

**LAKE VICTORIA ENVIRONMENTAL MANAGEMENT
PROJECT**

FINAL NATIONAL REPORT

**NATIONAL LESSONS LEARNT CONSULTANCY ON WETLANDS
COMPONENT ACTIVITIES**

BY

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EXECUTIVE SUMMARY

This report presents a critical review of activities carried out by LVEMP Wetlands Component in the last seven years of the project with a view of coming up with lessons learnt from interventions implemented in the entire basin. The thirty-day exercise was based on both primary and secondary data. Various methodologies were used to collect information from project implementers, beneficiaries and other relevant stakeholders including structured and unstructured interviews. Desk review was also carried out on reports accumulated by the wetlands component, literature from libraries of research institutions, universities, government departments and local and international NGO's. Field visits were made to selected sites where randomly selected beneficiaries were interviewed and investments inspected. Some information was also obtained through direct observation, workshops and informal interviews.

Findings show that the component used appropriate methodologies like PRA's to find an entry point into the communities. Rapid assessments, inventories and market surveys were also conducted to identify and prioritize activities that would best answer problems faced by the community and the wetland resources. In some cases, the beneficiaries were adequately exposed by sponsoring them to various exhibitions and exchange visits.

Membership of all the groups was relatively low, some with no experience in the implementation of such projects which compromised their performance. Supervision and intensity of extension services and training were the major contributing factor in the performance of the group. Most of the activities in the buffering capacity sub-component were performed by a consulting firm. The study contributed very well to our understanding of the buffering role of wetlands in the upper catchment. A gap however, still remains on the role played by the littoral lakeshore wetlands.

The overall achievement of the objectives by the component is satisfactory. This is attributed to numerous constraints including the fact that wetland management is a relatively new area and most concepts not easily grasped by a cross section of stakeholders. Others include staffing problems, inadequacy and poor flow of funds, lack of policy framework, inadequate networking and sharing of resources among components.

Survey of other institutions within the basin involved in wetlands research, conservation and management revealed the existence of enormous information which could augment the work being done by the component. Establishment of institutional linkages is recommended to help the component exploit the information and benefit from human resource in wetlands and related disciplines.

Among the lessons learnt over the project lifetime includes the importance of using appropriate tools and involving the local communities right from the beginning of the

projects. The need to emphasize wise use of wetlands, and the immense potential in the use of wetlands and their products to reduce poverty, increase food security and improve standards of living of local communities. Significance of the buffering role of wetlands and the need to integrate wetland conservation issues with provision of alternative livelihoods if we have to protect our wetlands.

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1.0. INTRODUCTION

Tropical wetlands are grouped into 8 classes namely Marine, Riverine, Lacustrine Palustrine, Deltaic, Plateau, Montane and Constructed wetlands based on topography and hydrological conditions (Crafter *et al* 1992). A wetland classification system for East Africa (Howard 1996) recognizes 22 specific habitat types, 16 of which are linked to inland waters. In general wetlands in the Lake Victoria Basin fall in the categories of riverine, lacustrine, deltaic, in some areas plateau and constructed (ponds and irrigated land). They are characterized by the changing hydrological regimes, especially the area around the Lake where rainfall seasonality leads to peaks and low riverflow. They also experience short-term changes in nutrient supply through seasonal flooding which leads to changes in the structure of plant and animal communities. Their transitional nature makes it difficult for one to precisely delineate their boundaries.

Figure 1 shows the occurrence and distribution of key wetlands in the Kenyan side of Lake Victoria Basin. Kenya's wetlands occupy about 3% to 4%, which is approximately 14,000 km² of the land surface and fluctuates up to 6% in the rainy seasons. The distribution of Kenyan wetlands depends largely on the amount of rainfall and to some extent on the landform. The areas covered by each type of wetland have not been worked out at the national level.

Large swamps which occur in the Winam Gulf include the Yala swamp and Nyando river wetlands. Yala swamp which lies in the mouths Yala and Nzoia rivers covers an area of 17 km² and, in it lie Lakes Kanyaboli (1050 ha), Sare (500 ha) and Namboyo (200 ha) as well as numerous inhabited islands. Part of this swamp (2300ha) was reclaimed in 1970 to give way for agricultural development an activity that bypassed the Lake Kanyabili. The Nyando River Wetland in Nyando and Kisumu districts lies in the Kano/Nyakach floodplains at the mouth of river Nyando and covers approximately 40Km². There are also several smaller but important wetlands including the Nyamthoe/Ambowo/Okana/ Nyamware/Dunga complex in Kisumu district, Osodo/Sango rota floodplain at the mouth of river Sondu – Miriu. Others are the swampy floodplains associated with rivers Migori and Kuja (Gucha). The Ahero pilot, Bunyala and southwest Kano rice irrigation schemes are important man made wetlands which serve to produce rice during the dry seasons but largely remain swampy in the wet seasons. The Kenya portion of the Lake basin also has numerous wetlands occurring in the valley bottoms and plateaus of Nyanza, Western and southern parts of the Rift Valley provinces.

The Government of Kenya to date has put in place certain frameworks to address conservation and wise use of wetland ecosystems. The existence of these frameworks however may not create the desired impact as long as there is no national wetland policy in place. Secondly there are attempts to institute people-driven provincial and site-specific wetland management plans to take care of the many wetland ecosystems which occur in non protected areas. Although wetland ecology and management courses exist in some government or private institutions, there is lack of coordination/integration of these courses in the formal educational curriculum. Awareness creation on conservation and wise use of wetlands to date has been mainly

done by both national and international NGO's. Below are some of the responses initiated by the Kenya Government to address sustainable wetlands management:

- i) **Policy and Legislation.** There used to be 77 sectoral statutes, policies and legislation on wetlands inscribed under various sectors' acts all relevant to wetlands conservation and management. This had resulted into duplications and conflicts. To harmonize these, the country has developed a National Environment Management and Co-ordination Act (EMCA), whose Section 42 deals with wetlands. Further the country has been developing a wetland policy, to guide the various aspects relating to wetland use and development. Several committees at various levels are in place to promulgate this Act. A national wetland policy is also at its last stages of development.
- ii) **Capacity in wetland management:** To enhance wetland management skills in the country, the government has included wetland education into the curricula of various learning institutions. A wide variety of education and awareness materials are now available in different institutions in various forms and formats like books, brochures, pamphlets and newsletters targeting various stakeholders. Various awareness programmes are also in place.
- iii) **Recognition of local communities in wetland management:** EMCA recognizes the role of local communities and has established a legal framework that empowers local communities to be actively involved in wetland issues in form of various committees and a right to a clean environment.
- iv) **International collaboration:** Kenya is signatory of various international conventions like the Ramsar, CBD, that are relevant to international collaboration on the management of wetlands and their resources. This has seen some wetland sites in the Rift Valley like Lakes Naivasha, Nakuru and Bogoria being conserved under these conventions guidelines. Consequently, various management plans have been developed for various wetland sites like Nakuru, Naivasha and Saiwa to ensure their sustainable use.
- v) **Funding:** The Government of Kenya through various local and international institutions has availed funding to various institutions to ensure wetlands are conserved for posterity. This also includes bilateral and multilateral arrangements that also focus on the local communities. Examples include the Lake Victoria Environmental Management Programme (LVEMP) Wetlands component.

The Lake Victoria Environmental Management Project (LVEMP) is a regional project, which was established seven years ago to address the following major objectives:

- Maximize the sustainable benefits to riparian communities from using resources within the basin to generate food, employment and income, supply safe water and sustain a disease free environment.
- Conserve biodiversity and genetic resources for the benefit of the riparian and global community.
- Harmonize national and regional management programs in order to achieve to the maximum extent possible, a reversal in environmental degradation.
- Promote regional cooperation among the East African countries.

In an effort to achieve these objectives, eight broad components addressing unique areas of environmental concern within the Lake Victoria Basin were identified. Since its inception to date various activities have been carried out within the basin under the respective components from which several lessons must have been learnt. This report presents a range of activities carried out in an effort to come up with the lessons learnt from interventions made by the wetland Management Component to the overall LVEMP objectives.

Figure 1. The Distribution of wetlands on the Kenyan side of Lake Victoria Basin

1.1. BACKGROUND INFORMATION OF THE COMPONENT

The Lake Victoria Basin is endowed with numerous biodiversity rich wetland ecosystems, which are valuable for buffering the lake's freshwater and livelihood of the now more than 30 million people living around the lake. Except in a few cases, the wetlands of the Lake Victoria Basin are facing environmental and socio-economic changes that contribute to abject poverty food insecurity and environmental degradation. This is mainly due to loss of wetlands through increased trends of mismanagement, insufficient knowledge on wetland resource values and their dynamics. In East Africa, common factors that put pressure on wetlands are poverty coupled with increasing population growth in the face of limited livelihood options outside the farm and where wetland resources may be the only source of survival for communities in terms of food, income, water and shelter. The problem is compounded by weak land tenure systems and lack of relevant appropriate technologies.

Wetland management was included as the eighth LVEMP component to enhance the restoration, conservation and sustainable management of the wetland resources within the Lake Victoria Basin. The component was subdivided into two sub-components: wetland buffering capacity, and sustainable utilization and management of wetland products sub-components. The component has implemented several of its activities in the three countries with a variety of successes and constraints which the current exercise addressed in order to produce a national and regional lessons learnt report which will help in providing the way forward for the LVEMP II.

The activities carried out by the component during the project life can be grouped as follows:

Buffering Capacity

1. Rapid Assessment of wetlands in six (6) river basins:- Nzoia, Sio, Yala, Nyando, Sondu-Miriu and Kuja Migori.
2. Information dissemination and awareness creation on wetland values through various channels:
 - (i) World Wetland Day and (exhibitions)
 - (ii) ASK Shows – Kisumu, Kakamega
 - (iii) T.V. documentaries of pilot project activities i.e. HEMNET, Citizen and KTN
 - (iv) Posters, brochures and pamphlets on wetland activities
 - (v) Lectures in public institutions, barazas and wetland video shows: Audiovisual equipment in 3 provinces
3. Consultancy study on Buffering Capacity and Processes on Lake Basin Wetlands:
 - (i) Mapping of Lake Basin wetlands and GIS maps produced.
 - (ii) Buffering Capacity and processes of pilot Lake Basin wetlands determined.
 - (iii) Wetlands Management Framework for 2 pilot wetlands Dionosoyiet and Marula developed.

- (iv) Buffering Prediction for Lake Basin wetlands (pond model) developed.
- 4. Hydrological and water quality study of Siteko wetland done.
- 5. Capacity building of staff in long and short courses. Four staff trained at M.Sc. Level (Moi and Salford) and other officers trained in EIA, PRA, Community Organization, Wetlands Management, Environmental Economics, GIS and other relevant topics. Support staff trained on various computer packages.
- 6. Office and Lab equipment procured. GIS facility with relevant hardware and software operational at Busia Office.
- 7. Component staff has assisted in development of the draft Kenya National Wetlands Policy.

Sustainable Use

- 1. Participatory Rural Appraisals carried out in 9 districts and Community Action Plans (CAPs) developed and are in various stages of implementation.
- 2. Pilot project activities carried out in wetlands to demonstrate wise wetlands use and management practices.
 - (i) Siteko (fish farming, catfish propagation, wetlands products and tree nursery).
 - (ii) Gomro (wetland products, transport – boat making, catfish propagation and wetland edge horticulture).
 - (iii) Kamoson (spring protection and cattle troughs).
 - (iv) Dionosoyiet (water point protection (artesian well), arboretum (tree planting), protection: fencing and signboards and bridge improvement).
 - (v) Yala Dam (bee keeping and tree nurseries).
 - (vi) Matulo (spring protection, afforestation and fish farming).
 - (vii) Dunga (ecotourism (birdwatch), wetland products and wetlands management).
 - (viii) Okana (dredging of irrigation canals (5km) gave tools and food for work).
- 3. Capacity building of wetland resource users carried out in the above sites through:
 - (i) On-site training on fish farming, catfish propagation, spring protection and management, seed raising, beekeeping and other relevant demand-driven topics.
 - (ii) Support provided to communities to implement pilot activities i.e. technical advices, funds and provision of materials.
 - (iii) Wetland resource users (mainly handcraft members) trained on record keeping, book keeping, marketing, group management etc in order to enhance financial management.
 - (iv) Wetland resource users trained to make improved products and new products e.g. fireless cookers, wall murals and lampshades. (Micro-projects).

- (v) Formations of on-site wetland management committees to sensitize community members on wetland values, identify and mitigate threats, and promote wetland conservation activities.
- 4. Two handcraft centers built in Bumala and Mubwayo markets to market papyrus products (mainly Marachi Chairs) and Phoenix products (mainly baskets) respectively.
- 5. Wetland resource users from the above two source markets assisted to patent their products with KIPI in order to ensure community ownership.
- 6. Market Surveys and study of Traditional Wetland Production Systems carried out from 1998 – 2003 to determine: sources of wetland products, Types of products supply and demand trends, identify existing and potential markets, determine threats, analyze access issues, ownership issues (i.e. land tenure, gender issues etc).
- 7. Socio-economic studies on Siteko, Dunga and other Wetlands undertaken.

1.2. OBJECTIVES OF THE COMPONENT

1.2.1. Overall Objective

The overall objective of the component was to develop wetland management strategies that lead to improved water quality of Lake Victoria and its catchment through maximized buffering capacity of wetlands and enhanced sustainable benefits derived by local communities.

