REPUBLIC OF KENYA

NATIONAL REPORT ON ENVIRONMENTAL ANALYSIS

UNDER ENVIRONMENTAL ANALYSIS AND MANAGEMENT COMPONENT,

PILLAR D OF THE

NILE BASIN INITIATIVE SHARED VISION PROGRAMME

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ACRONYMS

ACTS	**-**	**African Centre for Technologies**
AWN	**-**	**Africa water Network**
CMS	**-**	**Convention on Migratory Species**
CBD	**-**	**Convention on Biological Diversity**
DWO	**-**	**District Water Officer**
EAC	**-**	**East African Co-operation**
ECOVIC	**-**	**East African Communities' Organization for Management of Lake Victoria Resources**
ELC	**-**	**International Environmental Liaison Centre**
GEF	**-**	**Global Environment Facility**
GoK	**-**	**Government of Kenya**
ICIPE	**-**	**International Centre for Insect Physiology and Ecology**
ICRAF	**-**	**International Centre for Research on Agriculture and Forestry**
KMFRI	**-**	**Kenya Marine Fisheries Research Institute**
KWS	**-**	**Kenya Wildlife Service**
KENGO	**-**	**Kenya Energy Non-governmental Organization**
LBDA	**-**	**Lake Basin Development Authority**
LVEMP	**-**	**Lake Victoria Environment Management Project**
MENR		**Ministry of Environment and Natural Resources**
NBI	**-**	**Nile Basin Initiative**
NEAP	**-**	**National Environment Action Plan**
NETWAS	**-**	**Network for Water and Sanitation International**
NIB	**-**	**National Irrigation Board**
MOA	**-**	**Ministry of Agriculture**
MOLA	**-**	**Ministry of Local Authorities**
MWR	**-**	**Ministry of Water Resources**
Ramsar	**-**	**Ramsar Wetlands Convention**
RDA	**-**	**Regional Development Authority**
UNDP	**-**	**United Nations Development Programme**
WHC	**-**	**World Heritage Convention**
WSD	**-**	**Water and Sewerage Department**
WWF	**-**	**World Wide Fund for Nature**

1.0 Background

Nile river basin is shared by 10 riparian countries viz: Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda. Half of these countries are among the world's ten poorest countries. Today the Basin is characterized by poverty, instability, rapid population growth, and environmental degradation. Control of Nile Waters has long been a source of dispute and potential conflict in the region. Yet the Nile also holds great potential to foster regional social and economic development through power generation, food production, transportation, trade, environmental conservation, and other related development activities. To realize this potential, the riparians have come to recognize that they must take concrete steps to address these challenges and that cooperative development holds the greatest prospect of bringing mutual benefits to the region.

The Nile riparians have taken a historic step towards cooperation in the establishment of the Nile Basin Initiative (NBI) which was formally launched in February 1999. The Initiative is a transitional institutional mechanisms that provides an agreed basin-wide framework to fight poverty and promote economic development. The NBI is guided by a shared vision **" to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin Water resources".**

The NBI is composed of the Council of Ministers of Water Affairs of the Nile Basin States (Nile-COM), a Technical Advisory Committee (Nile-TAC) and a Secretariat (Nile-SEC) located in Entebbe, Uganda. The formation of the NBI and on-going riparian dialogue is supported by the World Bank, UNDP, and CIDA.

The NBI has articulated the shared vision, established a transitional institutional mechanism, and formulated general guidelines to facilitate cooperative development in the Nile Basin. To translate the vision into action, the NBI has also initiated a Strategic Action Program, which includes two complementary components as (1) a basin-wide Shared Vision Program (SVP) and (2) Subsidiary Action Programs (SAP). The SVP will include a series of projects, such as capacity building, studies and participatory activities to be implemented basin-wide to create an enabling environment for cooperative development. In parallel, appropriate groupings of countries (two or more) will initiate SAPs to define and implement investment projects that confer mutual benefits at the sub-basin level.

The SVP encompasses the following five broad theme areas, referred to as `pillars':-

(i) Cooperative Framework (on-going UNDP sponsored D3 Project);

(ii) Confidence Building and Stakeholder involvement (Pillar C);

(iii) Socio-economic, Environmental and Sectoral Analyses (Pillar D);

(iv) Water Resources Planning and Management (Pillar E);

(v) Applied Training (Pillar F).

Pillar D addresses five components as follows:

- Efficient water use for agricultural production;
- Socio-economic/poverty diagnostic study'
- Assessment of opportunities for power trade and pooling;
- Environmental analysis and management and;
- Opportunities for integrated infrastructure development.

There is a clear recognition within the Nile Basin Initiative that the development of Nile waters must be environmentally sustainable in the long-term. This is reinforced by the fact that the Nile is widely perceived as an environmental issue of global concern. Identifying the environment and development synergies, and thus the sustainable development opportunities, will be a major task for the initiative.

The Environmental Analysis and Management component of Pillar D will contribute to developing a strategic framework for environmentally sustainable development of the Nile River Basin, improve the understanding of the relationship between water resources development and the environment in the Basin and, provide a forum to discuss development paths for the Nile with a wide range of stakeholders.

Environmental management studies and actions in the Nile Basin have thus far been largely undertaken on a national basis, and not with a trans-boundary vision. The present component will help to translate existing national environmental commitments and interest into regional and basin-wide analytical frameworks and eventually basin-wide action. It will consist of two sub-components with one output funded by the GEF and the other output funded by the USAID. The GEF resources will support the preparation of a basin-wide environment project, which will be presented to ICCONI. The USAID resources will support a trans-boundary environmental analysis which will produce a study and serve as reference for relevant information. The environmental analysis and management component of Pillar D will also co-ordinate with two other Pillars (Pillars C [confidence building and communication] and F [applied training and capacity building]).

This report identifies the specific studies and preparatory work within the Environmental Analysis and Management component of Pillar D.

2.0 Introduction

The Equatorial Nile Basin comprises the Lake Victoria sub-basin that is geographically shared by five countries Kenya included. Lake Victoria with a total area of 68,800 km^2 and a volume of 2,760 km^3, is not only the second largest freshwater lake in the world but also the largest natural body of freshwater in Africa supporting a rich biological diversity. The lake is a shared water resource between Kenya (6%), Uganda (45%) and Tanzania (49%). The Lake basin has great economic potential and is host to a growing population currently estimated at over 27 million people distributed as follows: Tanzania 5.5 million, Uganda 5.5, Kenya 11 million (about 40% of the country's total population) and another 5 million in Burundi and Rwanda catchments.

In Kenya, the Lake Victoria basin comprises Nyanza/Western provinces and parts of the Rift Valley province. The land area covered by the basin is about 49,000 km^2. The basin's main physical features include Mau escarpment, Mt. Elgon, the Uasin Gishu plateau and Lake Victoria, a major water body. The catchment area of the Lake stretches from the Mau escarpments to Mt. Elgon along the Kenya - Uganda border. The elevation varies from as low as 1134 m on the shores of Lake Victoria to as high as 2700 m in the highlands. The basin is drained by seven perennial rivers viz: Nzoia, Sio, Sondu-Miriu, Nyando, Yala, Kuja and Mara. Other smaller rivers include Awach Tende, Awach Kibon and Kibos. These rivers originate in the highlands and drain into Lake Victoria. (see Lake Victoria/Nile Basin Map 3)

According to Jaetzod et al, the basin has 22 main Agro-ecological zones with nearly five different belts including the Upper Highlands belt, Lower Highland belt and Upper Midland belt. The upper highland belt has deep, well drained soils suitable for grains (maize, wheat and barley), coffee/tea and dairy farming. The lower highland zone has soils that are mainly deep, dark, reddish brown, clay roam to clay of moderate to high fertility, suitable for tea production and dairy farming, while the lower midland zone characterised by moderate rainfall and black cotton soils, is suitable for sugar-cane, cotton, rice, groundnuts and cattle ranching.

On the shores of the Lake are numerous wetlands ranging from papyrus to rocky/sandy beaches. Yala swamp formed by the lower reaches of Yala river and the delta of Nzoia river is the major lacustrine wetland. Within this wetland is Lake Kanyaboli occupying an area of about 10.5 km^2 and being an important breeding area for fish and other aquatic fauna. There are several other small wetlands including Saiwa riverine wetland that occur in the basin especially on the Uasin Gishu plateau. While wetlands are important for fish breeding grounds, habitats for bio-diversity, water filtration, water recharge and discharge, flood control and refuge for rare and endangered species among other functions, they are constantly under threat of being reclaimed for agriculture and other land uses.

Kenya's climate is largely influenced by the movement of the inter-tropical convergence zone (ITCZ) as modified by topographic features. Annual rainfall is generally low and seasonal with the country experiencing a dry weather spell in January to March, long rains from mid-March to May and short rains from October to December. While the rest of the country receives scattered and invariably unreliable rainfall, the Lake basin has no marked dry season and generally receives high rainfall from March to September (Ranging on average from 700 mm/annum on the Southern lake-

shore to over 2000 mm/annum in the highlands). The monthly air temperature in the basin varies between 19^{o}C and 25^{o}C throughout the year, with daily temperatures fluctuating from 15^{o}C to 30^{o}C.

The original vegetation cover in the basin comprised of indigenous equatorial forest and savannah grasslands. Much of the vegetation has however been cleared to provide room for agriculture, human settlement, commercial forest plantations and other land uses. Currently therefore, Kakamega forest reserve has been reserved as a small remnant of the original equatorial forest. Other forest areas with indigenous vegetation include the South West Mau/Trans-Mara forest and the slopes of Mt. Elgon. Trans- Nzoia and the Uasin Gishu plateau form the bread basket of the nation, a fact that therefore explains the increased conversion of land from the original vegetation cover to agricultural use.

Among the five drainage basins in Kenya, Lake Victoria is the only one endowed with abundant water resources (11,993,184 m^3/d surface water and 118,622 m^3/d ground water respectively as safe yields) and other natural resources. It has immense potential in terms of water resources, fisheries, biological diversity, agriculture and hydro-power among others. Much of the potential remains untapped, a situation that perpetuates poverty in the basin. This is exemplified by the fact that only 40% of the basin is under agriculture and the rest under a mixture of peasant farming, livestock rearing and natural vegetation.

There is rapid growth of human population in the basin resulting in increased fishing, agricultural activities and livestock keeping as major economic activities. Lake Victoria is an important body of water for fishing both for commercial and subsistence purposes. Fishing involves mainly Tilapia and Nile Perch that have high economic returns. Most of the other socio-economic activities in the basin involve complete clearing of vegetation cover to give way to agriculture, agro-based industries and livestock grazing. The combined effect of these activities has been increased land degradation resulting in soil erosion and pollution of water bodies. These effects are exacerbated by inadequate soil conservation measures coupled with increase in agro-chemical application meant for enhancing crop production but whose substantial amounts unfortunately find their way into watercourses. Deposition of sediment and organic loads in the recipient watercourses and ultimately in Lake Victoria, has consequently led to degradation of water quality and eutrophication of the lake especially in the Winam Gulf, thereby creating conditions conducive to proliferation of invasive and noxious weeds including water hyacinth, water lettuce and elephant/hippo grass.

Urban centres within the basin also discharge their domestic and trade effluents into rivers and the lake. Although a few towns have either sewage stabilization ponds or conventional treatment facilities, the performance of these facilities has been hampered by overloading and/or poor operation and maintenance and therefore most towns discharge untreated or partially treated sewage directly into the lake (such towns are Kisumu, Homa Bay, Kendu Bay and Mbita) or through the feeder rivers (eg. Eldoret, Kitale, Webuye, Muhoroni, Siaya, Busia, Migori, Kisii and Bungoma). Besides sewerage systems being overloaded, the sewer coverage in these urban centres is very low posing a major contamination threat to surface and ground water resources as well as being major sources of pollution to the lake.

The main urban centres on the shores of Lake Victoria are Kisumu, Kendu Bay, Homa Bay, Siaya, Mbita and Sio Port. Others within the basin include Eldoret, Kitale, Webuye, Kakamega, Busia, Bungoma, Kericho, Kisii, Kapsabet, Muhoroni, Ahero and Migori. There are several upcoming rural market centres including Chavakali, Mbale, Oyugis, Butere, Maseno, Mumias and

Rongo that are potentially a threat to the quality of water resources in the basin unless mitigation measures are planned and implemented early enough.

