
7. Busulwa H. et al (2001), "Preliminary findings of the study on buffering capacity of Uganda wetlands." In Kasamba C. and Osinde S. L. Victoria Environment management project, conference programs regional scientific conference 3rd-7th dec.2001.
8. Cheng'ole M.M.W., (1995), Valuation of forest recreation case study of Karura forest.
9. Crafter S.A., Njuguna S.G. et al (1973), "wetlands of Kenya" Samara publishing limited, tresaith, Dyfed, U.K.
10. Crafter S.A., Njuguna, S.G. and Howard, G.W. (1992) "Proceedings of a seminar on wetlands of Kenya", IUCN Switzerland.
11. Ehrlich R. P. and Ehrlich H. A. (1992) "The value of biodiversity" AMB10 Vol. 21 no.3
12. Emerton L. (1998), "Economic tools for valuing wetlands in eastern Africa". IUCN Eastern Africa regional office, Nairobi Kenya.
13. Gatahi M. and Gichuki N., (1997), "Biodiversity profile of Nakuru district and its environs", Kenya UNO/RAF/ 006/GEF-institutional support for the protection of e. African Biodiversity. National museum of Kenya July 1997.

14. Gichuki N. (2002), "Biodiversity research and monitoring in the Tana River primate national reserve (TRPNR) and its environs, Kenya".
15. Gichuki N. and Ndiritu G., (1999), "Publications on Biodiversity of wetlands ecosystems in kajiado district 1996-1999", National Museum Of Kenya.
16. Gichuki N. et al, "Assessment of wetlands resources". In Kasamba C. and Osinde S. L. Victoria environment management project, conference programme, regional scientific conference 3rd-7th Dec.2001.
17. Hanley N (1988) "Using contingent valuation to value environmental improvements" Applied Economics 20:541-549
18. Hanley N and Craig S.H. (1991) "Wilderness preservation and the Kruitlla Fisher model: The case of Scotland's Flow Country" Ecological Economics 4: 145-164.
19. Hartwick M J. "Deforestation and national accounting" Department of economics, Queen's University, Kingston, Ontario, Canada K7L 3N6.
20. Hughes R.H. and Hughes J.S. (1992), "A directory of African wetlands", IUCN, Gland, Switzerland and Cambridge U.K.
21. Karuhanga P.N.(1979), "Production functions as instruments of L. Victoria inshore fishery management"
22. Kasamba C. and Osinde S. L. Victoria, "Environment management project, conference programme, regional scientific conference 3rd-7th dec.2001".
23. Mcclanahan T.R. and Young T.P., (1996), "East African ecosystem and their conservation", Oxford university press New York.
24. Mugo D.G. (1995), "A theoretical and empirical estimation of the willingness to pay for reduction in air pollution. A case study of zimmerman estate".
25. Mungai P. M. (2001) "Wetland and dry land management". In Kasamba C. and Osinde S. L. Victoria environment management project, conference programs regional scientific conference 3rd-7th dec.2001.
26. Mwangi-wa-Githinji and Perrings C. (1993) "Social and Ecological sustainability in the use of biotic resources in sub-Saharan Africa."
27. Myers N. (1992) "Population/Environment linkages: Discontinuities ahead" AMB10 Vol. 21 No.1