1.2.2. Specific Objectives

- Undertake a rapid assessment and mapping of wetlands of Lake Victoria Basin, leading to an inventory.
- Determine the buffering capacity and processes of Lake Victoria Basin wetlands.
- Carry out an economic evaluation of buffering services provided by wetlands.
- Identify and quantify the nature and magnitude of threats to wetlands in order to propose mitigation measures.
- Formulate guidelines for wetland management.
- Quantify the economic benefits from wetland products.
- Develop management strategies for their sustainable utilization.
- Initiate pilot activities to demonstrate wise use of wetlands in the Lake Basin.
- Train communities on wetland wise use practices.

1.3. TERMS OF REFERENCE FOR THE CONSULTANCY

The scope and specific tasks of the national lessons learnt consultant covered various wetland areas and administrative districts targeted by the component and the following were performed and reported on at the end of the consultancy:

- Review the extent to which the component has achieved its original objective.
- Review the approach/methodology applied in achieving the above objectives.
- Review achievements made by the component including other components.
- Assess the impact of the project in relation to Lake Basin environment, community livelihood and stakeholders' expectations.
- Assess the cost/benefits of the interventions per dollar invested.
- Review problems encountered in the implementation of the component activities.
- Give a list of other programs related to the component activities in the Lake Victoria Basin.
- Based on the above, draw lessons of experience (both positive and negative) and their underlying factors.
- Propose possible replication of the approaches, methods or technologies to other areas within and outside the lake basin and why.

2.0. APPROACHES AND METHODOLOGIES

Different methodologies and approaches were used to collect different types of information. Below is a brief account of the activities conducted during this exercise to generate information.

2.1. PREPARATION OF DATA COLLECTION TOOLS

The data required for this survey were varied and necessitated preparation of various data collection tools. Tools were prepared to collect information from the project coordinators, community members who benefited from the various projects, key informants, wetland resource users, researchers from various institutions and consultants hired by the component to accomplish specialized study topics. A sample of questionnaires used for communities and coordinators is attached in appendix 1.

2.2. CONSULTATIONS WITH THE COMPONENT

The component is coordinated by one officer assisted by two tasks coordinators namely Sustainable Utilization and Management of Wetland Products, and Buffering Capacity respectively. Interview and informal discussions were held with the component coordinator and the task coordinators individually and other the relevant project staff at the component. The component administrative structure was such that the NEMA officers on the ground supervised activities carried out in different districts. Consultations were therefore made with the District Environment Officers (DEO's) who played a vital role in the implementation of the projects within their areas of jurisdiction. The purpose of this was to clearly understand the components objectives, the range of activities carried out in the programme and their views on the achievements and constraints.

2.3. DESK LITERATURE REVIEW

In the life of the project enormous data was generated and several reports written on various aspects of the project. Most of these documents act as benchmarks to activities carried out while other reports explains the what, how, where and why questions about the project. A comprehensive analysis of the documents and reports and how they relate to the components objectives was carried out. Literature collected from other institutions conducting research and implementing wetlands and related activities were also reviewed during this exercise.

2.4. FIELD VISITS

2.4.1. Sustainable Use

The majority of activities during this project were carried out by this sub component. Selected sites representing the upper and lower catchments of Lake Victoria Basin were visited and randomly selected members of the relevant communities interviewed using the tools developed at the beginning of the exercise. Apart from individual interviews, focused group discussions were also carried out and where applicable the information was verified by interviewing key informants or members of the community who were not necessarily registered members of the group in question. Personal observation was also used to inspect the status of the interventions.

The project sites visited were Mubwayo Handicraft Project (Busia), Siteko Wetland (Busia), Kamoson spring protection, Marula Swamp (Uasin Gishu), Kingwal Wetland (Nandi), Gomro Wetland (Bondo), Dunga Wetland (Kisumu), and Dionosoiyet wetland (Kericho). Information on a range of activities carried out in these sites were analyzed both qualitatively and quantitatively to generate the lessons learnt from interventions initiated by the component.

2.4.2. Buffering Capacity

Apart from rapid assessment, activities of this sub-component was concentrated in two wetland sites namely Marula Swamp, Eldoret and Dionosoiyet Wetland, Kericho. The work in these sites was carried out by SMEC consultants. Information on this activity was gathered in a workshop where the consultants presented their findings to a panel of experts, the component staff and officers in the field which I had a privilege of attending. More information was also gathered by reading the reports and visits to the sites. This gave me a wide understanding of the relevant activities, which enabled me to come up with lessons learnt by the consultant, component and the secretariat on engaging a consultant in specialized topical areas.

2.5. INSTITUTIONAL VISITS

A number of institutions within and without the Lake Victoria Basin where wetland studies have been carried out were visited and a list of such studies compiled. The institutions visited within the Lake Victoria Basin were Maseno University, Moi University, Lake Basin Development Authority (LBDA), Kenya Marine and Fisheries Research Institute (KMFRI), VIRED International, OSIENALA, and ICRAF. Other institutions visited include Egerton University, University of Nairobi, Kenyatta University and Jomo Kenyatta University of Agriculture and Technology. Government Departments such as Kenya Wildlife Services (KWS), National Museums of Kenya (NMK) and Kenya Institute for Public Policy Research and Analysis (KIPRA) and NEMA were also visited. The information on wetland studies/projects was collated, and presented in this report.

3.0. FINDINGS OF THE ASSESSMENT

3.1. SUSTAINABLE UTILIZATION AND MANAGEMENT OF WETLAND PRODUCTS

The sub-component had two general objectives, which were to determine the economic potential of Lake Victoria Basin wetland products and develop management strategies for their sustainable utilization and to demonstrate wise use of wetland resources within the lake basin. The specific objectives were to:

- Quantify the economic benefits from wetland products
- Develop management strategies for their sustainable utilization
- Initiate pilot activities to demonstrate wise use of wetlands in the lake basin
- To train communities in wetland wise use practices

Below is a review of the activities carried out by the sub-component to address the objectives above.

3.1.1. Participatory Rural Appraisals

Participatory Rural Appraisals (PRA's) were conducted in selected wetlands covering nine Districts within the Lake Victoria Basin. The purpose was to highlight key problems facing different communities living around the wetlands, identify opportunities within the communities that could be exploited to alleviate the problem and propose specific interventions. The wetlands covered included Gomro (Bondo District), Okana (Kisumu District), Ombeyi (Nyando District), Sironga (Nyamira District), Siteko (Busia District), Matulo (Bungoma District), Yala Dam (Kakamega District) and Komson (Uasin Gishu District).

As a prelude, most of the reports have given calendars detailing the various activities the different communities appraised engage in throughout the year. The activities are pegged to specific periods of the year and are thus quite informative. Besides this, the daily activities of men and women in the communities are also provided following a time line. The reports also give insight into resource expectations for the future in the communities studied. Roles played by different governmental and non-governmental organizations within the communities have also been discussed and the levels of interaction that take place between them highlighted. The reports have also made attempts to identify the basic needs in the different communities and indicated some of the key resources used to meet these needs.

With the background information, the reports then identified the different problems being experienced by the wetland communities, analyzed them by assigned possible causes to each problem, and then did a pair wise ranking of the problems and opportunities so as to formulate a prioritized action plan.

In Siteko Wetland, various problems were identified with the most highly ranked being low levels of income within the community. Based on a prioritized list of problems and other data gathered, a Community Action Plan (CAP) was formulated and some of the mitigation actions included starting of small incoming generating

projects, setting up wetland edge horticultural farms, fish farming and establishing tree nurseries among others.

In Sironga Wetland, major problems identified in order of priority included lack of clear drinking water, HIV/AIDS, malaria and unemployment. In this case also, a clear CAP was formulated based on the problems highlighted. Problems facing Ombeyi, Gomro and Dunga Wetland communities were also identified. These were varied and many with some unique to a specific community while others apparent in virtually all of them.

Nevertheless, in every case, CAP's were formulated to alleviate problems inherent in each community. It is particularly satisfying to note that the CAP's were designed based on the outcomes of the PRA's thus addressed problems identified by the wetland communities directly.

3.1.2. Market Survey

3.1.2.1. Market Survey of Wetland Products

Market Survey of Wetland Products was conducted in Busia, Siaya, Kisumu and Kisii Districts in 1998.

The study was extensive covering 24 markets in 4 Districts within the Lake Victoria Basin. It focused on three categories of wetland products viz. clay products, plant products and fish. Detailed questionnaires were used to extract data on various aspects of wetland products like trends in their supply and demand and their economic value. The study establishes that more commonly, only two plant species *Cyperus papyrus* and *Phoenix reticulata* are used to make the wide range of products sold in markets.

Likewise only two fish species, *Protopterus aethiopicus* and *Clarias gariepinus* are prevalent in the markets. The study highlights various aspects relating to the demand and marketing of these two fish. It also gives a brief account of some of the wetland clay products sold in the markets and identifies a number of factors that generally hinder access to raw materials occurring with the wetlands and which also prevent wetland products. Overall, the study provides clear pictures of the great economic potential wetlands products have. In conclusion, the study was conducted in a manner consistent with the objectives set out to achieve.

3.1.2.2. Market Analysis of Lake Victoria Basin Wetland Products

The scope of the study in the year 2003 was as extensive as the one carried out in 1998. It used more or less the same approach covering several markets considered to be the principal production points of wetland products at the lakeshore as well as other potential markets in the upper catchment areas of the Lake Basin in principal towns like Eldoret, Kapsabet, Kisii and Kericho.. Its main purpose was to assess the supply and demand of various wetland products and establish the kind of prizes paid for them by middlemen and local consumers. This information appears to have been captured in the results presented. However, it is not well articulated in the report

leaving one with a sense that some of the objectives of the study may not have been adequately covered. For example, the results indicate that demand for wetland products is usually highest during the period July to September, but there is no attempt to explain why this is so or why the demand remains low in all the other months. However this coincides with the harvesting period in the region. It would have been quite informative if specific places where these products are actually made were identified. Future analysis should identify these areas so as to give one a feel of the distribution of supply centers.

The report does not quite say whether the markets are the actual production points or not. As depicted in the report, they only appear to be channels for marketing the products. I would conclude by saying that going by the questionnaire, a lot of information may have been captured during the study but there seems to have been some weakness in synthesizing and articulating this information to the extent of giving one a clear picture of what the study achieved. However, this was a very important exercise which when factored into the interventions could directly address issues of poverty alleviation of the poor wetland communities.

3.1.2.3. Traditional Wetland Production Systems

The Study of Traditional Wetland Production System in the low-lying Districts of the Lake Basin was also carried out by the component.

This was an elaborate study covering selected wetlands spread over nine Districts within the Lake Basin. It had the mandate to derive information on several aspects of wetland production systems e.g. traditional utilization methods, traditional managements, threats to wetlands, constraints faced by those directly dependant on wetlands and measures that could be taken to mitigate these constraints. The study employed a detailed questionnaire to capture information. This was in addition to interviews with knowledgeable members of the local communities.

A number of factors influencing the management and/or utilization of the wetlands in the Lake Basin were identified in the study. In addition, the main threats to the wetlands were also identified. On utilization of wetlands, the study demonstrates that there are quite a wide variety of products that are made from wetland resources. Some of these products in some places have led to the establishment of small-scale cottage industries.

The study points out that certain interventions used in an attempt to restore some of the wetlands have actually led to a decline in their production capacities. It also provides a good picture of wetland products and highlights some conflicts and disputes arising from the use of wetland resources which impact negatively on the wetlands. It is encouraging to note that the study also captured information on how some local communities are engaged in activities geared towards the conservation of wetlands. In conclusion, this is a well-conducted study that has attained the objectives it set out to achieve.

3.2. INTERVENTIONS

3.2.1. Siteko Wetland

Siteko Wetland Project were initiated by the chairman after attending a workshop organized by the then National Environmental Secretariat (NES) who sold the idea to the community. The Project started in 1998 to date but started benefiting from LVEMP in the year 2000. The group has not received any direct funding except materials like tanks, fencing materials, fishing gears, a shade and capacity building. On their part they contributed labour, hardcore and provision of food during working sessions. This group composed of 30 members focused their activities in spring protection, fish farming, handicraft production, wetland edge horticulture, environmental conservation and poverty alleviation. It was not clear how much money the group has in their account as responses ranged from KShs.3,000.00 to KShs.12,000.00. The officials are elected democratically but have been in office for the last 5 years except for the treasurer who has been in office for 3 years.

Given its proximity to the component offices, the group benefited from the best supervision and preparation. They have been trained in wetland management, water point management, record keeping and group management. Attending exhibitions and exchange visits to Moi University Fish Farm, Marenga Beach, Sagana Fish Farm, Kisii and Uganda among others exposed them extensively.

The community have benefited from clean drinking water, transfer of technology, particularly artificial propagation of catfish, enhanced awareness in wetland conservation, promotion of unity, exposure to the outside world and overall increase in the standard of living particularly due to reduction of water borne diseases. Others are high quality wetland products and fireless cookers.

Amongst the negative things cited includes overdependence on donor funding. For instance they claim to have been promised money by LVEMP to construct a shed in Busia town to market their products and transport to take their fingerlings to the lakeshore markets. More capacity building is required to change the attitude of the communities to be self reliant as when they are advised by the component towards this end they do not take it kindly yet it is actually their problem to make sure they sustain such activities. According to the component, the products they produce are still very few and may not breakeven unless they redouble their efforts.

