WESTERN KENYA INTEGRATED ECOSYSTEM MANAGEMENT PROJECT

WKIEMP

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

ESMF

FINAL REPORT

By

Professor Steven G. Njuguna
Lead Environmental Impact Assessment and Environmental Audit Expert
SPARVS Agency Environmental Consultancy Services
P.O. Box 122, Limuru, Kenya
E-mail: <prof_njuguna @yahoo.com>
<sparvs@clubinternetk.com>

With Technical Inputs From:

Mrs. Immaculate N. Maina
Agricultural Extension Specialist
Kenya Agricultural Research Institute

And

Mr. Wilson Aore
Soil Scientist
Kenya Soil Survey
National Agricultural Research Laboratories
Kenya Agricultural Research Institute
October 2004

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ASAL	Arid and Semi-Arid Lands
ATIRI	Agricultural Technology and Information Response Initiative
BMP	Best Management Practices
BP	Bank Procedure
CBS	Central Bureau of Statistics
CBO	Community Based Organization
CDD	Community Driven Development
CMS	Convention on Migratory Species of Wild Animals
COSOFAP	Consortium for Scaling up Options for Increased Farm Productivity
DRSRS	Department of Resource Survey and Remote Sensing
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Co-ordination Act
ESA	Environmental and Social Assessment
ESMF	Environmental and Social Management Framework
FA	Focal Area
GDI	Gender-related Development Index
GEF	Global Environment Facility
GHG	Greenhouse Gases
GoK	Government of Kenya
HDI	Human Development Index
HIV	Human Immuno-Deficiency Virus
HPI	Human Poverty Index
IBA	Important Bird Area
ICM	Integrated Crop Management
ICRAF	International Council for Research on Agroforestry
IDA	International Development Association
IEM	Integrated Ecosystem Management
IMSC	Inter-Ministerial Steering Committee
IMCE	Inter-Ministerial Committee on Environment
IPM	Integrated Pest Management
ITCZ	Inter-Tropical Convergence Zone
KEMRI	Kenya Medical Research Institute
KMFRI	Kenya Marine and Fisheries Research Institute
KEFRI	Kenya Forestry Research Institute
KARI	Kenya Agricultural Research Institute
KWS	Kenya Wildlife Service
LBDA	Lake Basin Development Authority
LVILMP	Lake Victoria Integrated Land Management Project
LVEMP	Lake Victoria Environment Management Project
M&E	Monitoring and Evaluation
MoA	Ministry of Agriculture
MoH	Ministry of Health
NBI	Nile Basin Initiative
NEMA	National Environment Management Authority
NGO	Non Governmental Organization
NMK	National Museums of Kenya
NRM	Natural Resource Management
OD	Operational Directive
OP	Operational Policy
OPN	Operational Policy Note
PCO	Project Coordination Office
PMP	Pest Management Plan
PPA	Participatory Poverty Assessment
PRSP	Poverty Reduction Strategy Paper
PRA	Participatory Rural Appraisal
SESS	Seconded Environmental and Social Specialists

SIDA	Swedish International Development Agency
SMP	Soil Management Project
TAG	Technical Advisory Group
TOR	Terms of Reference
TP	Total Phosphorus
UNFCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
VDC	Village Development Committee
WKIEMP	Western Kenya Integrated Ecosystem Management Project
WHO	World Health Organization

UNITS OF MEASUREMENT AND CONVERSION FACTORS

^{o}C	degree Celsius
ha	hectare
km^2	square kilometre
KShs	Kenya Shillings
mm	millimeter
m	metre
m^2	square metre
m^3	cubic meter
m^3/s	cubic metre per second
masl	metres above sea level
US $	United States dollar
Yr	year

EXECUTIVE SUMMARY

Introduction

The Kenya Agricultural Research Institute (KARI) has requested for the preparation of an Environmental and Social Management Framework (ESMF) for the proposed Western Kenya Integrated Ecosystem Management Project (WKIEMP). The project corresponds with the central features of Kenya's strategy for poverty alleviation as outlined in the Poverty Reduction Strategy Paper of 2003. This ESMF report presents an environmental and social management framework for the WKIEMP. The Environmental and Social Management Framework has been prepared to fully comply with environmental legislations and procedures in Kenya and with the World Bank's environmental and social safeguard policies.

The screening criteria provided in the ESMF includes relevant questions on natural habitats/protected areas, involuntary resettlement and land acquisition, pesticide use, impacts to forestry resources, impacts to cultural property and inclusion of indigenous people in the project identification process. This will ensure that all concerns related to the Bank's safeguard policies are taken into account during the screening of subprojects for potential impacts, and that the appropriate mitigation measures can be adopted to address them.

Objectives

The Western Kenya Integrated Ecosystem Management Project (WKIEMP) seeks to improve the productivity and sustainability of land use systems in selected watersheds in the Nzoia, Yala and Nyando river basins through adoption of an Integrated Ecosystem Management (IEM) approach. In order to achieve this, the project will: (i) support on- and off-farm conservation strategies through interventions focused on improving soil fertility, agroforestry, and introduction of value added cropping systems; and (ii) improve the capacity of local communities and institutions to identify, formulate and implement integrated ecosystem management activities (including both on-and off-farm land use planning) that capture local, national and global environmental benefits.

Target Areas

The project will be implemented in three river basins of Western Kenya, namely, Nyando, Yala and Nzoia, which together support a population of 7 million people. Approximately 75% of the area within these basins is classified as an agro-ecosystem. The total area of the three basins is about 20,000 km^2 (Nyando, 3,550 km^2, Yala 3,364 km^2, and Nzoia 12,984 km^2). The project area will consist of 9 focal areas (FA's) each measuring 100 km^2. Of these FA's, 3 will be in Nyando basin, 3 in Yala basin and 3 in Nzoia basin. The FA's within basins will be stratified by elevation zones to include lowlands (1334 - 1440 masl), midlands (1440-1890 masl) and highlands (1890 masl).

Implementation

The project will be demand-driven and implemented under a decentralized arrangement. At the village/community level, community groups will be the main bodies for planning and implementing approved development interventions. Community groups could be formal village organizations such as Village Development Committees (VDCs) or smaller groups of interest group members. The seconded environmental and social specialists (SESS) from the National Environment Management Authority (NEMA) and KARI will be responsible for ensuring that the environmental and social impacts screening and review system set out in this Environmental and Social Management Framework (ESMF) is integrated into the subprojects cycles. At the national level, the Technical Advisory Group (TAG) will provide lead coordination and ensure that results meet the targets set by the project. The TAG will be chaired by the Director of KARI. The day-to-day coordination and monitoring of project activities will be handled by the PCO located in Kisumu.

The project will be supervised by the World Bank (WB) and financed by the Government of Kenya (GOK) and the Global Environmental Facility (GEF). The Kenya Agricultural Research Institute (KARI) and the World Agroforestry Centre (ICRAF) will implement the project. WKIEMP is a five-year project with a budget of about US$ 4.5 million. The estimated cost of mainstreaming the ESMF in the WKIEMP is US $ 675,000.