28. Newson M. (1994), "Hydrology and the river environment", Oxford University, press inc. New York.
29. Ngugi W.I.(1998), "Economic impacts of marine protected areas. A case study of Mombassa park".
30. Nthenge R., (1998), "Valuation of environmental resources. A case study of the Nairobi arboretum".
31. Nyaga E.O., (1986), "An economic analysis of fresh water fishing marketing on the landing beaches of L. Victoria(Kenya)"
32. Ochola J. et al (1998), "Buffering capacity of L. Victoria wetland project". A rapid assessment of wetlands in Rio river basin (part one) organized by the national environment secretariat under the wetland management component of L. Victoria environmental management programme.
33. Okoth R. (1993). "Towards an environmentally sensitive form of pastoralism. An indicative cost-benefit analysis."
34. Okung J. and Opanga P. (2001), "Pollution loading into L. Victoria from the Kenyan catchment". In Kasamba C. and Osinde S. L. Victoria environment management project, conference programs regional scientific conference 3rd-7th dec.2001.
35. Oyieke. H., (1996), "Sessional paper, Environmental and Development. Ministry of Environment and Natural Resources (draft)"
36. Pearce W. D. (1990) " An economic approach to saving the tropical forests" London environmental economics center IIED and University college London, 3 Endsleigh street, London WC1H ODD, U.K.
37. Repetto R. and Holmes T. (1983) "The role of population in resource depletion in developing countries." Population and development review 9. No. 4
38. Sarageldon I. and Steer A. (1994), "Valuing the environment". The world bank. Washington, D.C. 20433 U.S.A.
39. Shabman, L., and K. Stephenson (2000) "Environmental valuation and its economic critics," Journal of Water Resources Planning and Management-Asce 126(6) 382-388.
40. Wagwe F.M., (1999), "Valuation of Mombassa marine park. From open access to protection. A contingent valuation approach."

41. Wells P.M. and Brandon E. K. (1993) "The principles and practice of buffer zones and local participation in biodiversity conservation." AMB10 Vol.22 No.2-3
42. Willis K and Garrod G (1991) "Landscape values: A contingent valuation approach and case study of the Yorkshire Dales National Park" Working paper 21, countryside change center, university of newcastle-upon-tyne.