The major problem the group is facing is lack of commitment of a few members, which they attribute to donor syndrome. They believe that any visitor to the site brings money. Illiteracy and awareness particularly on land and environmental conservation issues is also a problem. Lack of competition could discourage the members and they suggest more similar projects be set up within the basin as they receive a fair share of visitors in the basin. Sustainability is however rated at about 30%. Support is still needed to expand catfish propagation, construction of a showroom in Busia town and integrated poultry/fish farming.

3.2.2 Mubwayo - Bunyala Handicraft Cooperative Society

Bunyala Handicraft and Produce Cooperative Society used to exist as Bumdondo Handicraft and Produce Cooperative Society, which collapsed in 1983. Since then, the artisans were left on their own until 1999 when it was rehabilitated through the assistance of World Vision. In 2001, the name was changed to accommodate all the members of the community when they received assistance amounting to Kshs.900,000.00 from LVEMP. The members' contributions include a plot and 10% contribution towards the project, which came from World Vision. Currently, they have KShs.15,187 in their account.

The objective of the community was to:

- Alleviate poverty by improving quality wetland products
- Market all wetland products centrally
- Purchase cereals to sell to members at subsidized prices during hunger
- Foster spirit of self help within the community
- Encourage wetland conservation to sustain raw materials for handicraft production

The Society has 247 registered members with 180 men and 67 women. Election of officials who are educated is democratic. The Society members were well prepared by the component before the project and have benefited from adequate supervision, three training sessions, exchange visits to Kampala and Machakos and both national and international exposure through exhibitions and visits to the center by guests from all over the world.

Achievements of the project include ready market for the products, improved product quality, stabilization of prices and reduction of middlemen exploitation. The strength of this intervention is that it was based on what was the traditional occupation of the residents and the membership was opened to the wider community.

Some of the problems the Society still has to contend with are non-commitment and mistrust on the part of some members and illiterate treasurer. Although the Society could have achieved sustainability level, they are currently undergoing rough times. Some members have started dealing with middlemen denying the Society the much-needed income. The Society also trusted some of their members with goods worth Kshs.50,000.00 which was never remitted back to the Society. This threatens the Society which is evidenced in the reduction in the number of members. Lack of commitment may still tear the Society apart. The new Cooperative laws bar some of the most committed members from being elected because of their level of education. This gives way to elites with other sources of income thus not giving their best for the success of the Society. Secondly, capacities building only original officials were trained. Refresher courses are needed for new officials and members in group management and attitude change. Lastly, marketing still remains the major problem of the Society. They need to construct outlets in towns to improve the marketing of their products and get rid of middlemen. The problem comprises sustainability as if products stay too long without being sold then most members may not be faithful to the Society.

3.2.3. Kamoson Spring Protection Project

The Kamoson Spring Protection Group was formed in the year 2003 after the World Environmental Day whose theme was “water is life, let us protect the source”. Kamoson is the source of Kapsaret River in Kapsaret Division of Uasin Gishu District. The objectives of the project were to:

- Protect the catchment and the spring in particular
- To solicit community participation and ownership

The community was already organized and running a cattle dip under Livestock Department. The same were used to spearhead this project from the beginning and no election has been done as at the time of the survey. Strengths of this project is that the community living in the area have a high sense of ownership and united by demand for water both for domestic use and watering their cattle. After a PRA conducted by the component, water supply emerged as the priority number one for the community.

The LVEMP Wetlands Component provided the community with funds to purchase materials in collaboration with Uasin Gishu District Environment Officer. The following amounts were disbursed: KShs.29,000.00, KShs.43,000.00 and finally KShs.60,000.00. The community on their part contributed unskilled labour, provided hardcore and ballast for stabilization of the water catchment and construction of cattle troughs. The facility is invaluable to the community.

Some of the internal constraints in the group are that:

- Officials have been there for too long and so monopolize the decision making. This contributed to most of the youth withdrawing their participation in the earlier proposed tree nursery project.
- Other problems arise from poverty as most members cannot give their best to the project as they have to look for alternative sources of income to present food at the table.
- The water source is in the valley far from the homes – it’s the desire of the community that a way be found to pump it close to them.
- Training on the management of the water source was planned but had not been carried out at the time of the survey.
- Coordination of the activities from Busia was sometimes inconvenient and brought delays since it is very far. Facilitation should be made for the field staff to use local skilled labour / personnel and to solve transportation problems to ensure smooth running of project activities. The community always gets discouraged if promises are not fulfilled in time.
- A deliberate effort should be put in place to come up with an IGA to provide funds for maintenance. Currently, no funds are generated and this threatens the sustainability of the project.

3.2.4. King'wal Wetland

King'wal Wetland is a large wetland in the upper catchment of River Yala. It is an important biodiversity site. It is a popular habitat for the rare Sitatunga, crested crane birds and wetland forest of *Syzygium* species. The wetland is an important resource for both the community living in the catchment and those living down stream.

The component proposes to initiate interventions in the conservation and management of the wetland. This year's International Wetland Day was celebrated at the wetland to help raise awareness on the significance of wetlands. A Workshop for stakeholders was held this year to create awareness and brainstorm on the way forward for the wetland. One issue that came up was the ownership of the wetland which needs to be resolved. There are good prospects of collaboration as Kenya Wildlife Service (KWS) are already involved, particularly in the conservation of endangered Sitatunga. Two CBO's TASIKE SETANDE (conservation of Sitatunga, birds, trees, bees, butterflies and snakes) and TORET MOI are also keen and have already initiated activities to this end. The provincial administration and the local authorities are also interested in the project.

Some of the threats to the fragile ecosystem include burning, encroachment for agriculture, siltation, brick making, *Eucalyptus* trees to drain the wetland and issues on land ownership. Cultivation in the wetlands during the dry season (food stress is a big threat to the ecosystem) extensive maize cultivation and vegetable poses a threat, not only to the availability of alternative products from the wetland but also to the ecological function of wetlands and socio-economic well being of the communities who depend on them.

Planned interventions by the communities include planting of indigenous trees along the swamp, Ecotourism activities through conservation of Sitatunga, bird watching, butterfly farm, apiculture, Snake Park and cultural village.

3.2.5. Dunga Ecotourism Project

Site Background

Dunga Swamp is a small wetland located at the tip of Kisumu Bay (01° 10' S, 34° 47' E) and covers approximately 10 km² stretching from Nanga, point Kibuye and stretches southwards along the shorelines up to Nyamware. The swamp is found in Kolwa Location of Kisumu District Winam Division. Dunga falls within block 14 of Kisumu City Council authority. The ownership of the swamp ranges from City Council land in the Block 14 area to trust land in the central part of the swamp to communal in the southern sections of the swamp near Nyamware. Dunga Swamp is a lacustrine floodplain being riparian wetlands of Lake Victoria and situated at the delta/estuary of rivers Nyamasaria, Odesso, Wigwa and Luanda. River Wigwa now forms a stream of sewage discharging directly into the lake near the water intake point.

From historical accounts, the area was initially a terrestrial environment settled with people until the rains of 1961-63 when the lake advanced displacing the inhabitants and claiming their land. This phenomenon contributed to the origin of many of the riparian swamps of the Lake Victoria. The name Dunga is Indian in origin and refers to a place of deep waters and was the initial terminus of the first railway to Kisumu.

Dunga Ecotourism and Environmental Team (DECTTA) is composed of 15 members of 12 men and 3 women. It was started in the year 2003 after a Stakeholders Workshop organized by NEMA and Wildlife Clubs of Kenya (WCK). The members are drawn from different organized groups within the community such as fishermen, mat makers, widows, teachers and women groups. The officials were elected democratically. The objective of the group is to promote ecotourism around Dunga, market Dunga as a tourist destination and sustainable use of the wetland resources.

The members were adequately prepared and trained before the project started. However, they have not benefited from any exchange programme. The group benefited from materials like a boat which they use to generate funds and life jackets and to date, they have KShs.7,000.00 in their account. They did not contribute anything towards the project but have now provided land for office construction, labour and pays the coxswain. To achieve sustainability in their activities, they need assistance to construct an office, provision of tour guiding tools, viewing stand and an outboard engine.

The project has benefited the group and the community in several ways. The boat has been used in rescue operations, collection of research data and transportation of materials for fishing activities. The group has also gained knowledge on ecotourism through seminars and workshops which now provides a source of employment to some of their members. Others include cleaning activities at the beach, protection of the wetland through rotational harvesting by the mat making (Jamvi) group and monitoring of wetland in collaboration with Nature Kenya using birds as indicators of wetland health. Tourists in Dunga can now benefit from semi-professional tour guiding.

The major problem the group faces includes lack of an outboard engine, which prevents them from taking tourists to favourite destinations within the lake. This accounts for 90% of their constraints. Others are uncooperative members (2%) and lack of training in flora and fauna of Dunga Wetlands. Externally, the group is affected by ignorance of the local community that frustrates their efforts in conserving the endangered Situnga, protection of fish breeding sites and destruction activities like burning of wetlands. Others are lack of commitment among members and lack of transport. The group also faces a problem as they registered with the Social Services yet for them to get support from relevant Ministries, they also need to register with Tourism and Fisheries Departments.

3.2.6. Gomro Catfish Propagation Project

Background and Brief History

Gomro Wetland is a lake fringe wetland at the shores of Lake Victoria in Bondo District, Maranda Division, Southwest Sakwa Location in Kapiyo Sub-Location. The wetland borders Utonga Bay on Northeastern shores of Lake Victoria and Mise Valley in the Southwest side, with an area of approximately 3.5 km. The Gomro Wetland area consists of only 5 villages, i.e. Nyandusi, Utonga, Kamenga, Gomro and Sinyanya villages. The rainfall in the area is bimodal but mostly erratic with an annual rainfall ranging from 800 mm - 600 mm. The long rains occur between March and June with the peak periods being between April and May. The short rains occur between August and November. The area is classified under Agro-ecological zone of LM4 with red volcanic soils with sandy loams, which are of thin layer because of the pronounced underlying rocks. The area can be categorized into semi-dry zones with very high temperatures and thorny bushes, especially outside the wetland.

The dominant wetland vegetation is papyrus with some strands of *Phragmites*, sedge grass and *Typha*. The water hyacinth, which had invaded the shores earlier, has since disappeared while the water levels in the wetland have been gradually receding over the years except in 1988 when there were El Nino floods. The wetland is a communally owned asset. Previously, freedom from hunger councils of Kenya was undertaking an agricultural activity at the site, which stalled and is currently being revived. Gomro area is sparsely populated with homesteads situated far apart.

The LVEMP wetland component visited Gomro site on four occasions since 1997 and carried out one day's rapid rural appraisal. During the last such meeting a community of 10, Gomro Wetland Management Committee was elected in addition to Kungo Youth Group (fish breeding) LAK (Location Agro Forestry Committee) and Rice Growers Group. The mobilization carried out by then was inadequate and hence the need to carry out a full Participatory Rural Appraisal (PRA) process for seven days in the area. The 7 days process was very useful to the community in planning, unification, sensitization and mobilization towards the collective activities. In addition, it was excellent in helping the community to identify locally available resources and how best they can be used to alleviate poverty.

The problems facing Gomro community were inadequate markets for mats, inaccessibility into papyrus, increase in poverty/low income, stalled irrigation project, uncontrolled burning of papyrus, inappropriate fish gears and prevalence of human disease e.g. HIV/AIDS. Proposed interventions by the component included improvement of transport within the wetlands for mat makers, improvement of quality and diversified mats, construction of mat-making store, office and workshop, rehabilitation of irrigation project for horticulture, improvement of marketing of wetland products, establishment of fish ponds for catfish propagation and establishment of a tree nursery.

The membership of this group was not clear from the interviews carried out. It ranged from 6 to 36 people. The group was formed during a survey carried out by LVEMP in March 2003 at a baraza where 30 members of the community resolved to form a

group. Officials were then appointed in this meeting most of who had very low level of education and very elderly.

The objectives of the project were to avail safe Lake transport for mats and mat makers to Island beaches, to improve papyrus harvesting routes/channels, to construct mat making store, office and workshop at the beach, to improve quality of mats, rehabilitation and re-planning of water project to enhance irrigation, to establish fishponds for catfish fingerlings propagation and to train community on wise use and improvement of quality of wetlands resources. LVEMP assisted the community with KShs.34,000.00 to purchase a boat to assist mat makers, 2 tanks, basins, a wheelbarrow, foot pump, 1 jembe, 1 spade, biological instruments and fertilizers/lime. The community on their part contributed labour, poles for fencing and building a house, 1 acre of land for constructing fishponds. The community does not have an account and have no money.

The catfish fingerling multiplication project at GOMRO was chosen to help the component learn from one intervention whose objectives were not achieved. . The major reason cited by the component was the recession of the lake water level. However, the community cited several reasons including:

- The fishponds were not fenced and so otters predated upon the fingerlings before the water receded.
- The fishponds were very far away from the homes without adequate security.
- Extension services from component stopped at a critical time that they had just achieved a breakthrough in hatching the fingerlings. Nobody was there to guide them on this highly technological venture, which was new to them from May 2003.
- The water source from the lake was blocked regularly due to siltation.
- Fish kills due to over-liming of the ponds.
- No exchange programme to other catfish fingerling production projects within the basin which was promised but never took place.
- Lack of patience on the part of their members particularly when the benefits were not forthcoming and members became a laughing stalk by non-members.

The community reckons they are still very willing to continue with the project and are waiting for the component.