Likewise, most agro-based industries in the basin have inadequate waste water treatment facilities discharging their polluting effluents ultimately into the lake, yet the lake and its feeder rivers are the principal sources of water supply for the local communities. The agro-based industries in the basin include pulp and paper factory, sugarcane processing factories, jaggeries, coffee and tea factories, and milk processing plants. Water treatment plants may be included under this category considering that the chemical sludge from the plants also discharges into water bodies. This scenario has far-reaching implications to socio-economic development, to human health and safety and; to the dynamics of the aquatic ecosystem.

In the basin, major water requirements are for urban and rural domestic consumption, livestock watering and agro-based industries, mainly sugar and coffee processing. Some irrigation is practised particularly on the Kano plains and around Yala swamp for production of rice and other subsistence food crops. There is great potential for large scale irrigation but its exploitation should be based on sound Environmental Impact Assessment (EIA) and the participation of stakeholders in planning, implementation and management. The lower reaches of the basin (the Kano plain) and the immediate vicinity of the lake including the delta area of Nzoia river (eg. Bundalang'i location of Busia district) often suffer from floods. It may be necessary to erect dams on the Nyando and Sondu-Miriu rivers to mitigate against the disastrous effects of floods on the Kano plains, enhance irrigation and to harness hydro-power. In this regard, it should be noted that there are no existing out-of-basin water diversions/transfers and that the only major dams in the basin are Moiben for urban water and the Sondu-Miriu multi-purpose dam (under construction).

3.0 Description of Natural Resources in the Lake Victoria Basin

3.1 Land Resources

Land is a physical entity that includes wetlands, rivers, lakes, rangelands, mountains, minerals and soils. The land covered by the Lake Victoria basin in Kenya is about 39,000 km^2. Like in other parts of the country, land supports flora and fauna and is the primary resource base for human activities. This land area is occupied by about 11 million people which is about 40% of the total country population. Some of the districts in the area such as Kisii and Vihiga are among the most densely populated districts in Kenya. This leads to ever-increasing pressure on land resulting in land use practices that often disregard land potential, carrying capacities, and limitations of land resources as well as their diversity and distribution. The problems of land management are further aggravated by the land tenure system and cultural norms relating to land ownership.

Given the cultural attachment to land and the rapid increase of human population, land continues to be sub-divided in some cases into units that are uneconomical and which can no longer be managed sustainably. The result has been human encroachment into forest areas, deforestation, soil erosion, reduction in the carrying capacity and degradation of environmental resources that are based on land including wetlands, water, soils, flora and fauna.

In order to redress the above situation, the GoK has initiated a review of the relevant policies

and legislation measures. Collaborative efforts between the government, other stakeholders, the local communities and the various development partners will however be necessary for any success in this exercise.

3.2 Water Resources

As indicated earlier in this report, Lake Victoria basin is relatively well endowed with abundant water resources (11,993,184 m^3/d surface water and 118,622 m^3/d ground water respectively as safe yields) and both perennial and seasonal wetland resources. The lake's position in relation to its catchment area and the river drainage systems has great economic and natural implications for the region. The potential for irrigation and hydro- power generation is vast as the high rainfall in the catchment areas ensures all-year-round flow of the rivers, whose seasonal run-off peaks result in flooding on the Kano plains and other lowlands of the lake-shore. With proper and integrated basin management these flows and floods can be effectively harnessed to enhance hydro-power, agricultural and fisheries production and; adequate water supplies to the inhabitants of the basin.

Box 1

80% of Kenya's economy is directly or indirectly dependent on natural resources. Therefore part of the earnings from exploitation of these resources should be re-invested into programs and efforts to sustainably manage the environment.

3.3 Forestry Resources

The government forests in Kenya cover 2,359,767 ha (1,662,472 ha gazetted and 697,295 ha un-gazetted) and the total woody biomass in the country is 433,330,000 ha (DRSRS 1989). Closed canopy indigenous forests including Kakamega and Mount Elgon forests, account for some 1.2 million ha. Woodlands cover over 2 million ha while the rest of the country is arid and semi-arid bushland and scrubland. About 30% of the country wood supply is in indigenous forests and industrial plantations combined. A further 40% is in the arid and semi-arid areas. However at present an average of 5,000 ha of forest land are being lost annually through excision and over-exploitation of forest resources.

Over-exploitation and illegal cutting of indigenous forest resources, is a matter of great concern. Over 80% of all households use wood fuel or other biomass fuels for their domestic needs. Roughly one third of biomass fuel consumption is in the form of charcoal. A considerable portion of wood fuel, including charcoal, still comes from indigenous forests, especially from arid and semi-arid lands. Without intervention, a deficit between supply and demand for wood fuel is projected to increase, and the imbalance is estimated to lead to a severe loss of savannah woodlands and closed canopy high forest exacerbating desertification.

In the Lake Victoria basin, natural forests and vegetation occupy about 11% of the total land area. The forest cover in the basin's highlands forms a vital component in the ecological balance, hosts substantial biological diversity and coupled with the lake's position influences the rainfall pattern in the basin. The basin has six major forest blocks comprising the Cherangani Hills, the

Kakamega Forest, the Nandi Forest, the Mau-Tinderet-Trans-Mara complex, the Ilkerin-Lolgorian complex and Mt. Elgon Forest reserve. These forest areas are major catchments for Yala, Nyando, Sondu-Miriu and Mara rivers but like other forests in the country, are however under threat of denudation and deforestation due to human activities and encroachment.

Major challenges in the management of national forests include increased pressure to change forest land to other uses, over-dependence on forests for fuel and timber resulting in unsustainable harvesting, minimal community participation in the management and conservation of forest resources due to the prevailing attitude that forests belong to the state and that community has no stake in them, and inadequate management system for both industrial and indigenous forests.

3.4 Fishery Resources

Lake Victoria basin is well endowed with fresh water resources, and its main water bodies include the Kenya portion of Lake Victoria and Lake Kanyaboli occupying 4100 km^2 and 10.5 km^2 respectively. The two bodies are augmented by major perennial rivers which drain into them. The basin therefore offers a great potential for fisheries exploitation in the lakes, the rivers and through aquaculture. Fishery resources particularly of Lake Victoria are however under ecological threat associated with the introduction of alien species (eg. the Nile Perch) for economic gains, degradation of water quality, eutrophication and aquatic weeds infestation. The tendency to do selective fishing and to over-fish in some areas is also imminent. It is necessary therefore to undertake an elaborate fisheries management for the Lake.

3.5 Wildlife Resources

Wildlife and fisheries constitute important natural resources with substantial socio-economic, cultural, scientific and environmental values. Besides terrestrial wildlife, Kenya is richly endowed with aquatic biological resources in both inland and marine waters. The rich biological diversity is attributed to the diversity of ecological zones and habitats stretching from coastal lowlands, savannah grasslands and forests to the glacier mountain tops.

The Lake Victoria basin has rich avi-fauna, the rare Sitatunga antelopes, unique land-forms and the Kakamega tropical forest with its unique species of trees, insects, birds and reptiles co-existing in a lovely ecological attraction. Besides wildlife, the basin has rich cultural diversity that can be tapped for tourism. Lake Victoria as a body of water fits in well for water sports and lake cruise while Mt. Elgon provides an added opportunity for mountain climbers. Other smaller but significant tourist attractions include Saiwa Swamp, Yala and Nabuyole falls, Kakamega aging stones, Simbi Nyaima birds sanctuary, Kit-Mikai rock water springs, Kisii soap stones and Thim Lich Ohinga historic site in Migori district. In the basin the Gok has established Saiwa, Mt. Elgon, Ndere Island and Ruma national parks, Kakamega national reserve and the impala sanctuary in Kisumu. This notwithstanding, western circuit tourism potential is yet to be fully exploited and developed.

4.0 Major Economic Activities

The country's main economic activities are agriculture, tourism, agro-based industries and fisheries, all of which are dependant on the natural resource base. Agriculture contributes about 30% of the country's gross domestic product (GDP) and employs more than 70% of the country's population. This situation is also evident in the Lake Victoria basin. According to the Integrated Regional Development Master Plan (IRDMP) the GDP growth rate for the basin was 3.6% per annum (using 1985 as the base period) and stood at K£ 970 million compared to the national GDP at K£ 4126 million with a growth rate of 3% per annum during the same period. Subsistence and modern agriculture (including fishing) contributed 62.9% of the basin's GDP, manufacturing and mining contributed 7.7% and service industry 29.4%. Assuming a constant growth rate of 3.6%, it was projected that the basin's GDP would rise to K£ 17,000 million by the year 2001.

Basin's Gross Domestic Product

YEAR	National GDP K£ million	Basin's GDP K£ million
1997	30071	1470
1998	30973	1520
1999	31902	1580
2000	32859	1640
2001	33845	1700

Source: Projection from 1998 Economic Survey/Computation from the IRDMP - LBDA

However, the performance of the overall national economy has been dismal due to various militating factors and as such, the projected growth of the GDP has not been achieved.

Besides farming, fishing is the second major activity employing a good number of people around the lake. The basin has over the last ten years contributed over 90% of the total Kenya fish landed mainly from Lake Victoria. During this period, fish production has increased from 113,452 tonnes (worth Ksh. 1.5 billion) to over 193,652 tonnes (worth Ksh. 3.6 billion in 1994). Fisheries is the main economic driving force in the districts bordering Lake Victoria especially in the immediate hinterland which receives low rainfall. Currently, fishing and its related industry including fish marketing provides employment to nearly 500,000 people in the basin and elsewhere in the country. Though fishing is still dominated by artisanal operators, fish processing and trade is gradually being taken over by large scale operators targeting export market.

Livestock rearing is an activity with significant socio-economic and environmental impacts in the Lake Victoria basin. In the upper highlands of the basin, dairy farming for milk and meat forms part of the mixed farming practised on the Uasin Gishu plateau. In the lower midland zone especially along the lake-shores and the immediate hinterland of Rachuonyo, Homa Bay, Suba and Migori districts that are characterised by moderate rainfall, cattle ranching is the main substitute to fishing. The economic gains and the cultural attachment to livestock does however lead to over-stocking and consequently to over-grazing in these areas. This scenario then forms part of the land

degradation that results in soil erosion and siltation of the lake.

Tourism, though relatively well developed in some other parts of the country, is not yet a major economic activity in the basin. The revival of the East African Cooperation (EAC) may however help to promote tourism in the basin. Through this cooperation, it is expected that Lake Victoria will form an important waterway for trade and commerce within East Africa and beyond. Because of this link, there will be increased passenger and cargo traffic across the lake exerting both positive and negative impacts on the lake and its environs.

Other economic activities in the basin include service industry, agro-industry based on sugar-cane, pulp and paper, coffee and tea processing and; to a very small extent informal mining in Masara and Macalder areas of Migori district.

5.0 Legal and Institutional Framework

Hitherto, there have been 77 sectoral statutes with pertinence to management and conservation of the environment. Analysis of these statutes has however indicated that there are various grey areas, omissions and a glaring lack of complimentary making these laws insufficient for holistic environmental management and conservation. It has also revealed that many of the laws have not been adequately enforced due to a number of reasons including poor or weak administrative structures, absence of provisions to specify standards of performance, inadequate deterrents and inadequate incentives. (see table 1). Most of these sectoral laws are being amended. The Kenyan constitution is at the time of compiling this report , also under review. It is proposed that the amended constitution will make provision for an individual's right to a healthy and clean environment.

5.1 Management of Water Resources

National water resources management is governed by the recently formulated and adopted National Policy on Water Resources Management and Development. The policy recognises and addresses four major issues viz: Water Resources Management, Water and Sewerage Development, Institutional Framework and Financing of the Water Sector. It devolves the responsibility of water resources development to the local communities and Local Authorities while the role of the government will be provision of legal and policy guidance and, supervision of the water sector activities.

The principal legislation for the management of water resources is the Water Act, (Cap. 372). The Act was last amended in 1972 and is presently under review in order to strengthen its weak areas, incorporate agreed modern water resources management principles, provide incentives and provide back-up to the water policy. Under the Water Act, all water sector activities are regulated by the minister in-charge of water affairs through the National Water Apportionment Board. The Act provides for the Director of Water Development as the chief technical advisor to the Board on all matters touching on water management including on hydrological assessment, water quality and pollution control and monitoring, planning and development.
The Water Apportionment Board has in turn delegated authority to the Catchment Water Boards that are based on the five drainage basins of the country. Following on the 1985 adoption of the District

Focus for Rural Development policy, District Water Boards have also been established as for a for management of water resources at the district level. Decisions made at the District Water Board reach the National Apportionment Board through the Catchment Boards. District Water Board forms the entry point to national water resources management, for any interested stakeholder including NGOs and CBOs.

Since Kenya has adopted the pathway of liberalised economy, the government is encouraging community management of water resources including through formation of Water Users' Associations and NGOs in the water sector. Already such NGOs as NETWAS, Care-Kenya, Plan-International and AWN have entered the sector as major stakeholders.