Reporting

The Project Coordination Office (PCO) and the seconded environmental and social specialists (SESS) will provide an annual report on environmental and social progress report to the national Technical Advisory Group (TAG) for review. KARI will hire an independent consultant to conduct an environmental and social performance audit of the project during the midterm review of the project. This audit report will be shared with TAG, KARI, the World Bank and other relevant government agencies.

Alternatives

Several alternatives for the project were considered before the current proposal was prepared. The first was linking the project with the International Development Association (IDA). The second was a stand-alone Global Environment Facility (GEF) project. The Government of Kenya has recognized the rapid decline in the natural environment and stagnation in agricultural production of Western Kenya as a priority. A number of jointly funded initiatives are being implemented by the Government, international donors, NGOs and community-based organizations. An IDA funded community based development project is also anticipated in the next three years. Given the scale of land degradation, more interventions will be required to reach ecosystem sustainability.

Implementing the project in fewer river basins than all the lands covering Western Kenya was considered because the project will have an important demonstration effect and it is expected to attract further resources. In addition, the learning opportunity provided by three river basins, which vary in agro-ecological and socio-economic characteristics is likely to outweigh the benefits from increased coverage on just one river basin.

Biodiversity

Existing rural activities and poor land management practices have also affected biodiversity in two ways: 1) by fuelling the demand for more agricultural land and therefore altering natural habitats; and 2) by altering the chemical properties and therefore reducing soil and plant diversity. Western Kenya is an area with unique habitats and biodiversity of local, national and global significance.

Socio-economic characteristics

Western Kenya has one of the densest and poorest populations, with up to 1200 persons per km^2 in some rural areas. The region is characterized by low agricultural productivity, high population pressure and lack of off-farm income opportunities. Over 58 percent of households live in absolute poverty.

The primary livelihood strategy for about 80 percent of the population in the three river basins is farming. Livestock ownership forms an important part of the household asset base for both farmers and agro-pastoralists. Traditional land management in western Kenya has relied on fallowing of unproductive fields to restore fertility and decrease pest problems. The rapid increase of population density makes this practice untenable and has led to wide scale abandonment of fallowing. High rural population growth coupled with stagnating urban job growth has accelerated the search for new agricultural land, resulting in a high rate of woodland, forest, grassland and wetland conversion for agricultural use.

Safeguard Screening Procedures

The WKIEMP is anticipated to have beneficial impacts on the environment since its overall objective is to promote sustainable land use and environmentally sound natural resources management through community driven development. Although the project is expected to produce net benefits in terms of natural resource management and conservation, certain project activities related to improved land management may have environmental or social impacts that require mitigation. Hence the proposed project has been rated Category B under the World Bank Policy on Environmental Assessment (OP 4.01), requiring a partial Environmental Assessment (EA).

The ESMF is expected to cover the unknowns, to help in the screening, and to recommend mitigation measures. The screening and review process will determine how and when a particular subproject will trigger a safeguard policy, and what mitigation measures will need to be put in place. The screening and review process will also ensure that subprojects that may have potentially significant impacts will require

more detailed study. The need for subproject specific EIAs will also be identified by the screening and review process.

Environmental and Social Impacts

The proposed project will involve direct interventions in the biophysical and human environments. The potential environmental impacts can be categorized as: biophysical, and social. These impacts can occur at various stages of project development and can be positive or negative. On balance, the potential positive impacts of the project outweigh the negative impacts. Therefore, the WKIEMP has the potential to make a significant contribution to Kenya's policies to protect and preserve the environment while reducing poverty in rural areas.

At the local level the project is expected to generate many positive impacts that could lead to improvements in alleviation of poverty, improved food security through better crop yields, diversified agricultural resource base, and improved household income. The project will also result in a multiplier effect on the local economy through development of entrepreneurial activities.

At the national, provincial and district levels, the project will promote rural development strategies that integrate ecosystem concerns. The decentralization process through community management of natural resources and Integrated Ecosystem Management (IEM) decision-making processes that is inbuilt in the project will also strengthen local social organizational structures to evaluate ecosystem concerns that cover more than one village.

At the global level, the project will contribute to the reduction of soil degradation, improvement of biomass production and sequestration of above and below ground carbon. The project will also contribute to reduced siltation, and nutrient runoff to rivers systems draining into Lake Victoria.

Potential negative impacts at local, national and global levels may include pollution and eutrophication of water bodies, interference with wetland and animal ecology (particularly birds and fish), erosion and sedimentation and social disruption through lack of adequate capacity for environmental and social screening. Alternative livelihoods and intensification of agricultural production (including livestock) which may result in community well-being, may also lead to an increase in areas brought under cultivation and overall numbers of livestock units which may increase demand on natural resources or degrade the surrounding environment. The stakeholders will be provided with an opportunity to learn how to avoid or mitigate localized impacts from initial subprojects so that measures can be integrated in subsequent activities.

Capacity Building and Training

In order to ensure proper implementation of environmental and social screening, and mitigation measures, as well as effective natural resource management, the WKIEMP will undertake an intensive program of environmental training and institutional capacity building. Environmental training and sensitisation will be required at all levels including community workers, local government bodies, and SESS. The PCO, SESS, CSPs and additional experts will provide a diverse range of technical training on environmental issues to these groups.

1. INTRODUCTION

The Kenya Agricultural Research Institute (KARI) has requested for the preparation of an Environmental and Social Management Framework (ESMF) for the proposed Western Kenya Integrated Ecosystem Management Project (WKIEMP). The project corresponds with the central features of Kenya's strategy for poverty alleviation as outlined in the Poverty Reduction Strategy Paper of 2003. This ESMF study report presents an environmental and social management framework for the WKIEMP.

1.1 Objectives

The objectives of the ESMF are:

- To assess the potential environmental and social impacts of (i) on-farm agroforestry, erosion control and soil re-capitalization; (ii) fertilizer use in the light of the degraded resource base, particularly soils in the proposed project area; and (iii) international waters and natural habitats;
- To propose mitigation measures which will effectively address identified negative impacts;
- To outline the institutional structure for implementing the ESMF;
- To prepare a resettlement framework (if required) within a development approach;
- To prescribe project arrangements for the preparation, review, approval and implementation of subprojects in order to adequately address World Bank safeguard issues;
- To conduct a social assessment that goes beyond providing a profile of social groups, and their issues and concerns.