MAP OF NAKURU DISTRICT SHOWING WETLAND AREAS

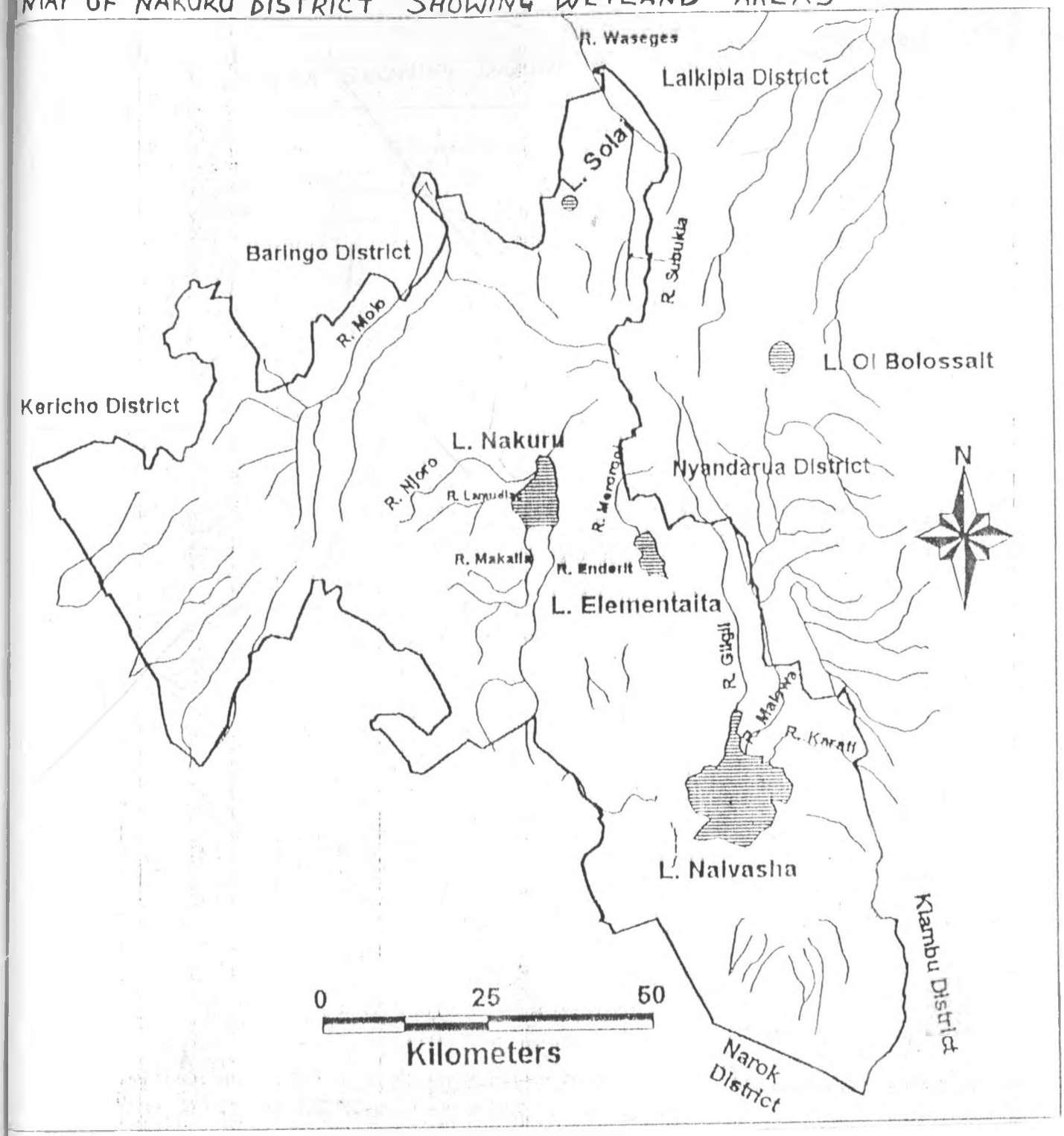
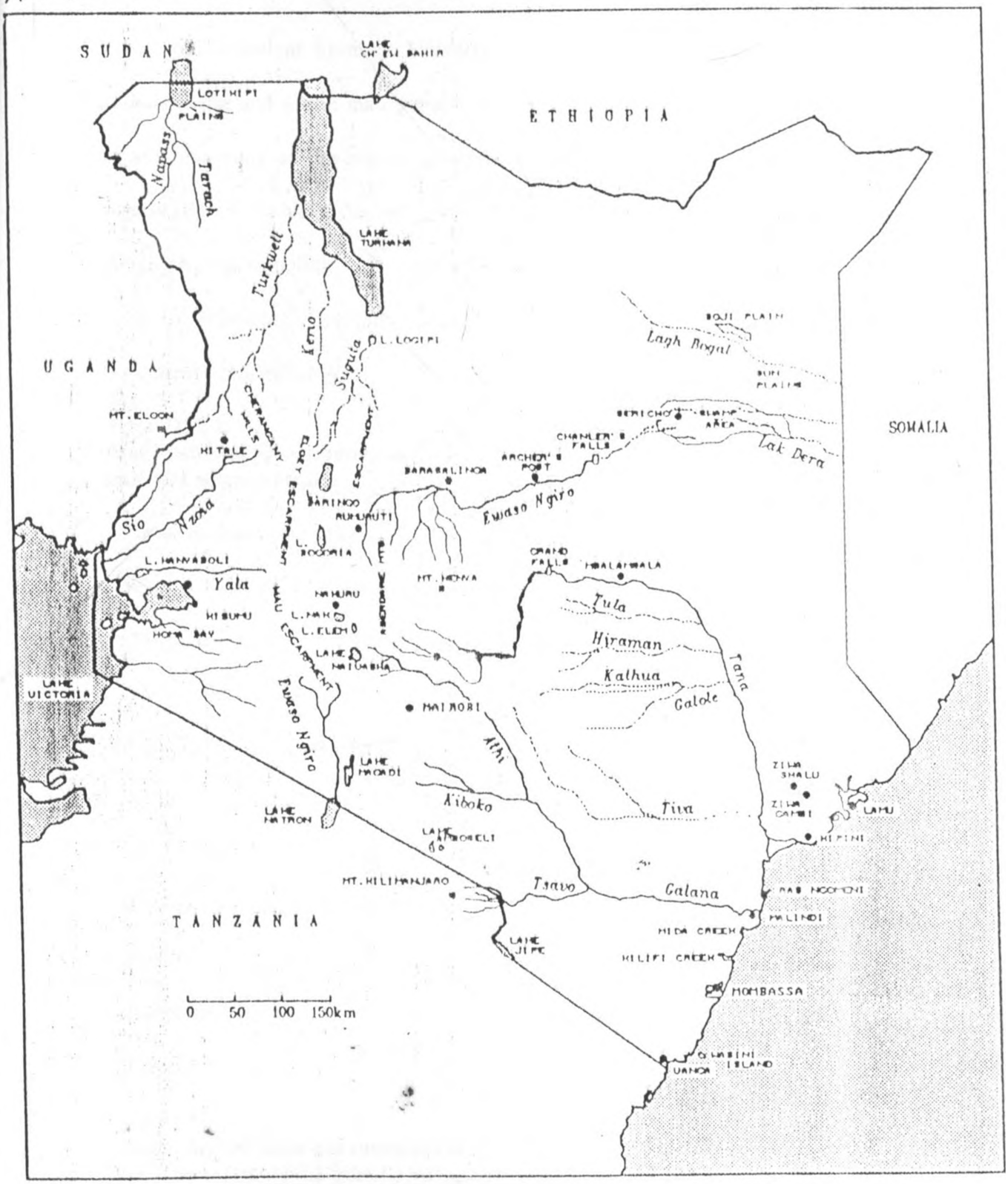