5.2 Management of the National Environment

For many years, the national environment has been managed as compartments that include forests, water, fisheries, wildlife, public health and museums. Co-orddination of this sectoral management has been inadequate. In this respect, GoK has in the recent past formulated the Environment and Development policy and has enacted the Environment Management and Co-ordination Act (in 1999). It is expected that the government will consequently set up the necessary institutional mechanism for holistic management of the environment.

Important NGOs in this sector include African Centre for Technologies (ACTS), Green Belt Movement and Environment Liaison Centre-Intrenational.

5.3 Management of the National Wildlife Resources

Management of the national wildlife resources including terrestrial and marine biological diversity, critical and fragile habitats such as wetlands and montane ecosystems, is a very important activity of the GoK and the country at large. The importance is not only for economic benefits accruing from tourism, but also to respond to the international obligations on conservation of natural heritage and the socio-cultural values Kenyans attach to their wildlife.

In this regard the government has ratified the relevant international and regional conventions and has enacted the Wildlife (Management and Co-ordination) Act. The Act is the principal sectoral law that is currently used to regulate conservation and utilization of wildlife resources. The enforcement of the Act is entrusted on the Director of Kenya Wildlife Service (KWS) a parastatal established under the same Act. KWS has on its part, opted to use command and control on one hand, and incentives on thr other hand to encourage community participation in the management of wildlife particularly outside the protected areas. In this case and in regard to wetlands conservation, the government has through KWS designated Lakes Nakuru and Naivasha as Ramsar Sites and has encouraged the community around Lake Naivasha to prepare and implement a management plan for the Lake's ecosystem and catchment based on the wise use principle.

While KWS manages all gazetted national parks, wildlife conservation in the game reserves is an obligation of the Local Authorities. Wildlife in the privately owned areas, is managed by private individuals as sanctuaries or game ranches but with the guidance of KWS. Major NGOs in the wildlife conservation sector include the Wildlife clubs of Kenya, IUCN, WWF, African Wildlife Fund (AWF), KWWG and the Lake Naivasha Riparian Association.

5.4 Management of National Forests

National forest reserves are managed by the Forests Department, Ministry of Environment and Natural Resources. The Department is responsible for the enforcement of the forests Act, (CAP. 385) that has been based on command and control. The Act is presently under review to make it more responsive to the modern challenges in forest management and particularly in light of the national obligations to the Convention on Biological Diversity, the Convention to Combat Desertification and the UN Framework Convention on Climate Change. Outside the forest reserves, communities are encouraged to practise agro-forestry for all its benefits including supply of wood fuel. The encouragement is based on the Forests and Agricultural Acts respectively. Major NGOS in the forest management sector include Forest Action Network (FAN), ICRAF, Kenya Energy Non-government Organization (KENGO), the Green Belt Movement and the Kipsaina Conservation Youth Group.

5.5 Management of the Urban Environment

The physical environment in urban centre is managed by the respective Local Authorities on behalf of the government. The Authorities are guided by the Local Government Act, (Cap. 265) as the main sectoral law. They however consider all other laws that are relevant to their operations such as the Water Act, the Public Health Act, the Agricultural Act and the Traffic Act. Out of this consideration, the Local Authorities formulate Municipal By-Laws to regulate activities within their jurisdiction. They are responsible for the enforcement of these By-laws.

5.6 Role of NGOs in Environment Management

The primary role of NGOs and CBOs has been that of advocacy for environment protection. They also play a pivot role in creation of public awareness through mobilizing and sensitizing local communities and supporting their active participation in natural resources management. This is largely due to their assumed direct access to the beneficiary communities.

Similar to the Uganda situation, the role of Kenyan NGOs in environment management can be summarised as follows:-

- Organizing and mobilizing members of the community to agree on common goals, objectives and targets for solving their own environmental problems for example through tree planting and neighbourhood cleansing;
- Conducting awareness campaigns on any major environmental issue
- training members of the community on ways oof dealing with existing environmental problems;
- Maintaining where possible liaison with the government on extension services and training programmes for the communities;
- Setting up tree nuseries and demostration centres for agro-forestry, energy saving stoves bee-keeping, gabion and contour making and organic farming.
- Championing advocacy of sound environmental practices and management.

Besides the institutions described above, there is currently a multiplicity of Governmental and Non-governmental institutions involved in national environment management albeit on sectoral basis. Such institutions include the Ministries of Labour (Directorate of Occupational Health and

Safety), Agriculture, Local Government, Health, Environment and Natural Resources (National Environmental secretariat, Departments of Water Development, Forest, and Fisheries), Kenya Wildlife Service, National Museums of Kenya, Regional Development Authorities and NGOs such as KENGO, ACTS, Care Kenya, Nature Kenya, Green Belt Movement, Forest Action Network, KWWG, IUCN and WWF. Others may include grassroots CBOs such as Osienala and Kipsaina Conservation Youth Group.

In addition to these institutions, it will be noted that District Development Committees (DDC) formed in response to the requirements of the District Focus for Rural Development policy, occupies a major position as a mechanism for environmental management at local level. The committees as hubs at their level for horizontal and vertical linkages.

The jurisdiction of each of above institutions whether Governmental or Non-governmental on environmental matters, is dependent on the sectoral mandate given to the institution. For instance, the Ministry of Agriculture or Local Government will be concerned with the environment only in as far as it relates or impacts on agriculture or urban development activities. Even within the Ministry of Environment and Natural Resources, departments focus mainly on their sectoral mandates and Inter-ministerial Committee on Environment (IMCE) is currently the only available multi-sectoral mechanism for dealing with cross-sectoral environmental issues. However, since the adoption of the National Environment Action Plan (NEAP) in 1994, the Government of Kenya has been addressing legal, policy and institutional issues pertinent to environment management in order to ensure proper co-ordination of all actors in national environment management. In this regard, the government has recently enacted an umbrella environmental law and will consequently be streamlining institutional arrangement.

As demonstrated by the record of international treaties Kenya is party to, the Government has firm commitment to international and regional conventions and agreements relevant particularly to environment and natural resources conservation and sustainable exploitation. In this regard, the Government of Kenya is party to the East African Community Treaty, and several international agreements including the Conventions on Bio-diversity, Wetlands, World Heritage, Migratory Species, CITES, Climate Change, Desertification, Ozone Layer Protection and the UN Law of the Sea Convention among others (see Table 7). Besides ratifying and acceding to these international instruments, the government has taken major steps to integrate in the policy and domestic laws the principles contained in the instruments such as the application of EIA in development projects and programmes, public participation in the management of the environment and polluter pays principles.

6.0 Environmental Management

As illustrated by the number of sectoral laws described above, concern for environmental planning and management has a long history in Kenya. Reference to integrate environment and economic issues was made in the country as far back as 1974. The 1974 - 1978 national development plan noted that competition and conflicts between land use interests including agriculture, tourism, ranching, wildlife management, forestry, water conservation, mining, manufacturing, human settlements and infrastructural development were growing and that there was need for greater co-ordination among the various arms of the government in order to address the

interests effectively. The subsequent five year development plan emphasised the need for environmental inputs in the national planning process, pointing out that environmental considerations pervade development decisions at every level hence the need for integration.

Box 2

Integration of development and environment is the only viable path to a sustainable future.

Excerpt from National Environment and Development Policy

Based on the fore-going observations, the Government of Kenya (GoK) through the National Environment Action Plan process has, since 1994, undertaken review and revision of various relevant sectoral laws, with a view to harmonizing, updating, strengthening and making them more focused. This on-going review has already affected the Physical Planning Act, the Water Act, the Forest Act, the Wildlife (Management and Conservation) Act, the Factories Act and the Fisheries Act. In the same vein and in an effort to address the grey areas in order to ensure holistic national environment protection, conservation and management, the GoK has recently enacted the Environment Management and Co-ordination Act (Act No.8 of 1999) to be an umbrella law transcending sectoral laws in the national environment management. The Act is not only to be a milestone in national environmental management but is expected to set in motion harmonisation of the existing sectoral laws and institutions on matters of the environment. In this regard, the government will undertake institutional review to determine the most effective institutional arrangement for implementation of the environment policy and enforcement of the related environmental laws in light of the liberalised economy.

The government has in addition formulated and adopted relevant policies to guide national development and natural resources exploitation and management. In this connection therefore, policy guidelines have been made available in the area of Agriculture, Industrialization, Forest management, Water Resources Management and Development, Wildlife Management and; Environment and Development. National Guidelines have also been drawn for undertaking Environmental Impact Assessment (EIA) for all major development programmes/projects that are likely to have significant impacts on the physical as well as the human environment.

Consequently, to the ratification of Convention on Biological Diversity (CBD) and the Convention to Combat Desertification (CCD) the government has recently prepared a National Bio-diversity Strategy document as a blueprint in the management of biological resources and a National Action Plan to combat desertification and mitigate effects of drought.
Wetlands policy is also being formulated among others in order to give direction on conservation and wise use of wetland resources. This follows Kenya's ratification of the Ramsar Wetlands Convention and designation of Lakes Nakuru and Naivasha as Ramsar Sites.

In relation to the Nile Basin, it is necessary to note that Kenya is actively participating along with Tanzania and Uganda in the activities of Lake Victoria Environment Management Project and

has actively been involved in the treaty making for the East African Community. The treaty recognizes environmental management as a key to the success of the community and has some of its articles therefore devoted to management of environmental resources at national as well as trans-boundary level. It is along such considerations that member countries of the East African Community have initiated joint cross Border Bio-diversity Conservation Project in addition to the management of the Lake Victoria basin environmental resources.

7.0 Protected Areas of Kenya

Protected areas in Kenya comprise Forests, National Parks, Game reserves, Mountainous areas and Marine Parks. These areas are well designated and delineated for protection either under the Forests Act Cap 385, or under the Wildlife Conservation and Management Act, Cap 376 of the Laws of Kenya.

The Forest Department is the principal institution charged with conservation and management of the national forests and forest products. Other major sector players include Kenya Forestry Research Institute, the Permanent Presidential Commission on Soil and Afforestation, Local Authorities, National (Regional) Development Authorities, NGOs and the private sector. Conservation, management and utilisation of forests and forest products is governed by the Forest Act (Cap 385) as a principal legislation. Other relevant sectoral laws include the Timber Act (Cap 386), the Plant Protection Act (Cap 324), the Agriculture Act (Cap 318) and the Seed and Plant Varieties Act (Cap 326).

Protected forest areas include:

a) Forest reserves managed by the Forest Department for their wood and other forest products as well as water catchment areas,

b) Nature reserves usually within forest reserves, in which no extraction of forest products is allowed,

c) Forest areas within national parks and national reserves,

d) National monuments, including the small Kaya forest at the coast, protected for its cultural and biological values,

e) Forests managed by the county councils particularly in the arid and semi-arid areas

(See Map 1: Kenya- Forest Reserves)

Areas protected for their wildlife resources are designated as National/Marine Parks, Game reserves, and Game sanctuaries. Kenya Wildlife Service is the principal government institution legally mandated to conserve and manage wildlife in the country. It manages the national/marine parks and regulates activities in the game reserves that are otherwise managed by the county councils. KWS also supervises the management of game sanctuaries that are run by the private sector.

About 8% of Kenya,s land area has been set aside for wildlife conservation in accordance with the national wildlife policy (as contained in the Sessional Paper No. 3 of 1975 and modified by the Kenya Wildlife Service Policy Framework Paper 1991 - 1996) and the government's desire to conserve and promote sustainable wildlife use for socio-economic, scientific and cultural development including through tourism. The objective is to conserve the natural environments including their fauna and flora, to use wildlife resources sustainably for national economic development and for the benefit of local communities living in wildlife dispersal areas and; to protect people and their property from injury or damage from wildlife. (See Map 2 Kenya- National Parks and National Reserves and, table 2)

8.0 Environmental Issues

Water pollution in developing countries worsened in the 20th century as industrialisation and urbanization, accompanied by poor waste treatment practises, have strained water resources and sanitation services. Deforestation and the destruction of natural filters such as wetland areas are identified as important causes of increased sediments and nutrients in water.