Challenges during Implementation

The catfish propagation sub project at GOMRO presented the following challenges:

- The Lake levels receded so much so that the water supply from the canal dug to channel water to the fish pond dried out. This discouraged the community members from continuing with the project.
- There was a management problem within the wetland community, which arose from the utilization of the boat/canoe between the mat makers group and the fishermen.
- The entire Community Action Programme (CAP), which was developed during the PRA, could not be implemented because of lack of funds.

- The community was used to everything being done for them and where they used their labour, it was paid for by Freedom from Hunger Council. This dependency syndrome presented a challenge to some extent.
- Another big water project by Freedom from Hunger Council failed in the same community because funds got finished before distribution pipes were provided but the pump is available. Probably the component could consider joining forces with this existing infrastructure to provide water for both irrigation and fish farming.
- The assistance given to the community should be made known to them as to date they do not know how much funds were spent to assist them with the facilities provided at the site.
- Land for constructing the fish farm was contributed by an individual without any documented lease agreements. This should be looked into in future.
- Despite the problems experienced, the catfish project should be revived

3.2.7. Dionosoyiet Wetland - Kericho

Apart from studies on buffering capacity in this site, other activities involving the community members were also carried out. Two groups were recognized in this site, the water point and members of the wetland management plan.

The water point group had approximately 3 members (range 2 – 6), who came together for the common goal of managing the water point. They were partly motivated by a CBO, Mtobo Environmental Project whose objectives were tree planting, garbage collection and spring water protection/management. The group started on 5th June 2004 after World Environmental Day. The group was not adequately prepared before the project. The material support they received from the component like cloth lines and the fence have so far vandalized by residents of Mjini Estate. Given the number of beneficiaries of the project, it can be deduced there is no group work particularly after the Chairperson disappeared with KShs.7,000.00 that had been generated by the group. A new group therefore needs to be formed to oversee the management of the water point. Supervision from component has been minimal, only three times.

The income of the group has not changed to date as most members withdrew when their money was misappropriated. Infighting still exists due to poor communication and inadequate skills on group dynamics and administration. The project has however, provided a cheap source of water for domestic use. Some of the problems include uncooperative members, lack of understanding and fear of voluntary work.

As concerns the wetland management group, the method used to appoint the officials was not democratic as elements of tribalism and nepotism was noticed particularly from the local administration. The members were neither prepared nor trained on the task ahead of them. Problems like vandalism of perimeter fence can be attributed to lack of community involvement right from the beginning. The community is poor in voluntary spirit, which interferes with their cohesion as a group and political interference. It should be noted that this is a special community group with special challenges that would help the component understand how to solve wetland conservation problems in urban communities.

The community therefore, needs education and awareness creation, training in technical aspects and assistance with funds to construct a tree nursery, overhead water tank and well-designed car-wash site. The handing over of the project to the Kericho Municipality was also prematurely done and NEMA officials at the district need to forge a close collaboration with them until the projects attain sustainability level as at now the group is very far from reaching this level.

3.3. ACHIEVEMENT OF THE OBJECTIVES

Table 1 shows the original proposed project activities and those carried out by the component. This was used as a checklist of the successful activities accomplished by the component in the last seven years. However it is important to note that the component was advised by the various review missions to modify this list and prioritize depending on their experiences on the ground.

Table 1. The original proposed Sustainable Use Sub-Component Activities and the interventions carried out by the component since the project started to date

Original Proposed Activities	Component Intervention
Survey the extent and intensity of the traditional methods of wetland utilization, and the corresponding management strategies employed by various ethnic communities around Lake Victoria.	Done but management strategies not clearly brought out.
Estimation of production rates and the biomass standing crop of papyrus and other wetland macrophytes and their potential for sustainable harvesting, economic feasibility of exploitation for mat making, energy briquettes and soft board manufacture	Some aspects done in some communities
Evaluate the suitability of wetland soils for agricultural crop production and livestock grazing within the upper reaches of the rivers of Lake Victoria Basin including options encompassing wetland modification	Not done
Development of strategies for the rehabilitation of specific degraded wetlands producing sub-optimal products, and the likely production returns following rehabilitation	Not done
Development of guidelines of wise use management practices that are compatible with the buffering capacity of individual wetlands	Developed in some sites
Evolve strategies for community participation in the implementation of wise use of wetlands which are acceptable to government, NGO's and other stakeholders	Strategies not evolved
Demonstration projects illustrating wise use utilization and management practices in sample wetlands in each of the three riparian countries	Note done
Train a core team of wetland specialists in wise use concept through tailor made short courses to work with grass root communities, administrators and policy makers	More needs to be done
Strengthen capacity of local NGO's and CBO's to undertake wise use activities.	Done to CBO's but not NGO's

3.4. BUFFERING CAPACITY

The sub component was established to look into the buffering role of extensive fringing wetlands found at the points where the major rivers flow into the lake. Although the buffering role of wetlands is widely known, it was important to understand the buffering capacity of these systems in reducing pollutant loads from agro-industrial activities and municipal wastes that cause eutrophication to Lake Victoria. The focus was placed on the fringing wetlands as the buffering role of wetlands in the headwaters is of lesser significance to the lake (see proposal Section 8.2.10.1). There was also need to determine the fate of the pollutants within the wetlands.

Sub- Component Objectives

The overall objective was to investigate the buffering process and capacity of the Lake Victoria wetlands and devise management strategy to maintain long-term environmental protection of Lake Victoria.

The Specific Objectives

- To undertake rapid assessment of wetlands of Lake Victoria Basin leading to a full inventory and resource survey of Lake Victoria wetlands.
- To assess the economic potential of wetlands and evaluate their contribution to the local communities and the environment within the Lake Victoria Basin.
- To identify and quantify the nature and magnitude of threats to wetlands and propose mitigation measures.
- To formulate guidelines for wastewater management.
- To sensitize the community on the importance of wetlands.

3.4.1. Rapid Assessment

Background

A river basin ecosystem approach was used to conduct rapid assessment of six river basins within the Lake Victoria Basin Nzoia, Sio, Yala, Nyando, Sondu-Miriu and Kuja – Migori. The objective of this exercise was to give a comprehensive understanding of the types and status of the wetlands in the basin, which would feed into the wetland management plans. A multidisciplinary team comprising of an ecologist, hydrologist, water chemist, soil scientist and an environmentalist drawn from different institutions was used to accomplish this exercise. The specific objectives of the exercise include:

- Locate geographical position and categorize wetlands in the river basins.
- Determine ecology, hydrology, water quality, soils, socioeconomic and management status of the wetlands in the river basins.
- Identification of sensitive areas for research in an effort to maximize the buffering capacities of the wetlands and enhanced management.

Outcome

In the entire basin the exercise categorized the role played by wetlands into two in terms of buffering capacity

Category 1: Wetland acting as storage surfaces particularly in the upper catchment highlands and plateaus.

Category 2: Wetlands acting as sediment traps and sinks for various effluents, nutrients, and other pollutants emanating from anthropogenic activities.

The rapid assessments brought out several threats and management issues which required appropriate interventions if the multi-functionality of the wetlands was to be sustained within the basin. These include:

- High sedimentation rates emanating from rural and urban runoffs bringing huge deposits of silt to the wetlands.
- High nutrient levels draining from the upper catchments with high agricultural potential.
- Overgrazing by livestock.
- Degradation of wetlands from brick making, drainage and reclamation for agricultural activities.
- Conflicting policies as in the case of popularization of the planting of *Eucalyptus saligna* along the streams and valleys in the 1950's to the 70's to drain the wetlands by the forest department.
- Loss of biodiversity and particularly habitat for waterfowl came out strongly as concerns the crested cranes reported to be abundant within the wetlands in the 1950's and 60's but to date have been displaced from the wetlands and their populations dwindling.
- Water abstraction for domestic use.
- Development project like the Sondu-Miriu Hydropower project.

Despite the threats, livelihood of the communities appears to depend largely on the wetland resources. Some of the uses include mining of clay for pottery, brick making, growing of horticultural crops, grazing of livestock, medicinal plants, fish farming, building materials and firewood from *Eucalyptus*, and products from wetland plants like papyrus which are used for making fish traps, baskets, mats and as building materials.

Management of these wetlands therefore will benefit greatly from deliberately designed interventions that provide alternative livelihoods to the communities. Some of the relevant interventions needed to save the wetlands in these river basins should revolve around:

- Demonstration sites for rehabilitation and restoration of degraded wetlands.
- Demonstration of wise use of wetland habitats with projects offering alternative livelihoods to the communities in these high-density areas.
- Assessment of the impact of *Eucalyptus* stands, brick making and agricultural activities on biodiversity and buffering capacity of wetlands in upper catchments and floodplains of different river basins.
- Development of bioindicators for the long-term monitoring of wetland health.
- Economic valuation and cost-benefit analysis of competing wetland uses.

3.4.2. Buffering Capacity Pilot Sites

3.4.2.1. Description

Dionosoyiet is a relatively small wetland covering approximately 34 hectares and a catchment area of 23 km². The permanent riverine wetland is located in the upper reaches of the Sondu-Miriu river system and lies in a wide flat valley bottom separating steep undulating topography on both sides. The wetland has several inlets bringing in water of different quality and quantity (Figure 2). This includes storm drain from Kericho town, spring discharging very clear water, three streams draining agricultural and residential areas with different population densities. All these features make the wetland very unique thus the understanding of its buffering capacity role.

Chepkoilel Wetland is a permanent riverine wetland 10 km long and about 700 m wide at the widest point with an area of 5.6 Km² and a catchment area of 210 Km² (Figure 3). The major inflows to the wetland is the Sergoit- Misikuri river system which drains the slopes ranging upto 2160m above sea level with several agricultural activities of mainly maize and wheat and limited vegetation cover. It has its source from Kaptagat forest with several small streams that join to form the Misikuri system. The wetland receives effluent from Moi University wastewater ponds, minimal discharge from the fish farm and runoff from agricultural farms. It is also bordered on the South East by Equator Flower Farm, which abstracts its water at a weir constructed across the Misikuri Stream with outflows entering the wetland from a spillway that discharges back into the water course immediately downstream of the weir wall.

3.4.2.2. Site Selection

The study concentrated on two sites Dionosoyiet in Kericho District and Marula Swamp in Uasin Gishu District. These were among the five sites which the component presented to the consultants. In the original project proposal, it is clearly stated that the project was to focus on the littoral wetlands on the shores of Lake Victoria preferably in close collaboration with the pilot zones designated by the project (Section 8.2.10.1 of the proposal). These littoral wetlands were recognized to be playing a more critical role in reduction of eutrophication in the lake than those in the headwaters (LVEMP, 1996). Because of the selection some objectives like number (v) “Design and undertake a detailed three dimensional, suspended and dissolved solids monitoring network within the pilot wetland to determine change both horizontally and at right angles to the lake shoreline and with depth” (MENR-LVEMP, 1999), could not be achieved.

Figure 2. Map of Dionosoyiet wetland in Kericho District

Figure 3. Map of Marula Swamp in Eldoret Uasin Gishu District

3.4.2.3. Contribution to Overall Objectives

The exercise contributed greatly to the understanding of the buffering role of wetlands in the headwaters of the basin. However, a deliberate effort should have been made to field test with another wetland close to the lakeshore as these are the ones that effectively reduce the amount of nutrients that enter the lake. Whereas pollution in the headwaters would affect immediate downstream users, effectively by the time water reaches the lakeshore it would have been naturally cleansed through the rivers self cleansing capacity.

3.4.2.4. Constraints

1. Interpretation of the TOR's brought some problem in this consultancy. Those who drew the TOR's were different from the supervisors and the implementers on the ground. Some important technical and logistical aspects of the study brought conflicts.
2. Technological transfer in the TOR was not clear on whom to meet the cost and the nature of training. It therefore turned out a mere meeting leaving the component without much needed skills in management of wetlands.
3. The duration of the study was too short.
4. Equipment, sample handling and protocols for analysis of samples were not made clear to the component up to the end. Quality control should have been done to ensure the quality data was collected and the same handed over to the component for management purposes and continuity.

3.4.3. Achievements

The achievements of the sub-component were assessed by comparing the successful interventions with the range of original activities set out at the beginning of the project in Table 2.

Apart from outputs arising from the activities in Table 2, the most significant outcomes of this sub-component as laid down in the project document should have been a management policy recommendation document for the lake basin, which contains:

- An economic evaluation of the value of buffering services provided to Lake Victoria by wetlands.
- Environmental Impact Assessment procedure for wetland interventions.
- A manual and investment proposal for wastewater filtering through wetlands.
- A manual and investment proposal for wetland rehabilitation and artificial wetland construction.

Whereas the sub-component strived to achieve their objectives, these important aspects which should be fed into the wetland management process within the basin still remains to be accomplished.