The analysis includes:

- An assessment of the potential environmental and social impacts of the proposed WKIEMP, taking into account the World Bank's relevant safeguard policies as well as Kenya's environmental policies, laws and regulations;
- A review the various studies on biophysical characteristics of the target areas covered by the project and identification of constraints that need to be taken into account during project preparation;
- Ascertaining whether the project area contains any cultural heritage that needs to be taken into account during project preparation;
- An assessment of the environmental and social impacts of the project activities in the target areas including the likelihood that they may affect indigenous peoples along river banks, and formulation of appropriate recommendations;
- Development of an entitlement matrix that reflects different categories of user groups and recognizes both formal and informal rights to resources (including land);
- Development of screening procedures (including checklists) that will be used as a mechanism in the ESMF for screening potential environmental and social impacts due to subproject interventions;
- Development of appropriate methods to promote an Integrated Pest Management (IPM) approach that will minimize the need for chemical pesticides during project interventions;
- Presentation of an analysis of alternatives;
- Review of national environmental policies, legislation, regulatory and administrative frameworks in conjunction with the World Bank's safeguard policies, and formulation of recommendations in the context of the project as appropriate;
- Description of any gaps between WB policy and the national laws and how these will be addressed by the project;
- Review of the relevant conventions and protocols to which Kenya is a signatory;
- Evaluation of the existing environmental and social assessment, and management capacity as well as capacity to implement mitigation measures, and formulation of appropriate recommendations, including the institutional structure and the responsible agencies for implementing the framework, a grievance mechanism and monitoring and evaluation (M&E) of potential impacts;

- Evaluation of capacity building and training needs and their costs;
- Presentation of an outline on institutional arrangements for environmental management, including environmental assessment procedures, monitoring indicators, and a monitoring plan (including costs) as appropriate under the project; and
- Development of an environmental and social management framework that establishes methodologies for environmental and social impact assessment during project implementation.

NEMA and KARI will deploy seconded environmental and social specialists (SESS) who will be part of the committee for screening the subproject proposals, as outlined in the process framework of the ESMF. The subprojects will be screened and given an environmental rating. The ESMF will also include a suggested format for EIA, in case the need arises where a subproject is of environmental category A in nature. The ESMF will fully comply with Kenyan environmental regulations and legislative requirements and with the relevant World Bank environmental and social safeguard policies. The ESMF will specify explicit and appropriate roles and responsibilities of all parties (individuals and institutions) responsible for managing and monitoring environmental and social concerns related to the subprojects.

A safeguard specialist will visit Kenya and be part of the mission before project effectiveness, when the Project Launch Workshop will be held. Relevant institutions (NEMA, KARI, ICRAF, Stakeholders, Community Representatives, Farmer Groups, NGOs, etc.) will be given appropriate training during the Project Launch Workshop. They in turn will train the groups and/or individuals responsible for screening the subprojects for environmental and social safeguard concerns. The safeguards specialist will also brief the identified individuals who will be part of the committee to screen subproject proposals for potential environmental and social issues. The objective of the training will be to raise the level of environmental and social awareness in the communities and promote adoption of the screening checklist.

The project will monitor and measure the impact of subproject interventions (both positive and negative) on the environment. Where negative impacts from the subprojects are anticipated, the mitigation measures as outlined in the ESMF will be implemented and monitored. The Monitoring and Evaluation (M&E) of the project will have environmental indicators included as well.

This ESMF study was carried out from 17 June to 10 July 2004. The assignment included a field visit to the project sites selected by the project. The itinerary of the field visit is given in **Annex 2.** Government organizations, NGOs, stakeholders and other persons contacted or consulted during the entire study period are listed in **Annex 3.**

1.2 Principles and Methodology

The study has focussed on the development of the ESMF instead of the Environmental and Social Assessment (ESA) because the precise details of the subprojects in terms of location, materials required, key communities, etc. are not yet known. The ESMF is required to screen for and manage the potential environmental and social impacts of the WKIEMP.

The ESMF Methodology involved:

- Review of previous reports, published and unpublished works on the environment of the study area;
- Identification of gaps existing in the available information;
- Field investigations;
- Collation of baseline data on the environmental conditions of the project area;
- Identification of positive and negative environmental and social impacts;
- Identification of environmental and social mitigation measures;
- Preparation of screening procedures to be used while screening subproject proposals; and
- Formulation of environmental and social monitoring plans.

1.3 Report Layout

The ESMF report is organized as follows:

2. DESCRIPTION OF THE PROPOSED PROJECT

2.1 Background to the Project

The Western Kenya Integrated Ecosystem Management Project (WKIEMP) seeks to improve the productivity and sustainability of land use systems in selected watersheds in the Nzoia, Yala and Nyando river basins through adoption of an Integrated Ecosystem Management (IEM) approach. In order to achieve this, the project will: (i) support on- and off-farm conservation strategies through interventions focused on improving soil fertility, agroforestry, and introduction of value added cropping systems; and (ii) improve the capacity of local communities and institutions to identify, formulate and implement integrated ecosystem management activities (including both on-and off-farm land use planning) that capture local, national and global environmental benefits.

The global environmental objective of the project is to promote a set of IEM interventions so as to achieve local and global benefits. These benefits include reduced land degradation, reduced greenhouse gas (GHG) accumulation in the atmosphere, improved on-and off-farm biodiversity, and decreased erosion in the watersheds that feed into the Nyando, Yala and Nzoia rivers. The IEM approach attempts to reinforce positive or beneficial feedback mechanisms between soil, atmospheric, biotic and socio-economic components of ecosystems.

The project will be supervised by the World Bank (WB) and financed by the Government of Kenya (GOK) and the Global Environmental Facility (GEF). The Kenya Agricultural Research Institute (KARI) and the World Agroforestry Centre (ICRAF) will implement the project. The WKIEMP is a five-year project with a budget of about US$ 4.5 million. The estimated cost of mainstreaming this ESMF in the WKIEMP is US$ 675,000.

2.2 Project Components

The project will address the agricultural and natural resources management by:

(a) Promoting an integrated approach to natural resource management

The project will pursue interventions that target the physical, social and economic aspects of ecosystem degradation. The integrated ecosystem management framework is based on the premise that there are social, economic, and biophysical interactions between the goals for production of environmental goods and services that are desired by different stakeholders.

(b) Linking upstream and downstream interventions

Project interventions will be implemented in the highland, midland and lowland areas in order to capture the physical diversity of the watershed and achieve greater results at the catchment level. The project will explore upstream-downstream linkages, particularly in relation to biodiversity conservation and international waters.

(c) Embedding project activities in local government processes

The project will be implemented at the village level with support from district administration. The project has been placed within the structure of local government to increase sustainability and avoid parallel delivery systems

(d) Incorporating global environmental benefits into local development priorities

The inclusion of environmental service functions (such as erosion control provided by reforestation) into project activities would generate a greater development impact by increasing agricultural sustainability and

output. Environmental services, particularly those associated with carbon sequestration, also have the potential to generate new types of assets that benefit local communities.

(e) Choosing a CDD approach

The project's demand driven mechanism builds on the high level of social capital in Western Kenya, the experience in other parts of the country, and the Government's renewed pledge to decentralization. Communities would play a lead role in articulating their needs, developing and implementing plans that address these needs.