As indicated earlier, agriculture is the mainstay of Kenya's economy and is practised generally throughout the country. In the Lake Victoria basin, agriculture involves putting large areas of land under mono-crop either sugar-cane, tea or coffee. It also involves small scale mixed farming for food production to support the growing human population. Irrespective of the extent of land involved, the practice has caused deforestation and removal of vegetation cover and; application of huge quantities of agro-chemicals (fertilisers and pesticides). The remaining marginal areas are susceptible to overgrazing by livestock. The combined effect of these activities and poor land management practices have led to soil erosion reducing land fertility, calling for application of more agro-chemicals and increasing incidence of flooding and the speed of surface run-offs that cause siltation and nutrient loads in rivers draining into Lake Victoria. This has caused degradation of water resources paving way to eutrophication of the lake and the concomitant proliferation of aquatic weeds including water hyacinth, elephant grass and algal blooms. Spread of the aquatic weeds subsequently impairs the natural balance of the aquatic ecosystem and; impacts negatively on socio-economic activities in and around the lake including fishing, navigation, hydro-power generation, water supply, tourism and recreation.

Besides the agricultural effects on water quality, the rapid growth of urban centres without commensurate growth of the necessary infrastructural facilities has also contributed towards degradation of water resources in the basin through discharge of raw or poorly treated domestic sewage, trade effluents and polluted storm-water. The main urban centres in the basin include Kisumu, Eldoret, Kitale, Webuye, Kakamega, Busia, Bungoma, Kericho, Kisii, Kendu Bay, Homa Bay, Siaya, Mbita, Kapsabet, Ahero, Muhoroni, Migori and Sio Port. Many of the centres have overloaded sewerage systems while others have none. Because of the low sewer coverage in the major urban centres such as Kisumu (about 40% coverage), Eldoret, Bungoma and Kisii, and given the high water-table in most of these areas, raw sewage from the un-sewered peri-urban and slum areas threatens to contaminate ground-water resources. Overflowing pit-latrines and septic tanks plus the polluted storm-water also pollute the lake and its feeder rivers. This phenomenon has often

led to incidence of water borne diseases in the low parts of the lake basin.

Box 3

Water is life. Yet this precious resource is widely mismanaged. Unless we change our ways of managing water we will face serious crises in the future. Consequently, competing claims to water between users within countries and between countries will have to be managed in a cooperative rather than confrontational fashion.

Ismail Serageldin, Chairman, Global Water Partnership

As earlier indicated, overgrazing is also contributing to soil erosion and organic pollution to water resources. Likewise, most agro-based industries (sugar, paper, textile and coffee factories) in the basin have inadequate waste water treatment facilities and hence they discharge their polluting effluents into watercourses and ultimately into Lake Victoria.

Wetlands that could buffer the watercourses and the lake from the effects of silt and nutrients through filtration and retention are, on the other hand, under threat from encroachment/reclamation and degradation. It is important to appreciate the role of these ecosystems in the hydrosphere/biosphere and hence subject any land use practices that may cause their alteration to Environmental Impact Assessment (EIA) in order to determine their wise use and prevent loss of their resources. Since information on wetlands in the Lake Basin is not fully documented, there is need to survey, identify and conduct an inventory of all important wetlands in the basin.

Other environmental issues brought out by the consultative process include:

(i) **Eutrophication and Weeds invasion of Lake Victoria**
There is need to urgently address eutrophication and the invasion of Lake Victoria by alien plant species, the noxious water weeds;

(ii) **Impacts of Agro-chemical on Water Resources**
Monitoring and research on the impacts of agro-chemical usage on the aquatic environment is necessary. It is understood that LVEMP is looking into this issue along with several others that include the development of Lake Victoria water quality and physical process modelling, study on quantitative and qualitative urban run-offs within the Lake Victoria basin, characterization of sediments and sedimentation rate, establishment of pollution loading into the lake, pilot scale project on wetland use for industrial and municipal liquid waste/effluent treatment and limnological studies of the lake;

(iii) **Infrastructural Development**
Need for improved infrastructural development given the deplorable state of the infrastructure in the basin. This should include water supplies, sewerage systems, irrigation and drainage systems, communication network and human settlement especially in the urban centres;

(iv) **Rural Water and Sanitation**

Need to promote appropriate rural water supply and sanitation including through creation of public awareness and technological innovations such as the ecological sanitation (Arboloo) being experimented on by Sida in Nyanza province;

(v) **Un-planned Settlements**

Need to urgently address mushrooming un-planned settlements particularly in urban centres through community/donors involvement, slowing rural - urban migration and through effective enforcement of the relevant laws;

(vi) **Land Use Changes**

Need for proper integration of natural resources management with land use. In this regard and in light of the newly formulated Environment and Development policy and the new environmental law, it will be necessary to involve monitoring of land use changes in the Lake basin and, by extension, in the entire Nile basin including through use of biological indicators;

(vii) **Institutional Capacity**

Need to assess and strengthen the capacity of professional institutions within the Nile equatorial basin such as public institutions, universities and NGOs involved in environmental management;

(viii) **Conflict between development and conservation**

Need to address the potential conflict between enhancing food security and development on one hand and maintaining ecological integrity of the Nile basin;

(ix) **Environmental Awareness**

Need to create the necessary awareness on environmental management and influence positive change of attitude particularly of the local communities;

(x) **Solid-waste and Refuse Disposal**

Need to institute adequate measures to address solid-waste and refuse disposal especially in the urban centres within the basin. In this case, urban centres are environmental `hotspots' with regard to pollution of water resources through discharge of untreated sewage, polluted storm-water and haphazard dumping of refuse, industrial wastes and such others as the infectious hospital wastes;

(xi) **Environmental Information**

Need to improve accessibility to environmental information and create enabling environment for environmental networking;

(xii) **Oil Spill**

Need for planning contingency measures for potential oil spills in light of the expected increase of waterway transport in Lake Victoria. It will also be important to improve and expand port facilities to cope with the general waste likely to be generated on-board the boats and the steamers that ply the Lake;

(xiii) **Flooding**

Need for planning contingency measures to deal with the occasional flooding on the lowlands adjacent to lake-shores.

Given the above scenario and understanding that Kenya is a country that suffers chronic water scarcity (*Marlin Falkenmark*) the government and the communities living in the basin have a major challenge to properly manage and safeguard the available water resources.

9.0 Recent, Current and Planned Initiatives

The following are some of the initiatives taken by the government, donors and the NGOs in the Lake Victoria basin. (see table 4 for more information).

9.1 Lake Victoria Environment Management Project (LVEMP)

This is a regional environmental management project involving Kenya, Tanzania and Uganda. The major objective of the project is to restore a healthy, varied lake ecosystem that is inherently stable and that can support, in a sustainable way, the many human activities in the catchment and in the lake itself. The project is based on an ecosystem approach to environmental management. The project implementation is through a multi-disciplinary team of experts drawn from all the three East African countries. It is funded by IDA and GEF grant through the World Bank to the tune of US$ 77.6 million, out of which Kenya receives US$ 26.919 million over a period of five years. The project activities involve information-gathering, capacity-building and actions to deal with the environmental problems of the lake and its catchment, water hyacinth control, improving water quality and land use management including wetlands. The central concern is to reduce the flow of nutrients and pollutants into the lake and reverse some of the adverse environmental developments of the past.

9.2 Lake Victoria Developmment Initiative

This initiative is being prepared by Sida in partnership with the East African Cooperation and is among major initiatives planned for the Lake Victoria basin. The Initiative aim is to support developments towards equitable and sustainable economic and social development to the benefit of the people living in the basin.

9.3 Lake Victoria Fisheries Organization (LVFO)

This is a regional organization with membership drawn from the governments of Kenya, Uganda and Tanzania. The organization has its headquarters in Jinja, Uganda. Its objectives include promotion and management of fishery resources of Lake Victoria, ensuring sustainable exploitation of these resources, ensuring that fishery resources are

obtained from a healthy environment and that fish handling, packaging and marketing conforms with the laid down health standards.

9.4 Lake Victoria Water Resources Project

This project was implemented between 1996 and 1999 by the Ministry of Water Resources with funds from FAO. Its objective was to carry out quantitative assessment of water resources in the Lake Victoria basin. At the end of the project, a hydrological data-base and a few river gauging stations (RGS) were established mainly in western province. More effort may be required in rehabilitation and establishing of more RGS for adequate data gathering necessary for planning and management of water resources in the basin.

9.5 KEFINCO Water Project

This is a joint project between the Governments of Kenya and Finland whose aim was development of rural water supply. The project developed several shallow wells mainly in western province and Siaya district. It is based on cost-sharing approach between the government and the communities.

9.6 Lake Basin Development Authority (LBDA)

This is a National (Regional) Development Authority established by the GOK through an Act of Parliament in 1979. LBDA is charged with the responsibility of planning and implementing socio-economic development in the Kenyan part of the Lake Victoria Basin. Programmes of the Authority are expected to take into consideration among other things, the natural resources available in the region and the best way to mobilize them for the purpose of economic development. The Authority has since 1983 prepared development plans for the region. It is currently implementing the third five year development plan (1997-20001) as an off-shoot of the Eighth National Development Plan. The regional plan is driven by the need to alleviate poverty and unemployment through an integrated approach. Its main objectives include, to harness hydroelectric power and increase irrigation on the agricultural land in the Lake Basin. This is meant to contribute towards the planned national industrial transformation. Under the Social Dimensions of Development (SDD), the Authority will also contribute towards national efforts on the control of HIV/AIDS.

9.7 Sida Rural Water and Sanitation Programme

Besides the initiatives described above, Sida has on-going community-based programmes for rural water supply and sanitation in Nyanza province. There has also been in the recent past, a Dutch rural water supply programme implemented in Kisii, Nyamira and Rachuonyo districts.

9.8 National Action Program (NAP).

Since signing the Convention to Combat Desertification and Mitigate the Effects of Drought (CCD) in 1994, Kenya Government has taken various steps towards implementing the provisions of the convention. Among the efforts is the preparation of NAP as an implementation tool for the convention. The three phased NAP has been prepared by Government of Kenya (GoK) with the support given by UNDP/UNSO. It is a nation-wide plan based on the understanding that desertification is a major environmental, developmental and socio-economic challenge affecting about 80% of Kenya's land area. About 8-10 million people residing in the arid and semi-arid areas suffer from widespread acute poverty and other adverse effects of drought. NAP has therefore been prepared as an important intervention program for anti-desertification.

The long-term objectives of the program is to achieve sustainable development particularly in the drylands of Kenya through clearly marked strategies for:-

- poverty alleviation;
- food security and;
- environmental conservation

Priority actions of this plan include strengthening institutional and legal framework, capacity building for institutional cooperation, and support to communities in their local area development and anti-desertification initiatives.

Other initiatives include national response to Climate Change and the Ozone layer protection programmes.

9.9 ECOVIC

This is a regional forum of NGOs and CBOs formed in December 1998 and registered as an international NGO with its headquarters in Mwanza, Tanzania, a regional coordination office in Kampala and national chapters which represent Kenya (through such NGOs as Osienala), Uganda and Tanzania. It is an initiative by East African NGOs arising from their concern on the deteriorating environmental conditions of Lake Victoria basin which is a shared resource.

The objectives of the forum include to:

(i) promote and coordinate community based activities for sustainable utilization of Lake Victoria resources so as to alleviate poverty in the region;

(ii) liase with the governments of the region to promote community participation in the management of the Lake Victoria resources;

(iii) sensitize communities and promote environmental restoration

programmes in the Lake Victoria basin.

The activities of the ECOVIC will comprise drawing up a Community Action Plan, community mobilization for action towards conservation of the lake basin and promotion of environmentally friendly resource use particularly with regard to fishing and wetland resources utilization. The forum is however still at its infancy stages.

10.0 Opportunities

Arising from the myriad of the environmental and socio-economic issues identified in the Lake Victoria basin, and given that poverty alleviation is the noble driving force of the Nile Basin Initiative, the national consultations flagged out the following opportunities within the basin:

10.1 Infrastructural development to enhance tourism, commerce and industrial development among others in the region;

10.2 Improvement on land use, accessibility to alternative livelihoods and credit facilities that would lead to alleviation of poverty;

10.3 Increased exploitation of the irrigation potential in the lowlands (Kano plains, Nyakach area and Nzoia delta area) to address food security;

10.4 Development of horticulture and floriculture for local and export market;

10.5 Development of multi-purpose dams to enhance water supply, irrigation and hydro-power generation. Currently a run-on-the-river dam is under implementation on Sondu-Miriu river primarily for hydro-power generation. Other proposed dams are Magwagwa on Sondu-Miriu, Nyando and Yala rivers;

10.6 Improvement of navigation in Lake Victoria through rehabilitation of navigation aids and mapping;

10.7 Promotion of rural and urban sanitation including industrial waste management to curb water pollution;

10.8 Rehabilitation of Lake Victoria catchment area leading to improvement of the general environment and water quality;

10.9 Management and control of water weeds in order to make good use of Lake Victoria resources;

10.10 Development of fishery resources for subsistence and income earning in the basin;

10.11 Development of environmental information infrastructure within the basin;

10.12 Promotion of joint research and development on common trans-boundary environmental issues;

10.13 Creation of political goodwill and integration within the basin;

10.14 Professional and institutional linkages in addressing trans-boundary environmental issues and networking through such fora as ECOVIC.