Table 2. A comparison of the original proposed Buffering Capacity activities and those carried out by the sub-component in the lifetime of the project

ORIGINAL SET ACTIVITIES	ACTIVITIES CARRIED OUT BY SUB-COMPONENT
Rapid quantitative categorization of individual L. Victoria wetland systems	Done
National technical workshops to discuss methodologies and prepare action plans for quantification of the buffering function	Partly done by consultant
Stakeholder seminars to raise awareness of the value of wetlands and to mobilize local communities	Done mostly in the upper catchment
Simulation of current inputs (loads and seasonality) into individual wetland systems	Done by consultant
An intensive one-year field-based programme of monitoring of loads into priority wetlands	Done by consultant
Comparison of buffering capacity of individual wetland systems and prioritization ranking of lake basin wetlands in the provision of buffering services to Lake Victoria	Not done
With the priority wetlands, implementation of a scientific process-based quantitative assessment programme of the buffering function of natural wetlands on water quantity, quality and sedimentation loads into Lake Victoria	Not done
Simulation of the magnitude of change in buffering function associated with the threats to wetland resources	Not done
Field-based investigation of the fate of assimilated minerals and nutrients within wetlands, with estimates of the volume of stored lake-threatening pollutants.	Not done
Economic valuation of buffering services provided to Lake Victoria by wetlands	Not done
Production of guidelines and investment proposals for wetland rehabilitation and artificial wetland construction to maximize the buffering capacity of the lake basin wetlands	Not done

3.5. WETLAND PROJECTS BY OTHER INSTITUTIONS WITHIN THE BASIN

3.5.1. KIPRA - Ecotools Project

Tools for Ecosystem Management (Ecotools) is a collaborative project between Kenya Institute for Public Policy Research and Analysis (KIPRA) and other international partners including University of Siena, UNESCO-IHE Institute for Water Education, Trinity College, Dublin, Makerere University, Ministry of Water – Uganda and University of York. The aim of this European Commission funded project was to provide regional managers, policy and decision makers with models and experiences that may be used to deal with management of complex ecological / socio-economic / political systems in wetlands within Lake Victoria. In Kenya Ecotools research activities focused on the Yala Swamp.

3.5.2. ICRAF Nyando and Yala Swamp Projects

ICRAF has done relevant research work in wetlands within the Lake Victoria Basin. Their work on wetlands has focused on the Nyando and Lower Yala/Nzoia River Basins. The information could be found in the theses reports of the students who conducted the research activities. Topics related to LVEMP Wetland Component activities include:

- Biogeochemical (carbon) cycling within Yala Swamp and Nyando Wetlands.
- Wise use options for wetland management.
- Sedimentation histories and land use changes within River Nyando, Sondu-Miriu and Yala-Nzoia River Basins.

3.5.3. VIRED International

a) NYANDO WETLAND PROGRAMME

The Nyando Wetland Conservation Programme (NWCP) is a community-based initiative to conserve the function of Nyando River mouth wetlands and to maintain the long-term availability of the wetland resources. The Programme was a joint research and community based project between scientists from VIRED International, Kenya Wildlife Service (KWS), and Nyando wetland community, and was funded by the KWS-Netherlands Wetland Conservation Programme.

In its lifetime the programme carried out education and awareness activities and demonstration of selected sustainable wetland wise use principles in the area. Baseline information was compiled to evaluate the impact of human activities within the catchment of River Nyando and on the existing status of environmental factors such as water quality and biodiversity within the wetland. Preliminary wetland mapping studies were undertaken. A socioeconomic and gender study was undertaken to evaluate baseline knowledge of wetland use and conservation issues. □ The Programme also addressed human-wildlife conflict in wetland ecosystems and that between food security issues and the need to conserve the Nyando wetland. □ The Programme continues to work with communities through food for work to manage flood water in flood prone areas to minimize the adverse effects of seasonal flooding in the Kano

plains and Budalangi as a means for promoting food security and to reduce the pressure to expand farming activities into the wetland. Principal among NWCP activities was the creation of awareness on the importance of the Nyando wetlands.

Apart from the floodwater management component, interventions on wetland conservation and rehabilitation activities stopped prematurely when the Netherlands Government withdrew their donor support to all projects in Kenya. This happened before sustainability was attained.

b) CONSTRUCTED WETLANDS FOR TREATMENT OF SUGARCANE WASTEWATER AT CHEMELIL

This was a need driven project designed to address the problem of high level of pollutants, particularly nutrients from sugarcane industries into Lake Victoria and the need to use the wastewater for sugarcane irrigation during the dry periods of the year. The basin has six sugar industries, the highest in any single basin in Kenya, that discharge their effluent into different rivers draining into the lake. Almost all these industries are facing the problem of not meeting the discharge standards as a result of high costs involved in the use of conventional wastewater treatment systems. Constructed wetlands have been identified to be an alternative to reduce the costs particularly in the tertiary treatment of wastewaters to meet discharge standards. The project has been engaged in several activities to try and achieve the goals above with Chemelil Sugar Industry as pilot project. The project, which is being carried out by VIRED International, started in the year 2001, and is in its third phase of implementation and funded by SIDA-SAREC.

Some of the achievements of the project include:

- Cost-benefit analysis for three different treatment systems for wastewater from Chemelil Sugar Company.
- Emergy analysis of three types of treatment systems for wastewater from sugar industries.
- Comparative performance of *Cyperus papyrus* and *Echinochloa pyramidalis* in the treatment of effluent from a sugarcane industry
- The biomass of *Cyperus papyrus* and *Echinochloa pyramidalis*
- The use of macroinvertebrates as bioindicators of the performance of the constructed wetlands under different loading conditions stabilization ponds.

3.5.4. OSIENALA – Conservation and Rehabilitation of Yala Swamp

Lake Kanyaboli Conservation and Rehabilitation programme was carried out by OSIENALA through funds donated by the UNDP-GEF Small Grants Programme within the Yala Swamp. The project addressed the environmental degradation within the wetland and its surrounding to come up with appropriate community based interventions. Among the activities carried out were community diagnostic survey, education and awareness programmes, opening of a feeder canal from River Yala to the lake and scientific research to generate data for management. The programme however ended before reaching its sustainable level.

3.5.5. Egerton University – Fingerponds Project

Fingerpond system is an intermediate technology aimed at enhancing wetland fishery and seasonal agriculture. Fingerponds project was started in 2001 and is funded by the European commission under the research area: *Tools for sustainable development, aquaculture and fisheries*. It aims at developing smallholder extensive and semi-intensive fish culture techniques using natural productivity of existing water bodies.

Fingerponds are small-scale integrated fish and crop production in natural wetlands. It is more or less enhancement of seasonal flood pool fishery and combining with seasonal agriculture normally practiced by rural communities living adjacent to natural wetlands. Finger ponds are constructed at the edge of the swamp by digging out series of parallel channels ‘fingers’ towards the centre of the swamp. The soil removed is used to provide raised beds between the ponds. The ponds are stocked by natural migration of fish from the adjacent water bodies during annual floods. After flood recession, the ponds can be used for fish culture while the raised bed can be used for locally demanded vegetable crops.

Two experimental sites in Kenya are in Nyangera and Kusa villages adjacent to natural wetlands at the shores of Lake Victoria, Kenya. Nyangera is located at the littoral wetlands at the northeastern shores of Lake Victoria at 00°03’ S and 34°04’ E. it lies at the shores of Kadimu Bay on the northern shores of Lake Victoria on the Kenya site near the Yala Swamp complex. Fingerponds were constructed in littoral wetlands within the emergent macrophyte zone about 500 m from the shoreline. The dominant vegetation at the site is composed of mixed stands of emergent macrophytes dominated by *Phragmites sp*, *Typha domingensis* and *Cyperus papyrus*.

Kusa is found on the eastern shores of Lake Victoria in Winam Gulf adjacent to Nyakach Bay at the mouth of River Nyando. The study site is situated at 00°18’ and 34°53’ E in Nyando wetland. The wetland ecosystem is dominated by papyrus, *Vossia cuspidata*. Isolated stands of *Phragmites sp* and *Typha sp* are also common in various parts of the wetland. *Cyperus sp* dominate the wetland region.

3.5.6. East Africa Inter-University Council - VicRes Funded Projects

The Inter-University Council for East Africa (IUCEA), with the support from Sida/SAREC has in the last three years supported multi-disciplinary wetlands research activities within the Lake Victoria Basin among the staff from universities and research institutions in the basin. Restoration of the already degraded wetlands and promotion of wise use and sustainable management of wetland resources requires generation and dissemination of scientific data to empower local users and influence decision-makers at national and regional level to prioritize sustainable wetland management through policy-making and macro planning. The contribution of SIDA and SAREC in funding the Lake Victoria Research program will lead to elaboration of strategies and actions to develop synergies for effective management of wetland resources of Lake Victoria. A few VicRes research topics are listed in the reference section but a comprehensive list can be found in the VicRes website.

3.5.7. KWS – BINU Project

The Biodiversity Indicators for National Use (BINU) in wetland ecosystems project is supported by the UNEP-GEF, with co-financing from the governments of UK, the Netherlands and Switzerland and aims to develop ecosystem specific indicator; and KWS frameworks. BINU also aims to develop general indicators that can be used by the resource users, managers and policy/decision makers at National level, and make wise use of information on biodiversity indicators to support global and regional frameworks aimed at biodiversity conservation under CBD and promote GEF initiatives. The project is coordinated by UNEP-WCMC with technical support from RIVM.

The BINU project involves efforts by four partner countries to develop biodiversity indicators, each for a single focal ecosystem, which are appropriate for use to support policy and decision-making at national level. Four countries are participating in this project with each addressing a single ecosystem include Ecuador (forests and other terrestrial ecosystems), Philippines (marine and coastal ecosystems), Ukraine (agricultural ecosystems), and Kenya (inland wetland ecosystems).

Kenya attempted to develop site-specific indicators, which were scaled to National level. The four ecosystems identified were; fresh water lakes (Naivasha), riverine wetlands (Tana River), swamps (Yala Swamp) and alkaline-saline lakes (Nakuru) which were carried out by four task forces. The indicators developed were aggregated to national biodiversity indicators. Biological indicators contribute significantly to conservation and sustainable development.

3.5.8. National Universities and Research Institutes

The national universities and research institutions have been carrying out a number of useful research activities addressing diverse areas within the Lake Victoria Basin. Most of this information is stored in the library shelves as Masters and Ph.D theses, reports and international journals. A survey of such wetland related topics reveals availability of enormous human resource that if harnessed through appropriate institutional linkages could contribute to achievement of objectives of a project like this.

A list of the wetland related research topics from the universities, and other institutions which is not exhaustive is provided in appendix 2.

3.6. PLANNED AND ONGOING DEVELOPMENT PROJECTS IN WETLANDS WITHIN THE BASIN

3.6.1. LBDA - Oluch Kimira Project

Oluch – Kimira Small holder Irrigation Development is a project planned to be carried out by the LBDA on the shores of Lake Victoria. Oluch with a planned irrigation area of 610 ha will be fed by natural flows from River Awach Tende while Kimira with a planned irrigation area of 771 ha will be fed from River Awach

Kibuon. Oluch and Kimira wetlands occur in Homa Bay and Rachuonyo Districts respectively of Nyanza Province. The project plans to construct irrigation weirs, canals, drains, siphons, night storage reservoirs, roads bridges for 1,380 hectares of gravity irrigation. Proposed crops to be grown includes maize, beans, sweet potatoes, tomatoes, kales and other vegetables to benefit approximately 3,000 households in each scheme.

Although the feasibility studies indicate that the wetlands have not been included in the layout. The risks of secondary soil salinity in rice growing areas and chemicals discharged from agricultural activities may need to be monitored closely from time to time once the project starts to ensure the fringing wetlands are not affected.

3.6.2. Dominion - Yala Swamp Irrigation Project

This is one of the single large-scale agricultural projects being carried out within a wetland fringing Lake Victoria. The project has and will continue to reclaim several hectares of the wetland and convert it to agricultural land. Among the investments to be made include cotton plantations, fish farming and rice irrigation. This project is very controversial and some of the activities to be carried out were not amongst the ones specified in the original project document and as such, the EIA never addressed their impacts, thus posing a great threat to wetland habitat integrity and biodiversity. Of immediate concern is a dyke that has blocked the backflow of water from the swamp to Lake Kanyaboli. This would have far reaching impacts to the lake which is endowed with unique indigenous fish species.

LVEMP Wetland Component could have contributed greatly by concentrating their activities in such a wetland to establish impacts of large scale reclamation for agriculture, restoration and monitoring procedures and strategies that could be used to ensure that the multi-functionality of such important wetlands are not lost..

3.6.3. Sondu-Miriu Hydropower Project

A hydropower generating station will soon be commissioned in the lower reaches of the Sondu-Miriu River Basin. The lower reaches of this basin is endowed with one of the highest diversity of fish species, other fauna and a healthy floodplain wetland at Osodo Bay. Environmental impact assessment carried out for the projects rules out any undue environmental impacts. However, precautions need to be taken to establish mechanisms to monitor the health of the wetlands downstream.

3.6.4. Small Holder Rice Irrigation Activities

Small holder rice irrigation schemes are a widespread feature in all the wetlands fringing Lake Victoria Basin. Most of these initiatives are normally carried out without any environmental considerations neither are they coordinated. Since these activities are carried out in wetlands, their impact should be assessed and the same can benefit tremendously if through research on the size of wetland that can ensure buffering for the lake were determined by this project.

3.7. LESSONS LEARNT FROM THE COMPONENT

Several lessons both positive and negative have been learnt from the range of activities carried out by the component to date as listed below.