(f) Seeking complementarities with other programs

The project seeks to build on and complement the successes of other natural resource management projects in the area (SMP, ATIRI, LRNP, and the SIDA sponsored Lake Victoria Project). Linkages with the second GEF-financed LVEMP II will also be further developed. While LVEMP II will focus on trans-boundary lake management issues, this project will support the on-the-ground watershed management investments that will improve the management of Lake Victoria.

(g) Laying the groundwork for Future IDA financed projects

In developing the World Bank's new Country Assistance Strategy, The Government of Kenya has requested IDA financing for a community driven development (CDD) project in Western Kenya for 2007. This new project will build on the experiences of the proposed GEF project. While the two projects will be administered separately, they will use the same implementation mechanisms. Given the acute need for community based development and land degradation interventions, the current project will help fill the gap until the new project becomes effective.

2.3 Subprojects

The subproject activities include the following;

- Tree planting for woodlots, in boundaries or as scattered trees in farms for poles, fuel wood and charcoal;
- Planting high value trees such as fruit, timber and medicinal trees;
- Introduction of improved soil and water management technologies;
- Management of natural forest patches for poles, timber and fodder;
- Establishment of fenced pastures to restore the natural vegetation;
- Establishment of tree nurseries;
- Agroforestry for soil fertility replenishment and improved crop production;
- Introduction of improved fallows, biomass transfer and mixed cropping;
- Proper management of residues on the farm;
- Introduction of non-wood products (honey, crafts, oils and medicine);
- Adding value to primary products;
- Improved marketing and trading of forest products;
- Improved technologies for energy saving and production (e.g. charcoal, stoves); and
- Proper handling and storage of farmyard and cattle manure.

The options outlined above are expected to contribute to improved crop and animal production, soil and water conservation, and to increase on- and off-farm biodiversity thereby improving local livelihoods and natural resource management. In addition, the measures will increase sequestration of above and below ground carbon. The above list of subprojects is not exhaustive as the development of subproject proposals will be community-driven.

In the highlands (>1890 m), the major interventions will be to increase vegetation cover. The proposed activities include reforestation and afforestation, utilization of appropriate farming technologies such as intercropping, controlled grazing in the grasslands and wetlands, and restoration of degraded grazing areas.

Water collection structures and spring and riverbank protection will be promoted as possible communal activities.

In the midlands (1140-18890 m), the major interventions will be the introduction of improved fallows, improvement of soil fertility through agroforestry and fertilizers, introduction of high value trees and fodder, afforestation, promotion of livestock and wetland conservation.

In the lowlands (1134-1440), the major interventions will include introduction of flood control measures, afforestation, agroforestry including high value trees, livestock improvement, water management technologies, grazing enclosures, de-stocking and re-seeding of pasture. Many of these interventions incorporate carbon benefits.

2.4 Project Target Areas

The project will be implemented in three river basins of Western Kenya, namely, Nyando, Yala and Nzoia, which together support a population of 7 million people. Approximately 75% of the area within these basins is classified as an agro-ecosystem. The total area of the three basins is about 20,000 km^2 (Nyando, 3,550 km^2, Yala 3,364 km^2, and Nzoia 12,984 km^2) The project area will consist of 9 focal areas (FA's) each measuring 100 km^2. Of these FA's, 3 will be in Nyando basin, 3 in Yala basin and 3 in Nzoia basin. The FA's within basins will be stratified by elevation zones to include lowlands (1334 - 1440 masl), midlands (1440-1890 masl) and highlands (1890 masl).

Focal areas will represent 8.5% of the land area in Nyando basin, 8.9% of Yala and 4.6% of Nzoia. Population and land use vary within each strata and there are strong associations between this zonation and variables related to population density, land use, soil condition and production ecology. Exclusions will include large-scale commercial agricultural areas (i.e. rice irrigation schemes, tea estates and sugarcane plantations), government lands such as national parks and national reserves, as well as lacustrine wetlands and urban areas.

Nzoia Catchment

- Highland: Forested areas; project intervention site includes areas with tributaries to Nzoia River;
- Midland: Agricultural area around the town of Lugari; former site of Lugari Forest Reserve (now de-gazetted) forest fragments still present around area; project intervention site includes two tributaries to Nzoia River;
- Lowland: Agricultural area east of Port Victoria; 30 km from Yala Swamp with small lakes, namely, Lakes Kanyaboli and Sare.

Nyando Catchment

- Highland: Agricultural area near Nandi Hills; forest fragments still existence; site also includes Ainabngetuny tributary;
- Midland: Agricultural area; site includes Nyando River and associated riparian zone.
- Lowland: Agricultural and grazing area east of Paponditi Town, and East of Kusa swamp; site includes Awach tributary.

Yala Catchment

- Highland: Agricultural area east of Kapsabet Town; includes tributaries to Yala River;
- Midland: Forest fragments west of former Kaimosi forest preserve (now de-gazetted); site includes tributaries to Yala River;
- Lowland: Agricultural area south of Siaya Town, site adjacent to isolated wetland remnants and seasonally flooded areas.

Table 2.1 Administrative Distribution of the WKIEMP Blocks.

Basin	Block	District	Division	Principal Location
Yala	1	Nandi	Kipkaren	Kamasai
	1	Vihiga	Tiriki East	Shaviringa
	2	Siaya	Boro	Alego East
Nyando	3	Kericho	Londiani	Sorget
	3	Nyando	Muhoron	Fort TenanAgoro
	4	Nyando	iLower Nyakach	East

Nzoia	5	Trans-Nzoia	Cherangani	Cherangani
		Busia	Butula	Marachi Central
		Busia	Budalangi	Bunyala South

2.5.1 Project Coordination and Implementation Arrangements

KARI will implement the project with backstopping from ICRAF. The implementation arrangements will be such that the proposals/activities originate from and are implemented by communities in the target areas with scientific back up from KARI, KEFRI, World Agroforestry Centre (ICRAF), MoA extension agents, NGOs and other partners. All these institutions are members of the Consortium for Scaling up Options for Increased Farm Productivity (COSOFAP) in Western Kenya. Applicable World Bank safeguards policies, and consequent project preparation requirements will be adhered to.

The nature of this project calls for an ESMF that will include a screening process to assess the potential impacts associated with subprojects. The seconded environmental and social specialists (SESS) from NEMA and KARI will work closely with the PCO and will be based in Kisumu, as and when required, to carry out the screening of the subproject proposals using the screening procedures and checklists. The subprojects will be given an environmental rating. The ESMF will also include a suggested format for EIA, in case the need arises where a subproject is of environmental category A in nature.