11.0 Priority Actions

Following on the identified environmental issues and opportunities in the lake basin and; taking into account the activities of the on-going Lake Victoria Environment Management Project, the following emerged from the national consultations as the priority actions that should be taken in the Nile basin area:

11.1 Control of Water Pollution

Water quality degradation as a result of pollution from point and non-point sources including urban surface run-offs is imminent (particularly in the Winam gulf) and without its control, the lake will continue to suffer from eutrophication and aquatic weeds infestation. Urgent measures are hence required to address both point and non-point sources of pollution. Measures targeting major municipalities such as Kisumu, Eldoret and Kitale, should borrow a leaf from the Sustainable Cities Programme (SCP) of UNCHS (Habitat).

Assessment of pollution loads in the basin has been initiated under the LVEMP and should be followed with implementation of pollution abatement measures. This may require enhancing the capacity of the institutions dealing with environment management and enforcement of environmental laws. It may also require creating the necessary level of community awareness in order to improve community participation in environmental conservation.

11.2 Control of Water Hyacinth and Other Aquatic Weeds

Arising from the increasing levels of eutrophication particularly in the shallow water areas of Lake Victoria, invasion of water hyacinth and other water weeds continue to increase, impacting negatively on the ecological balance of the lake and the socio-economic activities. Urgent control measures are therefore required to address this problem. An integrated basin-wide approach (comprising mechanical/biological control of the weeds and; catchment rehabilitation to reduce silt and nutrients flow) may be a necessary option. In this regard, the activities of the on-going LVEMP are a step in the right direction and more stakeholder involvement including through local NGOs and CBOs need to be explored and encouraged.

11.3 Urban Water Supply and Sewerage Development

Urban water supply within the lake basin is by and large inadequate. This causes inhabitants of these urban centres to seek alternative water sources to meet their domestic water demands. Unfortunately, water from most of these sources is contaminated and spreads water-borne diseases. It is necessary, therefore, to expand water supply systems particularly in the major urban centres of Kisumu, Eldoret, Kisii and Kitale.

As earlier indicated, the state of sewerage systems in the lake basin is deplorable and most of the urban centres are therefore discharging their raw/partially treated sewage and industrial effluents into the lake. The LVEMP has a component for a pilot scale municipal and industrial effluent treatment. In Kenya, this component targets to improve the sewerage system for Kisumu municipal council and apply a constructed wetland for tertiary effluent treatment at Pan African Paper Mills, Webuye. This will leave many other urban centres, particularly along the lake-shores, still discharging untreated sewage into the lake. Such urban centres that require comprehensive sewerage systems include Homa Bay, Kendu Bay, Siaya, and Mbita. Others that affect the lake through feeder rivers are Eldoret, Kitale, Webuye, Muhoroni, Migori, Kericho, Kisii and Bungoma. These centres will require appropriate attention in order to curb discharge of untreated sewage into the lake.

Efforts should also be made to increase sewer coverage in the urban centres already served with sewerage systems.

11.4 Rural Water Supply and Sanitation

As the case with urban centres, rural water supply and sanitation in the lake basin is still very low. It is imperative therefore that in order to improve the living standards of the inhabitants and alleviate poverty, elaborate measures should be put in place to increase safe rural water supply and improve sanitation. This is one of the areas where concerted efforts from the Government, NGOs and Development Partners/Donors are urgently required. It is therefore noteworthy to recognise the efforts currently being put in the basin by institutions such as Sida and Care Kenya among other development agencies.

11.5 Land, Agro-chemicals and Solid-waste Management

Current land use practices, over-application in some areas of agro-chemicals and inadequate/lack of solid-waste management have contributed to the current degradation of water resources in the lake basin. In this case any catchment rehabilitation activities on-going or proposed should take into account these issues and address them effectively.

11.6 Other Infrastructural Developments

Rehabilitation and improvement of road network damaged by the 1997 El`Nino weather phenomenon will be necessary in order to ease transport of goods and movement of people in and out of the basin. However the road infrastructure should be planned taking into account the need to conserve the environment, in particular water resources.

The GoK has initiated a country-wide roads rehabilitation programme. Other communication facilities including telephone will also require to be improved and coverage expanded.

11.7 Planning and Development of multi-purpose dams

Recognising the potential the basin has for irrigation and hydro-power development, and taking into account the prevailing poverty, there is urgent need to plan and develop multi-purpose dams on major rivers where feasible in order to control flood related devastations, improve domestic and industrial water supply, harness hydro-power and promote irrigation. In this connection, GoK has initiated action on Sondu-Miriu river.

11.8 Improvement of navigation in Lake Victoria

Safety of navigation in Lake Victoria should be ensured considering that waterway transport using the lake is bound to increase as the volume of trade in the lake region increases. Rehabilitation of navigation aids and mapping of the lake will be necessary.

11.9 Enhancing Environmental Awareness

Though the LVEMP has a capacity building component, it is desirable that more effort be geared towards empowering institutions and communities in the basin to effectively participate in environmental planning and management. This empowerment will be achieved among other ways by enhancing environmental awareness through appropriate information flow and exchange.

11.10 Development of Fishery Resources

Since fishery is a major resource in Lake Victoria, it will be incumbent upon the governments and communities in the region to develop and protect it. It will also be important to ensure that fishing is conducted in a sustainable manner and fish handled within acceptable health standards in order to maintain good market. This activity has already been initiated under the auspices of the Lake Victoria Fisheries Organization.

12.0 Stakeholder Analysis and Consultation Process

The consultations for the environmental analysis were done with stake-holder institutions that are directly or indirectly involved in environmental conservation and water resources management and use. Academic institutions involved in capacity building on environmental management were also consulted with. In this connection, consultations were conducted with governmental, academic as well as NGO and CBO institutions in the Lake Basin. Similarly views of institutions based in Nairobi and involved in planning, development and management of water resources and; the management of the environment in general were gathered through a one day workshop. Time and resources for consultations were however limited, reducing the number of institutions that could otherwise be consulted with. Fortunately, substantial information was obtained through review of the various documents and national reports.

Key stakeholders on environment and water resources management include:-

a) Government Ministries responsible for Environment and Natural Resources, Health, Local Authorities, Agriculture and Rural Development, Transport and Communication, Tourism and Trade;

b) National regional development authorities and parastatals including the Lake Basin Development Authority (LBDA);

c) CBOs, Local and International NGOs dealing with natural resources, environment management, water supply and sanitation such as WWF, ICIPE, IUCN, ECOVIC, NETWAS, Osienala, Care Kenya, Nature Kenya, ACTS, KENGO, Plan-International, ELC-International, ICRAF and AWN;

d) Academic institutions involved in capacity building on research work on the environment and water resources management such as Moi University, Maseno University College, University of Nairobi and Kenyatta University;

e) Development Partners/Donors with projects and programmes, on-going or proposed, in the Lake Victoria basin such as Sida, the Dutch, JICA, UNICEF and UNDP.

Within the time allocated for the national consultations, the following institutions were consulted with:

(i) ICIPE - Mbita Point Station;

(ii) Maseno University College;

(iii) Moi University;

(iv) Kisumu Municipal Council;

(v) Osienala, Kisumu;

(vi) KMFRI - Kisumu;

(vii) Care Kenya - Kisumu;

(viii) WWF-Project Saiwa (Kitale);

(ix) KWS;

(x) Kipsaina Youth Conservation Group;

(xi) Ministry of Environment and Natural Resources

(xii) LBDA;

(xiii) LVEMP;

(xiv) Pan-African Paper Mills.

The following institutions were further consulted through their participation in a one day workshop:

(i) Water Development Department
Ministry of Environment and Natural Resources

(ii) National Environment Secretariat
Ministry of Environment and Natural Resources

(iii) Forest Department
Ministry of Environment and Natural Resources

(iv) National Museums of Kenya

(v) Wetlands Programme
Kenya Wildlife Service

(vi) Kenya Water Institute

(vii) Ministry of Local Authorities

(ix) Ministry of Finance and Planning

(x) IUCN - East African Regional Office

(ix) Kenya Association of Manufacturers(KAM)

(x) Department of Civil Engineering
University of Nairobi (UON)

(xi) Africa Water Network

(xii) East African Cross-Border Biodiversity Project

(xiii) Lake Victoria Environment Management Project

(xiv) World Wide Fund for Nature

(xv) National Water Conservation and Pipeline Corporation

(xvi) Ministry of Health

(xvii) NETWAS

(xviii) Irrigation and Drainage Branch
Ministry of Agriculture and Rural Development

(xix) National Irrigation Board(NIB)

The consultative process also took advantage of the extensive stakeholder consultation conducted during the drawing up of the NEAP, the National Environment and Development Policy and; the National Biological Diversity Strategy among other reference documents.

Table 1: **Major National Laws Relevant to Environment and Natural Resources Management in Kenya.**

	Laws and Regulations	**Government Agency Concerned**
1	Water Act Cap 372, Rev. 1972	Water Development Department
2	Agriculture Act Cap 318	Ministry of Agriculture
3	Local Government Act Cap 265	Ministry of Local Government
4	Public Health Act Cap 242	Ministry of Health
5	Forests Act Cap 385	Forest Department, Presidential Commission on Soil Conservation and Afforestation

6	Factories and Other Places of Work Act Cap 514, Rev. 1972	Ministry of Labour
7	Radiation Protection Act Cap 243	Ministry of Health
8	Fisheries Act No 5 of 1989	Fisheries Department
9	Wildlife Act Cap 376	Kenya Wildlife Service
10	National Museums Act Cap 215	National Museums of Kenya
11	Environment (Management and Co-ordination) Act No. 8 of 1999 [2]	Ministry of Environment and Natural Resources
12	Regional Dev. Authorities Acts[1]	Respective Regional Dev. Authorities
13	Kenya Bureau of Standards Act Cap 496	Kenya Bureau of Standards
14	Mining Act Cap 306	Mines and Geology Department
15	Suppression of Noxious Weeds Act Cap 325	Ministry of Agriculture
16	Pest Control Products Act Cap 346	Pest Control Products Board
17	Land Control Act Cap 302	Ministry of Lands
18	Land Acquisition Act Cap 295	Ministry of Lands
19	Government Lands Act Cap 280	Ministry of Lands
20	Land Planning Act Cap 303	Ministry of Lands
21	Malaria Prevention Act Cap 246	Ministry of Health
22	Irrigation Act Cap 347	National Irrigation Board
23	National Water Conservation and Pipeline Corporation Act	National Water Conservation and Pipeline Corporation
24	Rivers Authorities Act Cap 443	Ministry of Agriculture
25	Lakes and Rivers Act Cap 409	Ministry of Agriculture
26	Chief's Authority Act Cap 128	Local Administration
27	Antiques and Monuments Act Cap 215	National Museums of Kenya
28	Town Planning Act Cap 134	Ministry of Local Government
29	Merchants Shipping Act Cap 389	Ministry of Transport and Communication
30	Maritime Zones Act Cap 371	Ministry of Transport and Communication
31	Seed and Plant Varieties Act (Cap 326)	Ministry of Agriculture

32	Plant Protection Act (Cap 324)	Ministry of Agriculture
33	Traffic Act Cap 403	Ministry of transport and the Kenya Police

[1] These are Acts of parliament giving mandate to Regional Development Authorities (eg. Lake Basin Dev. Authority)