1. It is commendable that community based interventions were based on PRA's and communities given a chance to prioritize their activities through the CAP's. This could lessen the rate of project failures and the approach should be used in any future projects.
2. Most activities were concentrated in wetlands in the upper catchment and the distribution uniform within the basin. Whereas the component was free to prioritize, a deliberate effort should be made to have more intervention sites at the lakeshore wetlands, given their direct significance to the lake ecosystem.
3. The use of market surveys to link the principal production centers to the markets within the basin was a bright idea. However, some of the production centers still have marketing problems. This can be attributed to lack of initiatives on the part of the communities and probably a new strategy should be adopted. Focus should be placed in instilling management skills and discourage the attitude of expecting very quick returns and overdependence on donor support.
4. Market surveys generated very important information that should be factored into the project management.
5. Information gathered from survey of traditional wetland production systems should be fed into strategies / guidelines by the component to address issues like:
 - Wetland restoration interventions that lead to a decline in their production capacities.
 - Guidelines on resolution of conflicts arising from use of wetland resources that impact negatively on the wetlands.
 - Reinforcement or support positive initiatives by the communities to conserve the wetlands.
 - Opportunities that exist in the basin to sustainably exploit this technology to increase the living standards of the community, a direction that should be pursued in future by the component and its collaborators.
6. Lack of competition and over exposure of a single community could lead to stagnation and it would be appropriate to establish more groups within the basin doing the same thing to instill a competitive spirit.
7. Supervision/extension is key to the success of community based projects. The projects that performed relatively better were those in close proximity to the wetland component office in Busia. Where local field officers like District Environment Officers (DEO's) are used, they should be adequately facilitated and in time to carry out project activities. This would enable them plan to balance their normal office responsibilities and project work.
8. Local communities can acquire complicated scientific technologies such as artificial propagation of catfish through hypophysation for their own benefit so long as they are adequately trained and exposed.
9. Bunyala Handicraft Cooperative Society (Mubwayo) which was rated by the component as one of the most successful projects appears to still have teething problems threatening its existence and success. It is apparent that capacity of

- such important groups be built and their progress monitored adequately until sustainability is attained to protect them from collapsing.
10. As concerns new projects, a comprehensive community based wetland management plan with a bottom-up approach should be developed to chart out all the interventions to be carried out in the conservation and wise use activities. The component has this opportunity in King'wal wetland in Nandi District where there is immense support by government authorities, local authorities and civil society. The local community at this site can be harnessed to produce a success story which can be used as a model for conservation of wetlands in the upper catchment..
 11. The promotion of *Zyzigium* trees by the CBO's as a substitute for blue gum (*Eucalyptus*) in the upper catchment as in King'wal wetland should be supported and promoted in the entire catchment as the tree is environmentally friendly and offers all the attributes the community can get from *Eucalyptus* which is a big problem.
 12. Dunga Ecotourism Project is a fairly young organization composed mainly of youths. The group is fairly cohesive and all the members appear to be informed of all issues including funds. This is the only group where all the members knew the amount of money in their account of all the groups visited in the Basin. This transparency should be instilled in all groups.
 13. Ecotourism promises to be a very lucrative area and since groups like Dunga are first timers, their capacity needs to be built to enable them venture aggressively in this unique area. The group should also to be assisted to make them politically right with all the line ministries as their activity is multidisciplinary.
 14. The membership in most of the community groups was very low despite the fact that the projects were offering important services like domestic water supply as in the case of Doinsoiyet. On the other hand, groups such as Dunga Ecotourism Project and Bunyala Handicraft Cooperative Society had an interesting membership which involved all the interest groups within their locality. This all-inclusive membership should be encouraged as interventions end up benefiting a wider community and the environment. Probably different strategies of community mobilization should be developed by the component or they collaborate with relevant NGO's who are specialized in this area.
 15. Lessons Learnt from Gomro Catfish Multiplication Project indicates that translation of institutional based to community based fish production system is not easy without adequate technological transfer. However it should be noted that it is not impossible as within the same basin Siteko Wetland Community succeeded and have been using the same technology. The same GOMRO Community also succeeded in producing fingerlings once. The demand for clarias fingerlings as fish bait is very high within the basin. It can be a good source of income to the community and at the same time prevent interference with breeding grounds of juvenile fish within the wetland. The last frame survey in Lake Victoria revealed the existence of 2.6 million hooks, so harvesting approximately 1 million juveniles per day from the wetlands is worrying. The activity could improve the income of the community tremendously as the turnover rate is high and the market is sure and within their reach.

16. Most projects need regular flow of funds and committed extension officers to follow up on project success particularly at critical moments.
17. Most fisheries officers at the district offices are not keen on fish farming and so cannot be relied on to assist the community in fish farming initiatives from other components. But if this is to be done then facilitation of the specialists identified should be based on the nature of the work to boost their morale.
18. The site selection at GOMRO was not appropriate. To benefit from community based fish farming initiatives, there is need for water to flow into the ponds by gravity. The accessibility to the site should be good and the site should be secure both against vandalism and fish predators. However, this project should not be abandoned as ample opportunities still exist. Rehabilitation of the Freedom From Hunger Council stalled water project would solve the availability of water for fish farming and horticultural activities prioritized by the community during the PRA.
19. Mobilization of urban communities as in Dionosoiyet may need different strategies as opposed to the rural communities due to diversity of ideas, ethnic background, and ownership. And an **all inclusive** committee should be formed to come up with a plan of action to oversee the long term management of the wetlands.
20. A clear demonstration of recharge functions of the wetland is demonstrated in Dionosoiyet where the water source for the community is obtained from recharge (interaction of wetland and water) this can be used as a demonstration site to reinforce water recharge functions of wetlands.
21. There is need to fully empower the NEMA officers in the field to continue playing a coordination role at district level as this would ensure continuity of activities initiated by the project.
22. Thorny issues affecting management of wetlands in the upper catchment should be addressed through appropriate education and awareness packages. These include encroachment of wetlands in privately owned lands, use of *Eucalyptus* to drain wetland, destruction of the catchment areas, brick making, conservation and capacity building.
23. Apart from financial facilitation, lack of transport affected the performance of field staff and implementation of the projects.
24. Whereas the rapid assessments carried out within the basins generated enormous amount of information, it appears the findings were not strictly relied on. A case in point is the Ramacha Wetland within the Kuja – Migori basin which was earmarked by the assessment as a potential pilot site. The wetland was identified to be highly polluted receiving a lot of nutrients from adjacent farms, extensively drained while at the same time the main water supply to the community. Future interventions should be based in such findings and such fragile ecosystems should not be ignored.
25. High level of nutrients due to high agricultural potential in the upper catchments of the river basins can be handled if the wetlands are conserved. Although land tenure/ownership poses a great challenge, strategies should be put in place to conserve and restore the integrity of these wetlands.
26. Lessons learnt in engaging a consultant to study a specialized subject area includes:
 - The client should ensure there are no unnecessary delays from the time the consultants are identified and the time they start their work. In this case the

TOR's were drafted in 1999, signed in 2001 and the project started four years later in 2004.

- The client should insist on working with the names specified in the contract document
 - International consultants are important as they introduce new technologies and findings in the region. However, local researchers who are fully conversant with the area should be fully involved in order to enhance quality of the final product.
 - Where technological transfer is needed, time needs to be dedicated for this exercise to ensure continuity. Modeling in this consultancy for instance, was one of the most significant outputs to be used for long term monitoring of wetlands within the basin. Technological transfer was given only one day leaving the component unable to grasp and apply the most needed technology.
 - The client should actively participate in the selection of the local collaborators to ensure their credibility and to clearly explain their role in the consultancy as they are bound to play a major role.
27. There is ample evidence that several local and international NGO's, Universities, Research Institutions and other international institutions are carrying out wetland conservation and management activities relevant to the objectives of the LVEMP wetland component. It is important that competencies of these institutions be ascertained and appropriate institutional linkage frameworks established as this would go along way in enabling the component achieve all its goals and avoid duplication of effort.
 28. There is urgent need to willfully involve adjacent communities including local grass root groups, civil society and municipalities in enforcing conservation and wise use of wetlands. All possible avenues including local barazas, target workshops, farmer day talks and demonstration of best practices could be used to empower policy makers, farmers, fisher folks and extension officers.
 29. There is need to provide practical guides with clear statement on best practices, which are indispensable for conservation and sustainable management of shared wetlands. The best practice manual should point out how much of a wetland can be transformed for what purpose (and when for seasonal wetlands), and how to minimize alteration of wetland hydrology, reduce erosion, keep the wetland soil nutrient-rich and conserve wildlife habitat.
 30. The development of wetland policies has been a hindrance to enforcement and actions pertaining to wetland conservation and management on the ground. A concerted effort should be made by NEMA and the government of Kenya to produce the wetland policy.
 31. Regional efforts through development partners such as the World Bank, the European Union, SIDA, NORAD and RELMA have led to isolated and limited impact on sustainable wetland management; mainly, because they are neither backed with scientific data nor effectively coordinated even when they target common problems. Further, their initiatives have taken project approach without an in-built sustainability component. Capacity building among scientists, environmental and agricultural extension workers should be addressed by these projects to respond to wetland management issues.

32. Awareness creation on wetland values among various stakeholders is very important and should be stepped up in the future in order to minimize threats and enhance sustainable management.
33. At the project level more support from secretariat to the component is needed to help them address their problems which are unique and multidisciplinary in nature.
34. Collaborative research and community mobilization activities have enhanced quality of work due to greater access to expertise and lab facilities in various institutions. Collaborative activities under land use components also made a greater impact particularly if targeting a limited area.
35. Community members show greater involvement and interest in activities where they foresee tangible economic benefits. This attribute should be exploited by designing wise use activities that address community livelihoods.

4.0. CHALLENGES IN WETLAND MANAGEMENT

4.1. LAND OWNERSHIP/TENURE

Most wetlands in non-protected areas occur in land owned by individuals, trust land and communal lands. Land tenure essentially defines the rules and social contracts whereby individuals and groups acquire, hold, transfer or transmit interests and rights in land tenure. Changes in land tenure have resulted in a lack of land use coordination and environmental insecurity. Perceived free access to land on a "willing buyer willing seller" basis and free choice of land use combined with a single-use philosophy has exacerbated wetland loss and degradation.

4.2. LAND USE TRENDS

Over a period of time there have been some major changes in land use. These changes have, mainly been due to agricultural and land use policies that have severely affected the environment resulting in wetland loss and degradation.

Reclamation of wetlands for agricultural development is the biggest threat to national wetland conservation and management. The reclamation is perceived as a form of positive development that is frequently misguided in the sense that greater productivity would result from leaving the wetlands intact and managing them properly than from reclaiming them. A case in point that needs urgent attention is the ongoing large-scale reclamation of Yala Swamp in the Lake Victoria basin, which promises to destroy ecological status of the largest wetland in the region.

4.3. LAND USE PLANNING AND WETLANDS

There exist many statutes in Kenya that relate to land and environment. These were enacted independent of each other and are being implemented by various government departments and institutions. Despite the existence of these several legal instruments that relate to land use and environment, there has never been a proper and comprehensive land use planning. Instead land use planning activities have been coordinated largely at the sectoral level. The consequence of this has been increasing

conflicts among different sectors of the government regarding different conflicting and use activities leading to wetland loss and degradation.

Inadequacy of legal provisions, incentives and disincentives with regard to the sustainable wetland conservation and management can also lead to uncoordinated and unsustainable land use and sectoral conflicts. Lack of institutional coordination mechanism and lack of awareness of policies relating to land by public and lack of public participation in land use policy formulation and amendments are other grey areas.

4.4. INADEQUATE FUNDING RESOURCES

Funding wetland management and conservation strategies has remained the reserve of international donor community and NGO's with very minimal contribution from the government. This has given rise to haphazard and uncoordinated programmes most of which end before attaining sustainability level. A deliberate effort needs to be put in place to ensure coordination and continuity of wetland conservation programmes being run by all stakeholders.

4.5. INADEQUATE PUBLIC EDUCATION AND AWARENESS

A wide variety of education and awareness materials are available in different institutions in various forms and formats. Much of the education and awareness information materials are in hard copies and available to the users in form of books, brochures, pamphlets and newsletters; in other places the information is in audiovisual forms and not available to most of the stakeholders especially the local community. Since most wetlands occur in the rural areas, some form of extension services should be put in place to create awareness in these areas. These should make use of print and mass media, and deliberate inclusion of wetland management and wise use principles in both curricula and extra-curricula activities of formal school system. International Wetland Day celebration should be used to create awareness to the wider public

Wetland ecology and Management courses at the universities and tertiary institutions such as Kenya Wildlife Service Training Institute (KWSTI) should be strengthened to give wetland managers and policy makers a strong foundation.

4.6. INADEQUATE POLICIES AND INSTITUTIONAL FRAMEWORK

Policy documents and their implementation are critical in harmonizing the various aspects relating to wetland use and development. In Kenya several sector statutes have policies and legislation on wetlands embodied and inscribed in them. In all, about 77 sectoral sections of various acts are relevant to wetlands conservation and management. This has resulted into duplications and conflicts. To harmonize these, the country has developed EMCA. Section 42 of this Act deals with wetlands. Though the country has the relevant policy that can guide wetland conservation, the complete implementation and enforcement of EMCA is still lacking.

4.7. NATIONAL, PROVINCIAL AND SITE-SPECIFIC MANAGEMENT PLANS

Management plans guide management decisions and interventions. Lack of national, provincial wetland-specific management plans has seen wetlands integrity being compromised and misused due to the failure to apply wetland wise use principals. This lack has seen important wetlands like Yala Swamp being turned into ecologically mismanaged ecosystems where the wetlands socio-economic potential has been compromised

4.8. TRANS-BOUNDARY WETLANDS

The challenges that face conservation and wise use of trans-boundary wetlands like Lake Victotia wetlands include:

- i) Exchange of information among and between stakeholders
- ii) Control of point and non-point pollution sources across national borders
- iii) Awareness creation on anthropogenic impacts of upstream-downstream linkages on biodiversity and livelihood of riparian communities
- iv) Maintaining water-dependent (wetland ecosystems), communities and species of plants and animals (multi-functionality of wetlands)
- v) Conservation of key plant and animal communities whose distribution covers adjoining countries e.g. establishment of protected areas and regulating utilization of biological resources especially along migration routes of birds, fish and other animals.