The project will be demand-driven and implemented under a decentralized arrangement. At the village/community level, village development committees (VCDs) will be the main bodies for planning and implementing approved development interventions. Implementation of selected proposals will be carried out through close supervision of the project coordination office (PCO) and District Steering Committees (DSCs). The SESS will be responsible for ensuring that the environmental and social impacts screening and review system set out in this Environmental and Social Management Framework (ESMF) is integrated into the subprojects cycles. At the national level, the Technical Advisory Group (TAG) will provide lead coordination and ensure that results meet the targets set by the project. The Director of KARI will chair the TAG. The day-to-day coordination and monitoring of project activities will be handled by the PCO located in Kisumu.

2.6 Annual Reporting and Performance Review Requirements

The project Coordination Office (PCO) and the SESS will provide an annual environmental and social progress report to the national Technical Advisory Group (TAG) for review. KARI will hire an independent consultant to conduct an environmental and social performance audit around the mid-term review of the project. This audit report will be shared with TAG, KARI, the World Bank and other relevant government agencies.

3. SAFEGUARD SCREENING PROCEDURES

This Environmental and Social Management Framework (ESMF) has been prepared to fully comply with environmental legislations and procedures in Kenya and with the World Bank's environmental and social safeguard policies.

In this chapter, the key safeguard policies that provide the policy context to the ESMF including World Bank policies and Kenya's legal requirements on environmental assessment have been outlined.

3.1 World Bank Safeguard Policies

As part of the ESMF process, proposed subprojects under WKIEMP will be designed at the local level to ensure that they are screened for potential impacts and that they comply with the requirements set out under World Bank safeguard policies

The WKIEMP is anticipated to have beneficial impacts on the environment since its overall objective is to promote sustainable land use and environmentally sound natural resources management through community driven development. Although the project is expected to produce net benefits in terms of natural resource management and conservation, certain project activities related to improved land management may have environmental or social impacts that require mitigation. Hence the proposed project has been rated Category B under the World Bank Policy on Environmental Assessment (OP 4.01), requiring a partial Environmental Assessment (EA).

This project calls for an ESMF, that will include a screening process to assess the potential impacts associated with subprojects. In addition to the OP 4.01, the WKIEMP has triggered OP 7.50 Projects in International Waters, as indicated in Table 1. Using the screening and review process for subproject identification will, therefore, help determine which of the safeguard policies are triggered and what measures will need to be taken to address the potential impacts. The screening and review process will determine how and when a particular subproject will trigger a safeguard policy, and what mitigation measures will need to be put in place. The screening and review process will also ensure that subprojects that may have potentially significant impacts will require more detailed study. The need for subproject specific EIAs will also be identified by the screening and review process.

Table 1. The World Bank Safeguard Policies

POLICY	APPLICABILITY
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	Yes
Natural habitats (OP 4.04, BP 4.04, GP 4.04)	No
Forestry (OP 4.36, GP 4.36)	No
Pest Management (OP 4.09)	No
Cultural Property (OPN 11.03)	No
Indigenous peoples (OD 4.20)	No
Involuntary Resettlement (OP/BP 4.12)	No
Safety of Dams (OP 4.37, BP 4.37)	No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	Yes
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)	No

Environmental Assessment (OP 4.01)

This OP 4.01 has been triggered because there is potential that the implementation of the WKIEMP may lead to some negative environmental impacts. There are no potential large-scale, significant or irreversible environmental impacts associated with the project. Project interventions will focus on implementation of specific activities that improve the long-term sustainability of the ecosystem. Although some land management activities may require assessment and mitigation, it is anticipated that few of the expected activities will have a negative environmental impacts. The potential impacts identified are localized impacts associated with activities that are likely to be financed under local investment funds such as road upgrading, wetlands and ecosystem management, and small-scale dams which can be effectively mitigated and are addressed in the ESMF. Those activities that are not addressed by the ESMF will be identified using the screening and review procedures in Chapter 6. The ESMF identifies the major potential environmental impacts and proposes measures to mitigate these effects, including proposed training and monitoring measures.

Natural Habitats (OP 4.04)

There are a number of critical habitats in western Kenya, however, none will be adversely affected by the project. The project will not be implemented in any protected area, but will target a number of critical natural habitats for biodiversity conservation. Critical natural habitats in the project area include swamps, wetlands and forest and grassland fragments. Since the project will focus on conservation strategies, thee will be no degradation or conversion of habitats. Other project activities are also not expected to negatively impact critical habitats directly. Those activities that are not addressed by the ESMF and may have impacts on natural habitats will be identified using the screening and review procedures as outlined in Chapter 6.

Cultural Property (OPN 11.03)

The project will not include areas of significant cultural value. However, the project may impact small communal cultural property such as funeral or burial sites. The project's participatory approach will ensure appropriate management of such property. The ESMF has identified some potential impacts that may arise and has proposed mitigation measures that include mapping of the unmarked sites with the assistance of competent authorities. The Government of Kenya through the Department of Monuments and Sites of the National Museums of Kenya is committed to the preservation of cultural properties and seeks means to avoid their elimination. The activities that are not addressed by the ESMF will be identified using the screening and review procedures as outlined in Chapter 6.

Projects in International Waters (OP 7.50)

The project will be implemented in the Nyando, Yala and Nzoia River Basins, which are part of the Lake Victoria watershed. These three rivers are part of the Lake Victoria Basin that is shared by Kenya, Uganda and Tanzania, and as such constitute an international waterway under OP/BP 7.50. The OP requires, as a general rule, notification of all the riparian owners of the international waterway of certain types of projects specified in the OP, but also includes some exceptions to the notification requirement. The project will not finance irrigation and other water use or pollution activities or any major works. It will only finance small works as part of the community-driven IEM subprojects, which will involve scaling up current land rehabilitation interventions such as protection of river banks and construction of water pans, improvement of soil fertility, agro forestry, and introduction of value-added cropping systems. Any rehabilitation works for spring protection will be small in size and will not adversely affect the quality or quantity of water flows into Lake Victoria. Based on the above, the project qualifies for an exception to the notification requirement under OP 7.50.

Pest Management (OP 4.09)

The project will finance activities aimed at increasing agricultural productivities, with the main thrust of activities on improving the sustainability of agricultural production through improved land management and adoption of agroforestry and soil fertility management practices. The project is expected to have a positive impact on pest management in the project areas. The ESMF includes methods to promote integrated pest management in subproject activities and identifies mitigation measures. Those activities that are not addressed by the ESMF and may use pest products that are likely to have impacts on the environment will be identified using the screening and review procedures as outlined in Chapter 6.

Indigenous Peoples (OD 4.20)

The project will be implemented with farmers in lowland, midland and highland areas and will not impact any indigenous peoples. The ESMF has included measures such as participation in decision-making process throughout the project planning, in the event of occurrence of any indigenous peoples.

3.2 Mainstreaming Safeguard Compliance into Subproject Screening

The screening criteria provided in the ESMF includes relevant questions which will help determine if any other safeguard policies are triggered and the measures need to be taken to mitigate impacts. The screening and review process will identify any subprojects that may have potentially significant impacts which require more detailed study and the need for a subproject specific EIA. This will ensure that all concerns related to the Bank's safeguard policies are taken into account during the screening of subprojects for potential impacts, and that the appropriate mitigation measures can be adopted to address them.