[2] Bill was recently enacted

Table 2: **Protected Areas of Kenya (National Parks)**

Protected area	**Size km^2**	**Year declared**	**Major habitats & species**	**Impacts & conflicts**	**Management**	**Global recognition**
Saiwa Swamp N. Park**	2.5	1974	Wetland crested crane and rare Sitatunga Antelopes	Reclamation/Overexploitation of wetland resourceshuman/wildlife conflict	Conservation by Governmentas a park	WHC,CBD and Ramsar
Lake Nakuru N. Park	118	1986	Wetland, Waterfowlespecially flamingoes	Human/wildlife conflict	Conservation by Government as a park	Ramsar,CMS and CBD
Lake Naivasha	150	1995	Wetland, waterfowls other flora and fauna	Water use and human/wildlife conflict	Government/Community via mgt plan	Ramsar,CMS and CBD
Amboseli N.park	392	1974	Savannah, grazers, browsers and predators	Human/wildlife conflict	Conservation by Government with community participation in dispersal areas	CBD, CITES & WHC as Biosphere reserve
Tsavo N. Park	20812	1948	Savannah, grazers, browsers and predators	Human/wildlife conflict	Conservation by Government	CBD, CITES & WHC
Aberdare N. Park	766	1950	Montane, browsers	Human/wildlife conflict	Conservation by Government	CBD, CITES & WHC
Mt.Kenya N. Park	715	1949	Montane, Browsers	Human/wildlife conflict	Conservation by Government	CBD, CITES & WHC as Biosphere reserve
Meru	870	1966	Forest &Savannahgrazers, Browsers and predators	Human/wildlife conflict	Conservation by Government and county council	CBD, CMS, CITES & WHC
Ruma N. Park**	120	1983	Savannah, grazers especially rare Roan antelopes,browsers	Human/wildlife conflict	Conservation by the Government	CBD, CITES
Mt.Elgon N.Park**	169	1968	Montane, browsers	Human/wildlife conflict	Conservation by Government	CBD, CITES & WHC
Ndere Island N.Park**	42	1986	Wetland, Grasslandfish reptiles, grazers and predators	Human/wildlife conflict	Conservation by Government	CBD,CMS & WHC
Hell's Gate N. Park	68	1984	Savannah, grazers, browsers and predators	Human/wildlife conflict	Conservation by Government	CMS & CBD
Nairobi N. Park	117	1946	Savannah, grazers and predators	Human/wildlife conflict	Conservation by Government	CBD & WHC
Malka Mari N. Park	876	1989	Desert & Savannah	Human/wildlife	Conservation by	CBD, CMS & CITES

				conflict	Government	
Samburu N. Park	165	1938	Savannah, grazers, browsers& predators	Human/wildlife conflict	Conservation by Government	CBD & WHC
Malindi Marine Park	6	1968	Marine,endangered turtles, Dugong & others	Human overexploitation	Conservation by Government	CBD, CMS CITES
Watamu Marine Park	10	1968	Marine,endangered turtles, Dugongs & others	Human overexploitation	Conservation by Government	CBD, CMS CITES
Mombasa Marine Park	10	1986	Marine,endangered turtles, Dugongs & others	Human overexploitation	Conservation by Government	CBD, CMS CITES
Kisite Marine Park	28	1978	Marine,endangered turtles, dugongs & others	Human overexploitation	Conservation by Government	CBD, CMS CITES

** National Parks within the Nile (Lake Victoria) Basin in Kenya.

Table 3: **Protected Areas of Kenya (National Reserves)**

Protected area	**Size km^2**	**Year declared**	**Major habitats & species**	**Impacts & conflicts**	**Management**	**Global recognition**
Lake Bogoria	107		Wetland & savannah waterfowlgrazers	Human/wildlife conflict	Conservation by Governmentand county council	CMS, CBD & Ramsar
Masai Mara **	1510	1950	Savannah, grazers, Browsers and predators	Human/wildlife conflict	Conservation by Government & county council	CBD, CMS, CITES & WHC
Kisumu Impala sanctuary **	0.34	1992	Wetland, waterfowlgrazers	Human/wildlife conflict	Conservation by Government	
Kamnarok	87.7	1983	Wetland Savannah, grazers, browsers and predators	Human/wildlife conflict	Conservation by County council	Ramsar & CMS
Kakamega **	44.7	1985	Forest Tropical forest,browsers, reptiles and predators	Human/wildlife conflict	Conservation by Government thro' county council	CBD,CITES & WHC
Tana river primate	169	1976	Riverine Forest, primates & flora	Human/wildlife conflict	Conservation by Government	CBD&CITES
Marsabit	1564	1967	Forest/Savannah, Grazers browsers & predators	Human/wildlife conflict	Conservation by Government thro'county council	CBD,CITES & WHC
Nasolot	194	1979	Savannah, grazers, Browsers and predators	Human/wildlife conflict	Conservation by Government thro'county council	CBD, CITES & CMS
Buffalo Springs	131	1985	Savannah	Human/wildlife	Conservation by	CBD, CMS

			Grazers & predators	conflict	county council	
Maralal sanctuary	5	1988	Savannah Grazers	Human/wildlife conflict	Conservation by county council	CBD
Mpunguti Marine	11	1978	Marine, fish, endangered turtles	Over exploitation	Conservation by Government	CBD, CMS & WHC
Mombasa Marine	200	1988	Marine, fish, endangered turtles & dugongs	Over exploitation	Conservation by Government	CBD, CMS & WHC
Kiunga Marine	250	1979	Marine, fish,endangered turtles & dugongs	Over exploitation	Conservation by Government	CBD, CMS & WHC
Laikipia	165	1991	Savannah, grazers, Browsers	Human/wildlife conflict	conservation by county council	CBD
Kerio Valley	66	1983	Savannah, grazers, browsers & predators	Human/wildlife conflict	Conservation by county council	CBD
Ngai Ndeithia	212	1976	Savannah, grazers, browsers & predators	Human/wildlife conflict	Conservation by county council	CBD
Watamu Marine	32	1968	Marine,endangered turtles, Dugongs & others	Human overexploitation	Conservation by Government	CBD &CMS
Malindi/Watamu Marine	213	1968	Marine,endangered turtles, Dugongs & others	Human overexploitation	Conservation by county council	CBD & CMS
Shimba Hills	192	1968	Forest/ Savannah,Browsers & grazers & others	Human/wildlife conflict	Conservation by county council	CBD

**** National Reserves in Nile (Lake Victoria) Basin in Kenya.**

Table 4: **Threats to the Lake Victoria/Nile Basin Resources in Kenya**

Issue	Symptoms Impacts	Immediate Causes	Root Causes	Extent	Severity
Deforestation	Changing rainfall patterns, increase in soil erosion	Changes in land use,logging for timber and charcoal burning	Population pressure, poverty, land tenure and land use practices weak policies/ laws,	Throughout the lake basin	Moderate in upper highlands, becoming severe in the lowlands
Disaster preparedness and remediation					
Eutrophication	Algal blooms and invasion of water weeds	High nutrient levels and sedimentation	Land degradation, over-use of agro-chemical, degradation of wetlands,	High in Winam Gulf Moderate else where along the shores	High in the Winam Gulf
Floods and drought	Flooding on Kano plains and low rainfall in the immediate hinterland of Lake Victoria	Occasional high flows of water	Deforestation Degradation of wetlands and riverbanks	Occasional on lowlands and lake-shore	Moderate
Land Degradation					
Loss and destruction of valuable species, special ecosystems, and habitats	Loss of indigenous species	Deforestation wetlands degradation/recl amation introduction of alien species	Population pressure land use practices inadequate policy guidelines	Throughout the lake basin	Moderate
Mining impacts	Discharge of Tailing and heavy metals	Lack of Treatment facility	Inadequate policy guidance on informal mining	Low	Low
Navigation risks, aids and mapping	Navigation difficulties and risks of collision and grounding	Poor aids and inadequate/o utdated charts/maps	Lack of rehabilitation of aids and lake mapping	Significant problem in Lake Victoria	Moderate to severe
Oil spill	Oil film on water	Discharge of waste oil and accidental oil spills	Lack of oil interceptors and oil spill contingency measures	low and localised at Kisumu port	low, but potential high
Pollution (point and Non-point sources)	Poor water quality rising eutrophication of	Municipal/indus trial and agricultural	Lack of/inadequate containment and treatment of wastes,	Urban and industries but also	high around Kisumu and lake shores

	the lake	discharges, refuse dumps, slums	rapid rural/urban migration, low budgetary provisions Weak policies/laws, low awareness and poor attitude	agricultural	
Refugee problems	Deforestation, soil erosion, social tension	Massive migration of people	Political and social tensions	-	Insignificant
River bank and lake-shore degradation	High Water Turbidityand nutrients levels	Cultivation and overgrazing, human settlement	Weak policies/ Laws		Moderate
Sanitation concerns (urban run-off, sewage discharge)	Pollution of the lake and feeder streams	Inadequate sanitation measures, un-planned settlements	Inadequate urban infrastructure and services Inadequate budgetary resources, previous low priority on sanitation and rapid growth of urban centres	In all urban centres along the lake-shores	Moderate
Sewage discharge in lake (from boats)	Poor lake water quality	Lack of waste storage in boats and waste reception facilities at ports	Lack of policy	Low	Low
Siltation	High water turbidity	Soil erosion in the catchment	Deforestation, land use practices, land tenure and weak policies	Winam Gulf	High in Winam Gulf and moderate elsewhere around lakeshores
Soil erosion	soil infertility and increased agro-chemical use	Devegetation, lack of soil and water conservation measures	Land use practices land tenure, weak policies/ laws	Throughout the lake basin	Generally Moderate but becoming severe in the lowlands

Uncertain impacts of climate change	Changes in weather, rainfall patterns and amounts and; increase in drought occurrence and severity	Global climate change	Global phenomenon and human interference	Low	Low
Urban and industrial issues					
Urban planning and industrialization on lake-shores and river banks	Pollution of the lake and feeder streams,	Haphazard location of industrieswaste dumping	Weak/in-adequate urban planning and zoning regulations	In all major urban centres around the lake	Moderate
Water borne diseases	Morbidity and clinical records	Contamination of water	Inadequate sewage/waste containment and treatment	Around the lake shores	Moderate around the lake-shore, low elsewhere in the basin
Water borne diseases	Morbidity and clinical records	Inadequate sanitationInadequate sewage/waste treatment and safe disposal	Inadequate budgetary resources Inadequate awareness	Mainly in urban slums and rural areas	Moderate
Water Quality Degradation					
Water weeds infestation	Spread of the weeds	Eutrophication of the lake and high nutrient levels	Eutrophication of the lake and accidental introduction	High in Winam Gulf	High in the Winam Gulf
Wetland degradation	Decrease in size and extent,	Encroachment and reclamation	Population pressure, low awareness of wetland function and values, lack of management policy on wetlands on	Both in the upper highlands and lowlands	Becoming severe

Table 5: **Recent, Current and Planned Environmental Initiatives, Programmes and Projects in Kenya**

Programme/Project	**Period**	**Budget US$**	**Implementing Agency**
Lake Victoria Environment Management Project(LVEMP)	Five Years	Total US$ 77.6 million Kenya's portion US$ 26.919 million	IDA/GEF/Ministry of Environment and Natural Resources
Lake Victoria Water Resources Project	Three Years(1993-1999)	-	FAO/Ministry of water Resources
Preparation of the National Bio-diversity Strategy and Action Plan	Recently concluded	-	GEF/UNDP-Ministry of Environment and Natural Resources
Reducing Bio-diversity Loss at Cross Border Sites in East Africa	Five Years	5,150,000	UNDP/GEF-Ministry of Environment and Natural Resources (National Environment Secretariat)
National Action Program to combat desertification	Five Years	8,325,000	UNDP/UNSO-Ministry of Environment and Natural Resources
East African Communities' Organization for Management of Lake Victoria Resources (ECOVIC)	At the formative stage	-	NGOs and CBOs with environment mandate within the Lake Basin
Lake Victoria Development Initiative	Being planned	-	Sida/EAC-secretariat and member States

Table 6: **Priority Environmental Actions in the Nile/Lake Victoria Basin in Kenya**

Environmental Issue	Priority Action	Scale	Emphasis	Urgency
Water Pollution	Review and updating pollution control legislation, Strengthening enforcement capacity and Rehabilitating water pollution monitoring stations; Rehabilitation of urban and rural sanitation and soil conservation measures	National, local	Legislation framework and capacity building and technical development	***
Water Weeds	Biological/mechanical control of Water Hyacinth and other Aquatic Weeds; control of nutrients and sediments flow into water bodies	Regional, National	Integrated approach, capacity building and community involvement	***
Water and Sewerage	Increasing Urban Water Supply and Sewerage Development	Local, National	Increased supply of Treated/ piped water and increased sewer coverage	**
Water and Sanitation	Development of Rural Water Supply and Sanitation	Local, National	Water Supply and Sanitaton	**
Land use and waste management	Instituting soil and water conservation measures including agro-forestry afforestation, optimal use of agricultural inputs, reduction and proper management and disposal of solidwastes (municipal,hospital and industrial)	Local, National	Land,Agro-chemicals and solidwaste management	***
Infrastructure	Development of roads, port facilities, fish landing areas, refuse disposal facilities	Local, National	Roads network, ports and waste disposal facilities	***
Water use	Planning and Development of multi-purpose dams for Hydro-power, irrigation, fisheries and flood control	Local, National	Development of multi-purpose dams	***
Navigation	Rehabilitation of navigation aids, radio communication and updating the navigation Charts/maps	Regional, National	Improvement of navigation, technical development	***
Environmental Awareness	Enhancing Environmental Awareness programmes by public and private sectors	Local, National, Regional	Public awareness, Environmental education	***
Wetlands conservation	Identification and inventory of important wetlands in the basin	Local, National	Conservation and wise use of wetland resources	***