Development of management plans for trans-boundary wetlands is extremely important as a first step towards sustainable wetland resource conservation. Local communities from both sides should be involved to ensure a shared vision and national commitment.

4.9. PRIORITIZATION OF SUSTAINABLE MANAGEMENT STRATEGIES

To sustainably manage Kenyan wetlands, it's imperative that community-driven wetland management plans be developed at national provincial and site specific levels. In developing such plans, attention should be paid to ensure the following guiding principles are addressed adequately. Interventions should aim at:

- i) Maintaining the essential values and functions of the different types of wetlands
- ii) Preserving the multi-functionality of wetlands
- iii) Taking account of the interrelations between wetlands and other ecosystems
- iv) Involve rural, wetland dependent communities in the management of wetland resources
- v) Integrating conservation and development activities to ensure sustainable use of wetland resources

4.10. REQUIRED URGENT INTERVENTIONS

Yala Swamp is one of the most unique wetlands within the Lake Victoria Basin with a complex of palustrine and satellite lakes that can be described as living museum of Lake Victoria. This is because certain indigenous fish species like *Oreochromis*

esculentus and some endangered wildlife species like the Sitatunga and waterfowl now extinct in Lake Victoria are still being found in the wetland. Continuation of the present rice irrigation project will adversely affect overall ecological integrity of the wetland. The component should be empowered to urgently address short term and long term management challenges in this important ecosystem.

4.11. OTHER CHALLENGES SPECIFIC TO THE COMPONENT

These include:

- Conflict between wetland conservation and community livelihood.
- Transportation to the project sites for the DEO's who act as project staff in the districts.
- Multidisciplinary nature of the component calls for broad section of experts to ensure all project areas are executed professionally.

5.0. KEY EMERGING ISSUES

5.1. PROJECT SITE

The original project document was quite specific that the interventions were to focus on littoral wetlands at the lakeshore. A fair amount of work was done on wetland in the upper reaches. To gain a clearer picture, the component may think of choosing sites to cover the entire basin with representative sites in upper catchment, middle catchment and fringing floodplain wetlands.

5.2. STAFFING AND EXTENSION SERVICES

The component was run by a skeleton staff of three, the component coordinator and two task coordinators. Later, one of the task coordinators was transferred. The three were to depend on the District Environment Officers (DEO's) in the districts yet most districts within the basin never had DEOs. The DEOs in the field also had assignments given to them by the parent ministry, which they had to fulfill before they could participate in project activities. This situation compromised the performance of the coordinators as can also be evidenced in their achievements in projects away from Busia.

5.3. UNIQUENESS OF THE COMPONENT

Wetlands conservation and management is a very young science in this country and the world over unlike traditional disciplines like forestry, fisheries, water, agriculture, capacity building and socio-economic issues. The concepts are therefore quite new to the local communities and elites alike. The component is also interdisciplinary addressing all the other issues addressed by other components. The component should have been allocated the highest amount of funds to carry out education and awareness programmes and implementation of projects which are all multidisciplinary in nature. This could have affected the focusing of the component to predominantly wetland issues.

5.4. COLLABORATIVE ARRANGEMENTS

Given the multidisciplinary nature of the component activities, the component was forced to conduct certain activities with experts from other disciplines. Whereas collaboration worked well in some cases like in rapid assessments, others did not as the project was not very clear on how to collaborate with individual experts, NGO's, other government institutions, universities and the private sector. This denied the component the privilege of incorporating a wealth of information generated by other institutions within the Lake Victoria Basin.

5.5. FINANCES

Throughout the lifetime of the project, there was a problem of adequacy and flow of funds. This seriously affected time-bound activities and also the relationship between the component staff and the communities.

5.6. SHARING OF RESOURCES FOR A COMMON GOAL

It goes without saying that several institutions were carrying out activities similar to the ones the component was mandated to do. Appropriate institutional linkages should be established at the beginning of a project to ensure smooth sharing of resources and information between LVEMP and other institutions working in the Lake Victoria Basin.

5.7. THE SECRETARIAT

Whereas there has been a great improvement in the dealings between the former and present Secretariat and the wetlands component, more still needs to be done as the component feels they are among the least favoured yet the success of other components is pegged on the success of wetlands conservation and management.

5.8. WETLAND MANAGEMENT PLAN

Comprehensive management of wetland ecosystems should always be based on management plans. This is a blue-print that would guide all interventions within the basin. A good amount of effort has been directed at PRA's and Rapid assessments. These initiatives together with contributions from other institutions should contribute to a basinwide management plan. Without such a plan interventions will not be coordinated.

5.9. REPORTING AND MAINTENANCE OF A DATABASE

Progress reports and maintenance of a wetland database are very critical tools in management. Mechanisms should be established to ensure regular reporting of the progress of the project and to establish a user-friendly basin wide database for management purposes and make the sharing of information easy among all stakeholders.

5.10. HIRING OF CONSULTANTS TO STUDY TOPICAL AREAS

Efforts should be made to ensure the names listed in the contract document actually do the research and the client together with the component should ensure tax payers' money is not wasted.

5.11. NATIONAL WETLAND POLICY

To date, we do not have a wetland policy. This poses great challenges as there is no policy framework within which to enforce laws related to the abuse of wetland ecosystems.

5.12. MANAGEMENT TOOLS

The component invested efforts in carrying out rapid assessment surveys and PRA's. These are very powerful management tools that the component should continue to perform as they give an informed opinion whenever any interventions are to be implemented. The findings of these exercises should be used to guide the direction of the project. Since the mandate is basin wide, and in the absence of thorough wetland inventories, a basin wide rapid assessment and PRA's should be conducted to identify the sensitive areas that require urgent interventions

6.0. CONCLUSIONS

1. Wetland ecosystems in Kenya are still threatened by anthropogenic activities
2. Wetlands management is a young and unique area which cuts across several disciplines. Its management therefore demands a multi-disciplinary / multi-sectoral approach
3. Lessons learnt from the interventions carried out by the wetland component in various parts of the basin are very useful and should be used to guide future interventions.
4. Various institutions exist within the basin who are researching and implementing projects similar to the LVEMP Wetland Component
5. Some objectives of the project are not achieved because of diverse reasons such as inadequate staffing, networking, and funding.
6. Wetland products, if well harnessed, could help in alleviation of poverty and improvement in the living standards of the wetland communities.
7. Lack of wetland policy and management plans for the entire basin is a hindrance to wetland conservation and management

7.0. RECOMMENDATIONS

1. Adequate and regular flow of funds should be provided.
2. The component should be provided with adequate staff and appropriate networking between the component, field staff and other relevant departments/institutions be established.
3. The project should strive to work together with organized community groups with track record and avoid groups that come up because of impending donor support. Chances of failures in such groups are quite high as they have nothing that holds them together and projects are more likely to end before sustainability is attained.
4. Interventions by the component should be equitably distributed in the entire basin.
5. In community based wetland conservation and rehabilitation programmes, the component should support and work with relevant CBO's and NGO's on the ground instead of overburdening themselves with a load they cannot bear given the staffing situation.
6. Before any investment is made to support any group, they should first be trained and prepared to handle the challenges that go with the project to be implemented.
7. Findings from PRA's and rapid assessments should be strictly adhered to in designing interventions.
8. The Secretariat should invest in a central laboratory of excellence within the basin where all components have equal opportunity of analyzing their samples and where quality control can be assured.
9. The components should be treated equally as concerns facilitation as failure of one means failure of the rest of the components.
10. Where an international consultant is to be hired, the Secretariat should ensure the procurement is done as quickly as possible in phase with the

components work plans. Adequate consultations should be made as pertains to TOR's and their interpretation before the contracts are signed.

8.0. WAY FORWARD

The journey towards sustainable management of Kenyan wetlands has just started and as a way forward, the following should be looked into:

1. Wetland Management Plans
2. Wetland Inventory
3. Target fringing floodplain Wetlands
4. Role of Small Water Bodies in biodiversity Conservation
5. Conservation and Management of privately owned wetlands
6. Guidelines for carrying out EIA's in wetlands earmarked for major development projects
7. Development of procedures and manuals for monitoring wetland integrity within the basin
8. Demonstration sites for wise use of wetland resources depicting different uses (Rice irrigation, Fisheries, Horticulture etc)
9. Demonstration of Restoration Programmes for the major different types of wetlands in the basin.
10. Attempts to study the Buffering Capacity of littoral lakeshore or deltaic Wetlands
11. Comprehensive study on Values and Valuation of Wetland resources within the LVB
12. Impact of Grazing and other anthropogenic factors on natural Wetlands
13. Primary Productivity and Regeneration Rates of major wetland species used by wetland communities and livestock
14. Demonstration on the use of Constructed Wetlands in Wastewater Management (Industries, Domestic, Stormwater, Greywater etc.)

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10.0. APPENDICES

APPENDIX 1. QUESTIONNAIRE FOR DATA COLLECTION

I. QUESTIONNAIRE FOR COMMUNITIES

GENERAL INFORMATION

1. What is LVEMP?
2. What is a wetland?
3. What is the importance of a wetland to the community?
4. Which project was carried out by your community under LVEMP.
 - (i). What were the objectives of the project?
 - (ii). How many members participated in the project

	No.
Men	
Women	
Children	
Total	

- (iii). How were the Members/group constituted?
(same clan, all women, all children, men and women)
 - (iv). How were the officials selected?
 - (v). When did the project start and end
5. How much money was given to the project by LVEMP?
6. What was the contribution of the community?
7. How much money is in the project account now?

PROJECT MANAGEMENT

8. Rate the following items by assigning the appropriate points where 1 is the lowest and 5 the highest. Feel free to choose not applicable if you are not sure

	1	2	3	4	5	Not applicable
(i) Adequacy of funds						
(ii). Preparation before the project						
(iii). Adequacy of training (if any)						
(iv). Your understanding of project by						
(v). Your understanding after training						
(vi). Importance of exchange programme (if any)						
(vii). Usefulness of visit made by the project staff.						
(viii). How far has the project reached a sustainable level.						

9. What are the qualifications of the officials: - Chairman, Secretary, Treasury
10. How many times were you visited by LVEMP staff?
11. Which months were the visits made?

ACHIEVEMENT/BENEFITS

12. What was your income before the project?

low fair good v. good

13. What was your income after implementation of the project?
 low fair good v. good
14. What other benefits did the project give to the community?
15. What are the positive things you have learnt from the project?
16. What are the negative things you have learnt from the project?
17. From the lesson learnt what advice would you give if a similar kind of project is to be implemented for better results.

CONSTRAINTS

18. (a). List all the constraints experienced during the project and rank them from most to least important where 0% is the lowest and 100% the highest.

(i).	Internal	Rank %
(ii).	External	

- (b). How did the members cope with the constraint?

II. QUESTIONNAIRE FOR TASK COORDINATORS

1. - What is the name of the task?
 - How long have you served as Task Coordinator?
 - What is your qualification?
 - How many staff do you have in your task?
2. What were the objectives of the task?
3. Please list the activities carried out by the task, stating the objective of each, its location and the time it was done?

Activity	Objective	Location	Duration (Time)	Duration Date

4. Please rate the activities above in terms of their relative success indicating the Amount budgeted, spent and the number of beneficiaries.

Projects	Rating (%)	Amount Budgeted	Amount Spent	Membership (Communities)

5. Which factors made the 1st best project succeed?
6. (i). Which factors made the least successful projects fail?
 (ii). What criteria was used to chose the activities?
 (iii). How were the beneficiaries prepared by the component at the start of the project
7. List the major constraints in order of importance and rate their contribution to the success of the activities in your task.

Constraint	Projects	Rating (%)
(i). Funds - Availability/flow		
- Adequacy		
(ii). Staffing - Availability		
- Adequacy		
- Relevance		

(iii). Transport		
(iv). Collaborators/other Components		
(v). Distance from site		
(vi). Language		
(vii). Cultural beliefs		
(ix). Attitude of beneficiaries		
(x). Political interference		
(xi). Others - Specify		

8. What percentage of activities were you able to complete under your task.? 25%
 50% 75% 100.?

9. Which particular projects were not carried out and why?

10. Were all the set objectives achieved in the life of the project?
 25% 50% 75% 100%

(i). Which objectives were not achieved and why?

(ii). RELEVANT REPORTS FOR OBJECTIVES ACHIEVED

11 (a). How many proportion of projects were implemented in collaboration with other Components: (i). $< \frac{1}{4}$ (ii). $\frac{1}{4}$
(iii). $\frac{3}{4}$ (iv). None

(b). Comment on the success of the projects implemented by the Component Vs those implemented in collaboration with other projects.

(c). Which factors were used to close such institutions?

(d). Please name the institutions/other Components you collaborated with, in which activities and for what reason.

Institution	Project	Reason for Collaboration

(e). What were the major impediments to collaborating with:-

(i). Individuals

(ii). Other institution

(iii). Other Components.

12. Which other activities were carried by the taste that were not part of planned activities.

13. Rate the performance of the Secretariat in relation to their dealings with your Component since the inception of the project.