3.3 Kenya's Environmental Legislation

The preparation of this ESMF has taken into account the requirements for environmental assessment under Kenyan law, mainly under Section 58 of the Environmental Management and Co-ordination Act, 1999. The section also requires project proponents to obtain an EIA License from NEMA before the implementation of a project. The Act as well as the Environmental (Impact Assessment and Audit) Regulations 2003,

Kenya Gazette Supplement No. 56 of 13th June 2003, requires that the project proponent submit a project report to the National Environment Management Authority.
The Environmental Management and Coordination Act, 1999, provides for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya. Part VI (S.58) of the act makes it mandatory for environmental impact assessments (EIAs) to be conducted before the commencement of projects involving urban development, water bodies, transportation, mining, agriculture and forestry related activities.

3.4 Subproject Screening under Kenyan Law

With the above requirements in mind, for those subprojects which require an EIA, as determined under the screening and review process, a copy of the EIA report will be submitted to the National Environment Management Authority (NEMA) for approval. NEMA will review and comment on the EIA before the subproject can be appraised. This will ensure that subprojects that may have potentially significant impacts and require more detailed study receive national level approval as well as district level approval. With the approval of the ESMF by NEMA, not all subprojects will require EIAs to be undertaken.

3.5 International conventions and treaties

Convention on Wetlands or the Ramsar Convention

The Ramsar Convention on Wetlands is primarily concerned with the conservation and management of wetlands. Parties to the Convention are also required to promote the wise use of wetlands in their territories and to take measures for their conservation by establishing nature reserves in wetlands, whether they are included in the Ramsar list or not. Kenya ratified the Ramsar Convention in June 1990. The proposed project is expected to adhere to the Ramsar Convention's principles of wise use of wetlands in the project area.

Convention on Biological Diversity

The Convention on Biological Diversity adopts a broad approach to conservation. It requires Parties to the Convention to adopt national strategies, plans and programmes for the conservation of biological diversity, and to integrate the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programmes and policies. The proposed project is expected to conserve biodiversity, especially the rare and endangered species in the project area and its environs.

Convention on the Conservation of Migratory species

The Convention on Migratory Species (CMS) was adopted to conserve migratory species of wild animals given that migratory species are seen as an international resource. Such species may be terrestrial or marine. The State Members of the Convention endeavour to conclude agreements for the protection and management of migratory species whose conservation status is unfavourable and of those whose conservation status would substantially benefit from international cooperation deriving from an agreement. The Convention's Agreement on the Conservation of African-Eurasian Migratory Water birds is specific on the need to protect the migratory water birds' feeding, breeding and wintering habitats, the main ones being wetlands and open water bodies.

United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCC) seeks to regulate levels of greenhouse gases (GHGs) concentration in the atmosphere, so as to avoid the occurrence of climate change at levels that would harm economic development, or that would impede food production activities. The Convention is founded on the principle that contracting parties would should take courses of action, in respect of their economic and social activities, and with regard to the Convention's specific requirements, that will protect the climate system for present and future generations. The proposed project will assist in the implementation of the specific requirements of the Convention.

United Nations Convention to Combat Desertification

The objective of the United Nations Convention to Combat Desertification (UNCCD) is to combat desertification and to mitigate the effects of drought in seriously affected countries, especially those in Africa. It seeks to achieve this objective through integrated approaches to development, supported by international cooperation and partnership arrangements, in the affected areas. It lays emphasis on long-term

strategies that focus on improved productivity of land and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level. The proposed project is designed to implement the requirements of the UNCCD.

Important bird areas

Lake Victoria basin has five of sixty sites that have been identified as Important Bird Areas (IBAs) of Kenya. The Important Bird Areas Programme is a worldwide initiative working for the conservation of biological diversity and the sustainability of human use of natural resources. The project is expected to recognize these IBAs and to protect them where they occur in the project area or in the environs.

The Nile treaties

There are about eleven treaties dealing with the consumptive use of the waters of River Nile and Lake Victoria. The riparian countries are under limited obligations under general international law to permit the lower riparian States an equitable share of the water, but then the exact modalities would be subject to fresh negotiations. The Nile Basin Initiative is currently addressing the issue of equitable utilisation of the common Nile Basin water resources.

The Nile Basin Initiative seeks to harness the tremendous potential of the Nile for the benefit of the people of the Basin, both for now and for generations to come. This becomes a major challenge because as economic development accelerates, population increases and demand for water grows. NBI's Shared Vision puts economic development at its centre. The Shared Vision is: "To achieve sustainable socio-economic development through the equitable utilisation of, and benefits from, the common Nile Basin water resources" or in short "Sustainable development of the River Nile for the benefit of all".

4. BASELINE INFORMATION

4.1 Biophysical

4.1.1 Location

The project area is part of the Lake Victoria basin. The whole lake basin covers an area of 184,000 km^2 of Kenya, Uganda, Tanzania, Rwanda and Burundi, and is home to an estimated population of 25 million people with an average density of 135 persons per km^2. The lake basin has 11 major river catchments, namely, Nzoia, Yala, Nyando, Sondu Miriu, Gucha, Mara, Gurumeti, Mbalageti, Duma, Simiyu, Magoga, Isonga and Kagera, and a large lake edge area that drains directly into the lake. The surface area of the lake is 68,000 km^2 making it the largest tropical lake, and the second largest freshwater lake in the world. It is shared by Kenya (6%), Uganda (45%) and Tanzania (49%). The lake is bisected by the equator and lies at an altitude of 1,134 metres above sea level. The lake and its catchment cover an area of 252,400 km^2.
The Kenyan portion of Lake Victoria basin covers about 42,000km^2 and is home to about 7.9 million people. The average density is about 190 persons per km^2. Seven major rivers, namely, Nzoia, Yala, Nyando, Sondu Miriu, Gucha and Mara drain this area. The WKIEMP will cover the basins of Nyando (3,600 km^2), Yala (3,400km^2) and Nzoia (13,000km^2) rivers.

4.1.2 Geology and soils

Various soil types are found in the river basins. The soils of the mountains, hills, plateaus and foot slopes are excessively to well drained, very shallow to shallow, dark reddish brown, stony and rocky, sandy clay loam to clay, and in places with an acid humic topsoil, and are moderately deep to deep. Most protected natural forests are found in these areas and serve to stabilize the soil and protect the water catchments.

The soils of the uplands are well drained, deep to very deep, and in some places shallow to moderately deep, dark reddish brown to dark brown, friable to firm clay, with thick acid humic topsoil. Protected plantation forests are found in these areas. Most of the tree species in the plantation forests are exotic and require well-drained deep soils.