Un-planned Settlement	Improving enforcement of Town planning regulations and zoning, creating employment thro'out the basin to slow down migration, population management	Local National, Regional	Local Authorities, Donor and community involvement in planning settlements	***
Institutional Capacity	Assessment and strengthening institutional capacity for environmental management	Local, National Regional, Internatio nal	Capacity building, technical development	***
Environmental Information	Improving accessibility to environmental information thro' creation of Databases, media involvement and networking of relevant institutions	Local National Regional, Internatio nal	Public awareness, capacity building	***
Oil Spill	Planning and developing contingency measurers for oil spill in Lake Victoria	National, Regional	Capacity building, technical development	**
Flooding	Planning and developing floods control and other related contingency measures in the basin	National	Capacity building, technical development	**

* Important
** Very important
*** Extremely important

TABLE 7: STATUS OF SOME INTERNATIONAL AND REGIONAL ENVIRONMETAL CONVENTIONS/AGREEMENTS IN RELATION TO KENYA

Convention/agreement	Signature	Ratification
Convention on Wetlands of International importance Especially as Waterfowl Habitats (1971)	* 1990	*
Convention on International Trade in Endangered species of wild fauna and Flora (1973)	*	*
Convention concerning the protection of the World Cultural Heritage (1972)	*	*
UN law of the Sea Convention (1982)	*	*
Convention on Biological Diversity (1992)	*1992	* 1994
UN Framework Convention on Climate Change (1992)	* 1992	* 1995
International Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification particularly in Africa (1994)	* Oct. 1994	June 1997
Lusaka Agreement on Co-operative Enforcement Operations Directed at illegal Trade in Wild Fauna and Flora (1994)	*	*
Kampala Declaration on Sustainable Development in Africa (1989)	*	*
Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal	*	
Bamako convention on the Ban of the Import into Africa and the Control of Trans-boundary Movement and Management of Hazardous Wastes within Africa (1991)	*	
Treaty for the Establishment of the East African Co-operation	* 1999	
African- Eurasian water-bird Agreement	*	
Convention on Migratory Species	*	
Convention on the law of the Non-Navigational Uses of International Watercourses (1997)		
Vienna Convention for the Protection of the Ozone Layer (1985)	* 1985	*
Montreal Protocol on Substances that deplete the Ozone Layer (1987)	*	*

TABLE 8: SPECIFIC DESCRIPTION AND PRIORITY ACTIONS NEEDED FOR CROSS-BORDER PROTECTED AREA

Country Protected Area	Size/Year	Site description and regional significance	Impacts and conflicts	Current Mgt Arrangement
Kenya Mt. Elgon National Park	169/Km2/1968	Montane ecosystem supporting a variety of flora and fauna including tropical forest trees and animals; a major water catchment area in the Lake Victoria basin	Effects of population pressure building up in terms of deforestation for land for settlement and agricultural use	Conserved and managed by the Government in response to various international conventions and national needs joint activities for the area to be undertaken through UNDP/GEF Cross Boarder project.

- **Mt. Elgon transcends Kenya/ Uganda border**

SIGNIFICANT WETLANDS WITHIN THE NILE (LAKE VICTORIA) BASIN IN KENYA

As pointed out earlier in this report, information on wetlands in the Lake Basin is not fully documented. There are however, several riverine and parustrine wetlands along the major rivers of the basin and in the upper hughland zone, the Uasin Gishu area. While most of the parustrine wetlands (except the crater lake Simbi Nyaima) are either man-made or seasonal, the riverine wetlands are perennial. They occur along Sio, Nzoia, Nyando, Sondu-Miriu, Yala and Kuja rivers. They include the Kisii valley bottoms that have seriously been degraded through agricultural land use. Others include the West Kano, Nyando, Yala and; the Nzoia and Sio river deltas all of which are under threat of encroachment, reclamation and degradation.

Along the lake shores are the fringing lacustrine wetlands including at the Winam gulf. These ecosystems should be buffering the lake from the effects of the catchment degradation, but they are also under constant threat of degradation through encroachment, reclamation and over-grazing.

Efforts are urgently required to study the lake basin wetlands, characterise them and document information about them for their conservation and wise use. Given the population pressure and the need to optimise land use for maximum agricultural production in the region, it is imperative that adequate relevant information on the wetlands is made available for national planning and decision support system on land and other natural resources use. Lake Victoria Environment Management Project (LVEMP) has initiated action in this direction through the Buffering Capacity of Lake Victoria Wetlands component. The project is presently carrying out rapid assessment of the wetlands along the Sio river. It is however necessary that complimentary efforts are planned to cover the entire lake basin.

Given the current inadequacy of information, it is not presently possible to authoritatively tabulate all significant wetlands according to their size, location and projects. The only wetland within the basin for which some information has been established is the Saiwa swamp in Kipsaina area of Trans-Nzoia district. This information is given in this report under the protected areas of Kenya.

ANNEX 1

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ANNEX 2

Key References and Sources

Institute of Economic Affairs: 1998 Our Problems, Our Solutions an Economic and Public Policy Agenda for Kenya;

Sida: 1999 RELMA - Regional Land Management Unit;

GoK: 1999 Implementation Process of the National Action Program in the context of the Convention to Combat Desertification and Mitigate the Effects of Drought (CCD) in Kenya;

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GoK: 1999 Sessional Paper on National Water Resources Development and Management policy;

Gok: 1994 The Kenya National Environment Action Plan;

GoK: 1997 Lake Basin Development Authority Five Year Development Plans 1997 - 2001;

ANNEX 3

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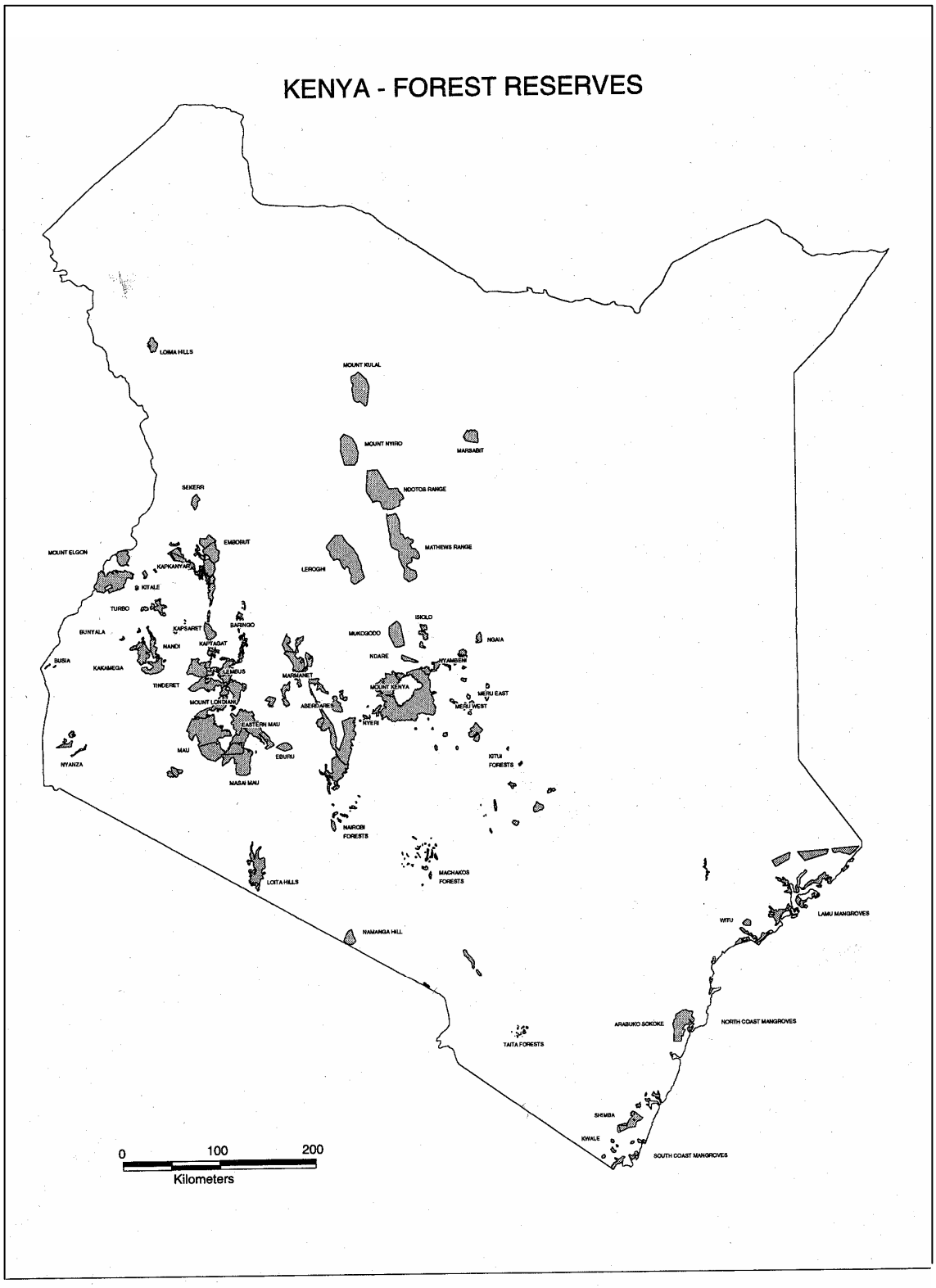
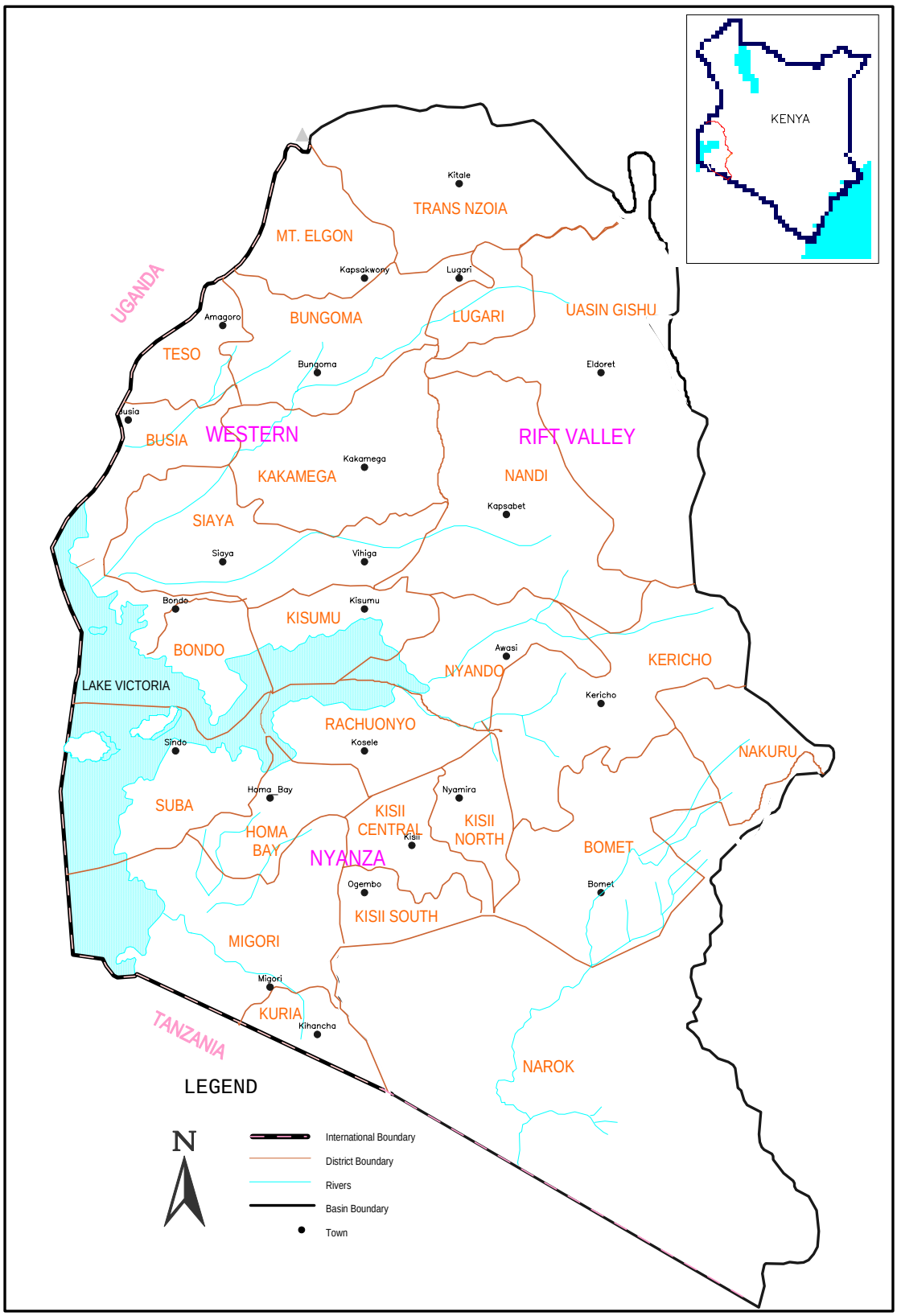