FIGURE 3

A MAP OF KENYA SHOWING DRAINAGE PATTERN (WETLANDS)



APPENDIX 3: THE QUESTIONNAIRE

Hallo, I am a student from the University of Nairobi, currently doing a research on sustainable use and sound management of wetlands in L. Naivasha. The research I am carrying out aims at developing a wetland management system that would ensure conservation of L. Naivasha and other wetlands in Kenya. You have been selected through random sampling and your readiness to spare some few minutes and voluntary answer the following questions is highly appreciated. All your answers will be treated with utmost confidentiality.

APPENDIX 1.
Social Economic Questionnaires
Please tick where possible

1. Please indicate your sex. Male [ ] Female [ ]
2. What is your age?.....
3. Do you reside around L. Naivasha? Yes [ ] No [ ]
4. Are you the household head? Yes [ ] No [ ]
5. What is the size of your family? [ ]
6. What is your occupation? ----------.
7. Please indicate your monthly income (In ksh)?.....
8. What is your education level?

   1=None [ ] 4=Tertiary [ ]

   2=Primary [ ] 5=University [ ]

   3=Secondary [ ]

Appendix B
Wetlands degradation questionnaires
9. How far is your home from L. Naivasha? ----------(In kilometers.)

10. Do you know anything about wetland loss or degradation? Yes [ ] No [ ]

11. If Yes then rank the following types of L. Naivasha degradation/depletion according to their seriousness, where 1 represents the most serious and 3 the least serious problem.

[ ] Over fishing and poor fishing practices

[ ] Factory effluents

[ ]Vegetation harvesting e.g. papyrus

[ ]Trees harvesting for firewood, fencing posts etc around the lake and in the catchment areas.

[ ] Agricultural encroachment e.g. flower growing.

[ ] Agro-chemicals

[ ] Sinking of bore-holes

[ ] Geo-thermal power station

[ ] Others specify.....

12. Which of the following benefits does your household derive from L. Naivasha and its surroundings

[ ] Income

[ ] Fish

[ ] Firewood

[ ] Fencing and building materials

[ ] Recreational facilities

[ ] Others specify.....

.....

Appendix C
Willingness to pay questionnaires

13. Do you know anything about environmental conservation program in your location (especially on wetlands) Yes [ ] No [ ]
14. If a system is introduced so that both residents and non-residents visiting L. Naivasha can contribute an annual fee to improve the condition of the lake would you participate? Yes [ ] No [ ]
15. If YES how much would you contribute at a maximum (in Kshs) per year.....
16. If No, who do you think should be responsible for ensuring wetlands conservation.

    [ ] Government [ ] Water and Environmental ministries

    [ ] Non-Governmental organizations [ ] Don't care

    [ ] Others specify.....
17. If in any case there is no L. Naivasha / or that the government decides to drain it so that water flows through Nairobi to Indian ocean, how much would you ask the government in Kshs annually as compensation for its loss.....

Respondents suggestions

18. Would you like to give suggestions towards the conservation of L. Naivasha?

[ ] Yes [ ] No

19. If YES what is your comment? ----------

Thank you for your co-operation and may God bless you.