The Kavirondian Rift System determines the topography of the lowland areas. Tectonic earth movements and erosion of different rock types over long periods have created varied morphology of lowlands bounded by upland areas. Pre-Cambrian volcanic and intrusive rocks, tertiary volcanic rocks and quaternary sedimentary deposits characterize the geology of the lowland area. In general most soils are susceptible to erosion as the silt content is very high in relation to the clay content.

4.1.3 Climate

Rainfall is mainly convective in origin and is largely influenced by the movement of the inter-tropical convergence zone (ITCZ). Nonetheless, rainfall amounts are partly influenced by the expansive Lake Victoria. Due to the convective origins of rainfall, there is high seasonal variability exhibiting high intra- and inter-seasonal variation in onset, duration and amount of precipitation. There are two fairly distinct rainy seasons: The long rains peaking between April and May and the short rains peaking between November and December.

4.1.4 Water quality

The Winam Gulf of Lake Victoria is important for the riparian states, providing food, freshwater supply, transport, recreation, tourism, and biodiversity conservation. The lake is under extreme pressure and evidence of nutrient build-up is increasing. The "Winam Gulf Baseline Study" conducted in 1984 and 1985 provides the most comprehensive water quality data for the Gulf. Secchi depth measurements of water transparency were low (1.6-2.4 m at the centre of the Gulf, 0.8 m at the eastern lakeshore area, and 0.3 to 0.4 in Nyakach Bay. This indicates relatively low transparency of the bay due to high levels of suspended solids from the Nyando River, and blue-green algae blooms are a common occurrence.

Winam Gulf is considered eutrophic on the basis of conventional trophic state indices, that is, Secchi depth, TP and Chlorophyll-a. The bloom-causing algae (Cyanophyta) predominate in the Gulf region. Sporadic cyanophyte blooms occur within the Gulf resulting in fish kills. *Microcystis aeruginosa* and *Anabaena circinalis* are the dominant bloom-causing algal species.

4.1.5 Biodiversity

Western Kenya's rich stock of biodiversity has suffered as a result of land degradation. By the mid 1980's, some 400 endemic species of cichlid fish were approaching extinction due to introduced fish species, the Nile Perch (*Lates niloticus*), encroachment from water hyacinth and increasing eutrophication of Lake Victoria. Deforestation and loss of vegetative cover has also resulted in a shortage of plant and tree resources. Over the last 150 years the most important land cover conversion pathways in the Nyando basin have been characterized by substitutions of vegetation dominated by trees (characterized by a C_3 photosynthetic pathway) to vegetation dominated by grasses (characterized by a C_4 photosynthetic pathway). Evidence from stable carbon isotope (i.e.; $d^{13}C$) studies suggest that historically, grass and cereal crop based land use types are strongly associated with elevated soil erosion risk in this environment.

Vegetation
The original vegetation in the lowland area was *Acacia-Balanites-Combretum* woodland. This has been degraded over time due to human settlement and agriculture. Tree stands are usually found in relatively scattered patches in wooded grassland. Planted *Eucalyptus* and *Euphorbia* species are commonly seen on borders of farms and homesteads. The vegetation of the lowland area is rather poor from a naturalist point of view. What remains of the natural vegetation is restricted to some few hilly areas that are rich in biodiversity. These hilly areas are not easily accessible.

A direct effect of eutrophication in Lake Victoria is the rapid spread of the water hyacinth, *Eichhornia crassipes*, in the lake and other water bodies in its catchment. The climatic factors and the nutrient status of the lake are ideal for its growth. Several other aquatic weeds are found in the Lake Victoria and its satellite water bodies including wetlands. Of these, the most problematic weeds are the water hyacinth, *Eichhornia crassipes*, and the Nile Cabbage, *Pistia stratiotes*. The water fern (*Salvinia molesta*) is also found in the littoral areas of Lake Victoria. Indigenous aquatic plants growing naturally in water, such as the hippo grass, *Vossia cuspidata*, can achieve weed status when the water body undergoes eutrophication.

Fauna
Wetlands are critical biodiversity areas often hosting a large variety of bird life. Of the 1089 bird species found in Kenya, 255 species from 44 families are associated with water and aquatic systems, implying wetlands support approximately 25% of Kenya's avifauna. Of the 255 species, freshwater bodies support 235 species or slightly over 92%. In total, 170 species are supported by the Lake Victoria wetlands, and out of this number, 82 are dependent on aquatic vegetation and water edge habitats. Wetlands in the project area are fairly well stocked with fishing birds like the Gulls, Terns, Pelicans, Kingfishers and Cormorants.

Lake Victoria is world famous for its many endemic species, especially the cichlid endemism of 99% with 300 species. Since the introduction of the Nile Perch, *Lates niloticus* and Nile Tilapia (*Oreochromis nilotica*) in the late 1950s and early 1960s, there has been a large change in the ichthyofauna of the lake. The Nile perch is a voracious predator preying on the cichlids particularly *Haplochromis* spp. The total annual fish catch in the Kenyan portion of Lake Victoria range from 180,000 to 250,000 metric tonnes, landed at over 200 beaches. Most fish caught are for domestic consumption and any surplus is sold in local markets. Farmers living near wetlands are also fishermen.

A wide variety of vertebrates and invertebrates are supported by the numerous wetlands and rivers found in the project area. However, outside these ecosystems, the diversity and population of wildlife is quite low since their habitats have largely been destroyed by human activities. Animals that are dependent on the wetlands include the Sitatunga that feed and breed in wetlands and are, thus, restricted to the papyrus and swampy areas. Other major fauna include the Otters, which are not entirely wetland mammals but are known to live in wetland areas where there is plenty of fish, which they feed on, as well as crabs, molluscs and amphibians. The Nile crocodile and hippopotamus are also found in the area. Monkeys, monitor lizards and several snakes including python, cobra, and mamba are also found within these wetlands. There are also several animals that are not associated with wetlands and water bodies like hyenas, porcupines and antelopes. These are less well represented in the area due to human disturbance and extensive cultivation.

Human-wildlife conflicts occur in the project area. Crop destruction and damage by raiding monkeys, hippopotami, waterbuck and porcupines is one form of conflict. The other form consists of injuries and sometimes death by dangerous wildlife species such as crocodiles, hippopotami and snakes.

4.2 Socio-economic Characteristics

4.2.1 Population and Social Characteristics

Population Characteristics

Western Kenya has one of the densest and poorest populations, with up to 1200 persons per km^2 in some rural areas. The region is characterized by low agricultural productivity, high population pressure and lack of off-farm income opportunities. Over 58 percent of households live in absolute poverty.

Traditional land management in Western Kenya has in the past relied on fallowing of unproductive fields to restore fertility and decrease pest problems. High rural population growth has made this practice untenable, and has led to wide scale abandonment of fallowing and the search for new agricultural land. There has been little restriction on encroachment onto steep slopes, wetlands, or forests, despite the existence of laws and regulations against such practices.