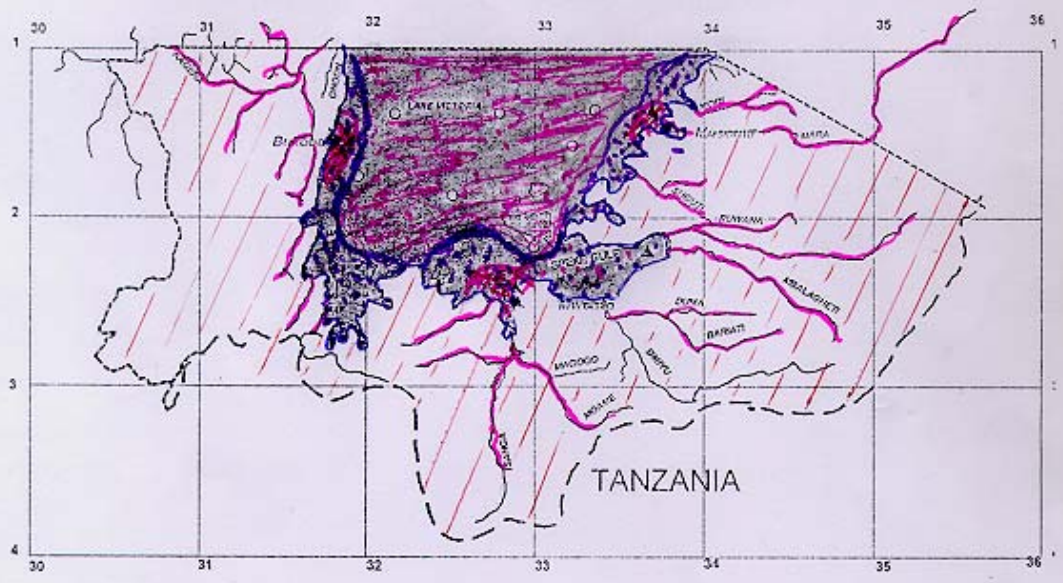
Source: Forest reserve boundaries from 1:50 000 topographic sheets

Map 1. National Forest Reserves



MAP 3: NILE (Lake Victoria) BASIN IN KENYA

MAP No 10 Sanitation, Eutrophication and Water Weed infestation.



Sanitation coverage in the rural areas in the basin.

Eutrophication points (by domestic and industrial wastes into the Lake.

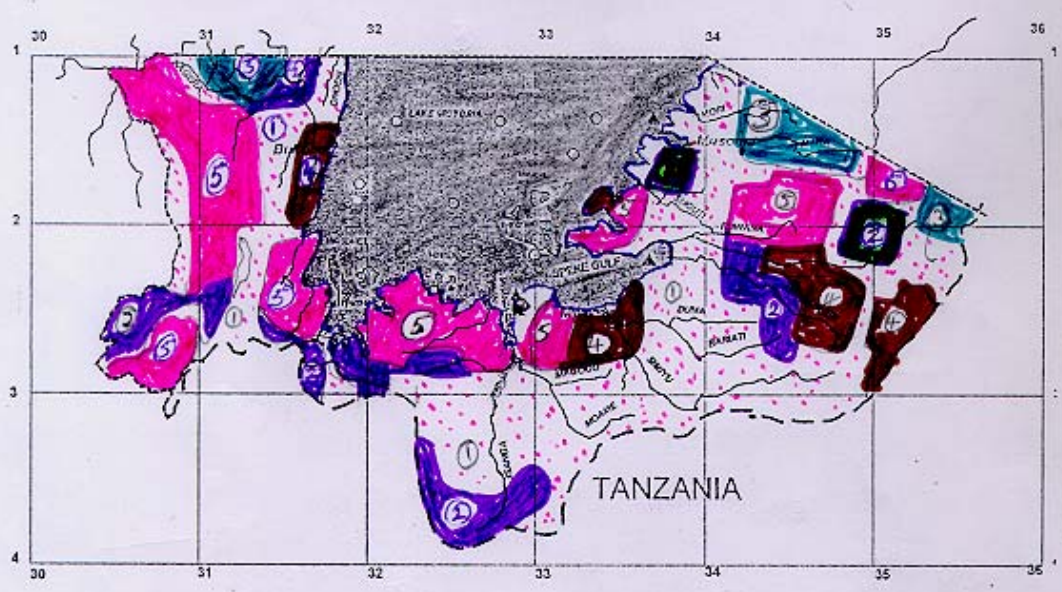
River water being eutrophicated by agrochemicals and domestic wastes during the rains.

Lake Victoria waters being eutrophicated by domestic, industrial wastes and agrochemicals.

Water weeds mostly along the lake shores and at points where rate of eutrophication is very high (Mwanza, Bukoba and Musoma.

Sanitation ~~and~~ problems are (mostly at Mwanza, Bukoba and Musoma)

MAP 2.0: EROSION HAZARD AND DEFORESTATION CATEGORIES.



1 Low

2 Low to medium

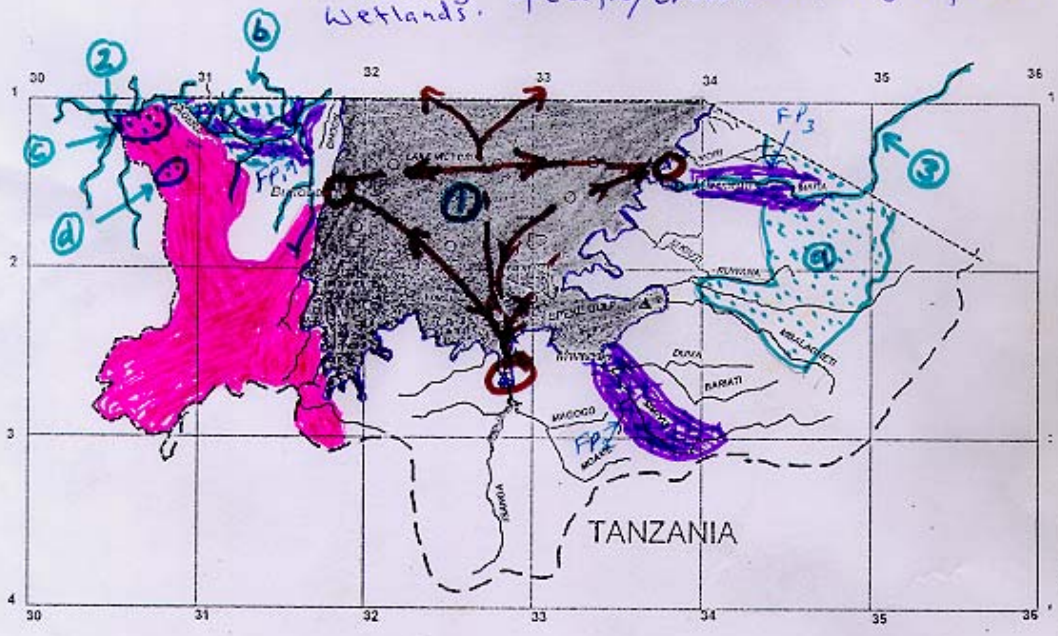
3 Medium

4 Medium to high.

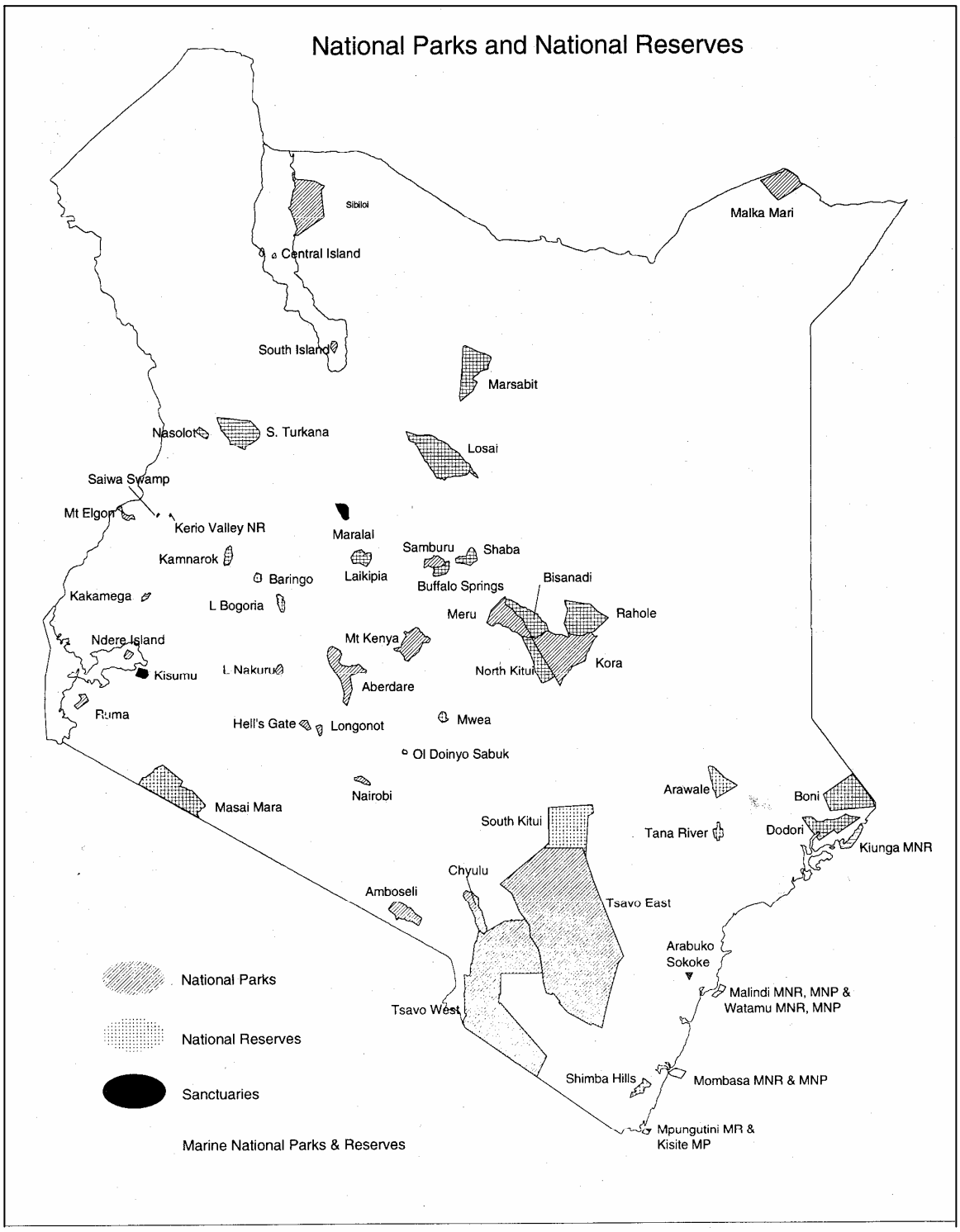
5 High

6 Very high.

MAP 3.0 Navigation risks, Refugees, Flooding and Wetland degradation and Significant Cross border protected areas including specific/cross border significant Wetlands.



- Areas/ Districts occupied by refugees.
- Cross border Significant wetlands. (1) Lake Victoria, (2) Kagera River and (3) Mara River)
- Flooding and wetland degradation. - Flood plains in Mara River, (FP1) Kagera River (FP1) and simiyu River (FP2).
- Significant Cross border Protected areas. (a) Serengeti National Park (b) Minziro Forest reserve, (c) Ibanda Game Reserve (d) Rumanyika Game Reserve.
- Navigation routes.
- National boundary.
- Lake Victoria basin boundary.



: Compiled by KIFCON from KWS Planning Unit maps

Map 2 **National Parks and National Reserves**