YEARS	1	3	5

13. Explain the variation in the rating? (if any)

14. What suggestions would you make on the direction you wish the project to take if there has to be a continuation of LVEMP?

15. What lessons did the Component learn from the project

PROJECT	Lessons Learnt	
	Positive	Negative

15. What direction would you like LVEMP II to take in your Component/Task.

Appendix 2. List of Research and Development Activities being carried out within Lake Victoria Basin Wetlands by universities and other institutions

AUTHOR/TITLE	STUDY SITE	INSTITUTION/ SOURCE
Omollo, M.O (2003) Importance of wetland plant resources & agricultural products in Nyando River wetlands: a comparative study of <i>Cyperus papyrus</i> and Rice (<i>Oryza sativa</i>). M.phil thesis, 131pp	Nyando, Lower Nyakach and Kadibo Divisions	Moi University, SES
Afullo, O.A (1995) Pollution of lake Victoria by inorganic fertilisers used in the West Kano irrigation scheme. M.phil Thesis.92pp	West Kano irrigation scheme	Moi University, SES
Achoka, J.D (1998) Levels of the physico-chemical parameters in liquid effluents from pan-paper Africa paper mills at Webuye and in River Nzoia. D.phil thesis. 169pp	Webuye paper mills and River Nzoia	Moi University, SES
Owilli, M.O (1997) Application of GIS in mapping and management of flood prone areas in Nyando Division, Kano plains-Kenya. M. Phil thesis.130pp	Kano plains-Nyando division	Moi University, SES
Agwata, J.F.M (1992) Response of Lake Victoria to regional and global climatic changes. M.phil thesis,1 57pp	Lake Victoria	Moi University, SES
Shivoga, W.A (1991) Relationship between Environmental factors and phytoplankton species composition & biomass in Kesses-Dam, a tropical man-made water reservoir. M.phil thesis. 44pp	Kesses-Dam	Moi University, SES
Ndagijimana, A (1999) The impacts of Eldoret municipal and industrial effluents on R. Sosiani: public health aspects. M.phil thesis. 87pp	River Sosiani	Moi University, SES
Ambrose, K (2002) Capacity of Ombeyi wetlands in improving water quality in Ombeyi River, with special emphasis to the use of coliforms as bio-indicators of pollution in L. Victoria basin, Kenya. M.phil thesis	Wetlands along Ombeyi river system; covering Miwani and Nduru beach	Moi University, SES
Raburu, P.O (2003) Water quality and the status of aquatic macroinvertebrates and ichthyofauna in River Nyando, Kenya. D.phil thesis	Nyando and Sondu-Mirui Rivers	Moi University, SES
Were, P.J.A (2005) Potency of endod (Phytolacca dodecandra) to control mosquito vectors of malaria in shores and small water bodies along lake Victoria basin, Kenya. Proposal for D.phil thesis	Small water bodies and shores of L. Victoria	Moi University, SES
Werunga, M.M (1998) Sewage treatment employing constructed wetlands. Dissertation	A constructed wetland at Moi University, main campus and waste stabilization ponds	Moi University, dep of civil and struct.engineering
Odinga C.A (2005) The effectiveness of aquatic plants (<i>Echinocloa pyramidalis</i> & <i>Cyperus papyrus</i>) in removing nutrients from wastewater; case study of Chemelil, sugar factory wetland. Dissertation	Constructed wetlands belonging to Chemelil Co.	Moi University, dept of civil & struct.engineering,
Embwaga, P. C (2001) Water quality assessment of chlorophyll a and nutrient analysis carried on 16 satellite lakes/dams within Nyanza province. Field attachment report.	Satellite lakes/dams on the Lake Victoria basin.	Moi University, dept of Fisheries
Mboya, T.A (2001) The significance of lower Sondu-Mirui wetland in the conservation of riverine fish species. Field attachment report	Sondu-Mirui wetland	Moi University, dept of Fisheries
Okello, F.O (2004) Effectiveness of macrophytes species in treatment of Chepkoilel fishpond water. Dissertation	Chepkoilel fishpond	Moi University, dept of fisheries
Ong'ore, C.O (2004) The use of EPT bioindex to assess the environmental health status of R. Sosiani. . Dissertation	River Sosiani	Moi University, dept of fisheries
Tuda, A O (1999) Capacity of <i>Cyperus papyrus</i> dominated natural wetland in tertiary treatment of sewage wastewater. Dissertation	Marura swamp/wetland	Moi University, dept of fisheries
Kawaka, J.A (2004) Abundance and diversity of zooplankton species in lake Kanyaboli and L. Sare. Dissertation	Lake Kanyaboli and lake Sare	Moi University, dept of fisheries
Kirathe, B.M (2004) Macroinvertebrates composition and diversity in a constructed wetland at Chemelil sugar Co. Dissertation	Constructed wetlands belonging to Chemelil Co.	Moi University, dept of fisheries
Odindo, C.O (2003) Effect of point source pollution on macroinvertebrate species diversity in a wetland ecosystem. Dissertation	Chepkoilel wetland	Moi University, dept of fisheries
Opaa, B.O (2003) Investigation of the use of constructed wetlands to treat industrial effluent; case study of Chemelil sugar Co. Dissertation	Constructed wetland belonging to Chemelil Co.	Moi University, dept of Fisheries

Mac'Were, O.E (1997) Influence of sewage effluents on the composition, distribution and abundance of aquatic macroinvertebrates in Marura swamp. Dissertation	Marura swamp	Moi University , dept of fisheries
Ngeja, J.N (2004) Factors affecting macroinvertebrate abundance and distribution in Ziwa dam, Uasin-Gishu district. Dissertation	Ziwa dam	Moi University , dept of fisheries
Njoroge, P. K (1996) A survey on amphibians of four selected wetlands in Uasin Gishu plateau, Kenya. . Dissertation	Mareba, Marura, Ziwa, pau Boit wetlands	Moi University , dept of Wildlife management,
Wamkoya, N. N (2004) Relationship between physico-chemical parameters & mosquito larvae abundance in Chepkoilel sewage treatment and fishponds. Dissertation	Chepkoilel oxidation ponds and fish ponds	Moi University , dept of Wildlife management
Lubalo, J (2004) Factors affecting the distribution of Anurans in sewage and fishponds along Marura swamp. Dissertation	Marua swamp	Moi University , dept of Wildlife management
Likhotio, L M (1999) Criteria and prioritisation of important inland wetlands in Kenya for conservation. Dissertation	Selected inland wetlands	Moi University , dept of Wildlife management
Mukema, N. E (1992) Population structure and habitat utilization of the Sitatunga (<i>Tragelaphus spekei spekei</i>) in Saiwa swamp national park. Dissertation	Saiwa swamp national park	Moi University , dept of Wildlife management
Omondi, P (2003) Eco-tourism in wetlands for conservation and local development in Kenya's L. Victoria basin of east Africa. ECOWET project	Yala swamp, L Simbi Nyaima, Nyando River wetlands, Ndere islands	Moi University , dept of geography
Opiyo, D.A (2004) A study on the sustainable management of Osodo wetlands on the Sondu-Miriu River basin, Kenya. Research proposal for MA thesis	Osodo wetlands	Maseno University , dept of geography
Aduma, A. E (2002) Irrigation water management in the Kano plains: a case study of smallholder irrigation support organization. Research proposal for MA thesis	South west Kano irrigation Scheme (SWKIS)	Maseno University , dept of urban and regional planning
Abila, R (2003) An evaluation of community utilization, conservation and perception of a Kenyan wetland: case study of Yala swamp wetland.	Yala	<i>Maseno Univer, dep of zoology</i>
Opande, O.G (2002) Distribution of the water hyacinth (<i>Eichornia crassipes</i>), its carpet characteristics, some of its diseases and mart, pests in the Winam Gulf of L. Victoria. Ph.D thesis	Rusinga, Kisumu, Kobala, Homa-bay, Lwand-Nyamasaria, sori bay, Lwanda Kotieno, Osodo bay Dunga beach	<i>Maseno University</i>
Akenga' T (2005) Traditional herbal antimalarial isolation, characterisation of therapeutic compounds from plants in the L. Victoria basin wetlands	Lake Victoria basin (Kenya and Uganda)	<i>JKUAT</i>
Obare, G.A (2005) Vulnerability livelihoods and institutional dynamics in the management of wetlands in L. Victoria watershed management. Unpublished.	Sango-Rota, Kalenjuok, Budalangi/Mabinju.	<i>Egerton University</i>
Tuitoek, P.G (2005) An assessment of food security and nutrition status of households in wetlands of L. Victoria basin. Unpublished.	Kisumu, Homa-bay, Siaya and Nynado districts	<i>Egerton University</i>
Ochola, W.O (2005) Land cover, land use and related issues in the Lake Victoria basin. Research proposal	Lake Victoria basin	Egerton University
Wegulo, F.A (2005) Exploring linkages between land tenure, land use and food security and their implications on gender and resource management in L. Victoria basin. Unpublished	Lake Victoria basin	Egerton University
Mathooko, J.M., Kitaka,N., Mpawenayo, B., Magana, A., Shivoga, W., Yasindi, A.W., Manyala, J.O., Kipkemboi, J (2005) Fingerponds in L. Victoria wetlands, Kenya: Functioning and potential. Fingeronds project stakeholder workshop, May 2005.	Nyangera and Kusa villages at the shores of lake Victoria	Egerton/Moi Universities
Opere, A (2004) Impact of natural disasters due to environmental change on the livelihood of the L. Victoria basin. Unpublished	Lake Victoria basin	<i>University of Nairobi, dept of meteorology</i>

Ransley P.J and Norton-Griffiths, M (1985) Integrated landuse (ILU) survey (Nov-Dec 1983). Final report	Kisii, Kisumu, Siaya, South Nyanza districts	LBDA
Macharia, J (2003) Analysis of genetic diversity of <i>Cyperus papyrus</i> using isoenzymes in L. Victoria basin, Kenya. Msc thesis in Ecological Marine management (ECOMAMA), Brussels	Usenge, Kibos, Sondu, KMFRI pier	National Museums of Kenya
Terer, T (2004) DNA polymorphisms, allozymes diversity and biomass of <i>Cyperus papyrus</i> in Kenya's wetlands. Msc thesis in Ecological marine management (ECOMAMA), Brussels.	L. Victoria, Sondu, Kibos, Nyando, Amboseli, Lobo swamp, L Naivasha	National Museums of Kenya
Kulindwa, K (2005) Tools for wetland ecosystem resources management in Eastern Africa (Ecotools). Dissemination workshop 6-7 th April 2005, Ecosystem outlook report for L. Victoria basin; Economic valuation of environmental assets in the L. Victoria basin.	Lake Victoria basin	Kenya Wildlife Service (KWS)
(AEO) report (2004). Environmental assessment of the L. Victoria basin as a contribution to UNEP AFRICA environment outlook Stakeholder's workshop, 2-4 th September 2004 at Imperial hotel Kisumu.	Lake Victoria basin	KWS
Njuguna, K. P (2005) Towards integrated management and community conservation of littoral wetlands of Lake Victoria. Research Proposal	10 identified littoral wetlands of L. Victoria	KWS
Kirai, P and Smiet, F (1994). Environmental concerns in Nyanza province with emphasis on water resources, pollution and landuse. Report of fact-finding mission to Kisumu, Homa-bay and Siaya districts. Royal Netherlands embassy, Nairobi	Kisumu, Homa-bay, Siaya districts	KWS
Otieno M. N (2003) Evaluating the ecological integrity and changes in Yala swamp using spatial analysis techniques of remote sensing. Paper presented at Ecotools scientific workshop on Yala swamp, western Kenya at Switel Hotel, Bondo on 9-10 th Dec2003.	Yala swamp	KWS
Raburu P.O. (1999). Conservation and rehabilitation of L. Kanyaboli wetland, Kenya. (In W. Streever Ed)- An initial persepective on wetland rehabilitation, 167-172pp, Kluwer academic publishers.	Lake Kanyaboli ecosystem	Moi University
Okungu, J. O and Sangala F. D (2003) Water quality and hydrology of Yala wetlands. Paper presented at Ecotools scientific workshop on Yala swamp at Switel Hotel, Bondo on 9-10 th Dec 2003.	River Yala, Nzoia river, Yala swamp	KWS
Koyo, A (....) Lake Victoria; a brief on its biodiversity and potential for conservation and sustainable utilization. Review paper on management, institutional and legal framework.	Lake Victoria	KWS
Kulindwa, K (.....)Economic valuation of environmental assets in the lake Victoria basin. IUCN Eastern Africa programme; Socio-economics of Lake Victoria Fisheries	Lake Victoria Basin	IUCN
Owino, J. P (....) Traditional and central management systems of the Lake Victoria fisheries in Kenya. IUCN Eastern Africa programme; Socio-economics of Lake Victoria Fisheries	Lake Victoria	IUCN
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Appendix 3. Activities Carried out by the Wetland Component in Pictures

Plate 1: Activities at Siteko Wetland in Busia District

Plate 2: King'wal Wetland in Nandi District, a site the Component would demonstrate sustainable use activities for the upper Catchment wetlands

Plate 3: Activities at Dunga Ecotourism Activities and Gomro Catfish Multiplication Project

Plate 4: Sceneries of activities at Dionosoyiet Wetland in Kericho District

Plate 5: Buffering Capacity Research Activities at selected sites

Plate 6: Sceneries at Kamoson Wetlands