The project area includes a diversity of livelihood strategies and local cultural norms and groupings. Such differences, in combination with the agro-ecological circumstances identified above, affect access to resources, the agriculture mix, petty business and other non-farm activities. People from three major ethnic groups (Luo, Luhya and the Kipsigis) inhabit the districts falling within the project area.

Population by sex, number of households, area and density in the project area is shown in table 4.1 below.

Table 4.1 Population by Sex, Number of Households, Area and Density

District	Male	Female	Total	Households	Area (km^2)	Density /km^2
Busia	174,368	196,240	370,608	81,697	1,124	330
Vihiga	232,720	266,163	498,883	105,701	563	886
Nandi	290,003	288,748	578,751	112,713	2,899	200
Kericho	237,821	230,672	468,493	98,867	2,111	222
Nyando	146,635	153,295	299,930	68,371	1,168	257
Trans-Nzoia	286,836	288,826	575,662	116,112	2,487	231

Population Densities by Division

Table 4.2 Population and Densities by Divisions in the Project Focal Areas

Basin	Block	District	Division	Population	Density/km^2
Nzoia	1	Trans-Nzoia	Cherangani	52,974	179
	2	Busia	Butula	95,489	389
	3	Busia	Budalangi	53,356	286
Nyando	1	Kericho	Londiani	59,441	112
	2	Nyando	Lower Nyakach	49,247	270
	3	Nyando	Muhoroni	63,450	190
Yala	1	Nandi	Kipkaren	52,753	167
	2	Vihiga	Tiriki East	59,943	618
	3	Siaya	Boro	47,455	263

4.2.2 Current Land Use Systems

An overall situation of rapidly declining land-holding sizes remains. The main reason for this decreasing average land size is the fragmentation of land through heritage, which in turn is not only due to the traditional hereditary system, but is also partly due to the lack of economic alternatives outside farming, and related to land being a secure asset and a place to retire. Population increase is also a factor in land fragmentation.

Conversion of woodlands, forests, and wetlands into agricultural production has accelerated in recent years with significant negative impact on the natural resource base. Studies conducted in the context of the Lake Victoria Integrated Land Management Project (LVILMP) uniformly indicate the occurrence of severely accelerated land degradation in the Lake Victoria watershed. Measurements performed on sediment cores collected in the Nyando estuary show that sedimentation rates of the basin have increased fourfold over the

last 100 years resulting in large gullies that advance at rates up to 200 meters per year and large quantities of sediment deposit in the Winam Gulf of Lake Victoria.

Intensification of land use is necessary to achieve farming systems that are more sustainable than what is available today. Farmer management of land is greatly affected by the potential rewards of different agricultural choices. Increased profitability of agriculture increases the incentives for landowners to invest in their land, with likely implications that less degradation will occur on their land and they will have less incentive to leave smallholdings in search of larger ones. Experiences from Central Kenya, where there is evidence of high productivity, high profits, and good land management, are supportive of this relationship.

Profitable agricultural opportunities are not a sufficient condition for good land management on farms. The prevention of degradation, in the absence of traditional techniques of fallowing, requires new innovations and the sharing of information. On the technical side, soil fertility replenishment, mitigation of land degradation, and enhancing soil organic matter must be accompanied by appropriate conservation practices, crop diversification and increased planting of trees on farms, in short, good land husbandry. More sustainable agriculture will in turn provide environmental benefits that accrue at the local, national, and global levels since current poor management practices are threatening biodiversity, increasing sediment loads in key waterways and reducing GHG storage in above and below ground biomass.

4.2.3 Economic Characteristics

The Lake Victoria basin supports one of the densest and poorest rural populations in the world. Western Kenya as a whole is characterized by comparatively lower household incomes from the farm. In addition high levels of disease and destitution characterize the proposed project area. Studies conducted in the area reveal linkages between:

- Poverty and land investments. Poor households invest very little in agricultural inputs;
- Agriculture, ill-health and poverty;
- Wetland drainage for irrigation agriculture and land degradation; and
- Low soil fertility and lack of technical advice.

Poverty in Kenya remains a challenge requiring urgent attention. It is a multi-dimensional phenomenon, which includes inadequacy of income and deprivation of basic needs and rights, and access to productive assets as well as to social infrastructure and markets (PRSP, 2003). The quantitative approach of measuring poverty defines the poor as those who cannot afford basic food and non-food items. The 1997 Welfare Monitoring Survey estimated the absolute poverty line at KShs.1,239 per person per month and KShs.2,648 respectively for rural and urban areas. This poverty line is determined and based on the expenditure required to purchase a food basket that allows minimum nutritional requirements to be met. The minimum nutritional requirements are set at 2,250 calories per adult equivalent per day. Based on Welfare Monitoring Survey (WMS III) of 1997, the proportion of the population that cannot purchase the basic basket of goods was estimated to be 53 per cent of the rural and 50 per cent of the urban population.

Using the qualitative approach of Participatory Poverty Assessments (PPAs), people define, view and experience poverty in different ways. In the 2001 PPA reports, people mainly defined poverty as the inability to meet their basic needs. Poverty was associated with features such as lack of land, unemployment, inability to feed oneself and one's family, lack of proper housing, poor health and inability to educate children and pay medical bills.

In Kenya the poor tend to be clustered into certain social categories such as:

- the landless;
- people with disabilities;
- female headed households;
- households headed by people without formal education;
- pastoralists in drought prone ASAL districts;
- unskilled and semi-skilled casual labourers;
- AIDS orphans;

- street children and beggars;
- subsistence farmers;
- urban slum dwellers; and
- unemployed youth.

In urban areas, the poor live in peri-urban and slum settlements, which are characterised by inadequate/low quality basic services, like inadequate water, limited access to quality schools and health services and unhygienic living conditions. Poverty levels in the rural and urban areas of the study area of the WKIEMP which spreads over Busia, Vihiga, Nandi, Kericho, Nyando and Trans-Nzoia districts, according to the CBS (2003), are as outlined in Table 4.3 and 4.4 below.

Table 4.3 Rural Poverty Levels within Study Sites

Division/Location	Headcount Index: Percent of Individuals below Poverty Line	Standard Error of Headcount Index	Poverty Gap as Percent of Poverty Line	Standard Error of Poverty Gap	Number of Individuals from 1999 census*	Estimated Number of Poor Individuals	Standard Error of Estimated Number of Poor Individuals
LONDIANI DIVISION	41.46	7.15	13.53	3.12	53,134	22,030	3,799
Sorget	39.25	12.61	12.61	5.50	7,352	2,885	926
KIPKAREN DIVISION	43.45	6.58	14.98	3.02	51,417	22,341	3,383
Kamasai	52.17	12.54	18.37	6.15	5,205	2,715	652
CHERANGANI DIVISION	50.82	7.11	18.02	3.49	52,275	26,567	3,716
Cherangani	50.70	12.37	17.97	6.37	12,006	6,086	1,485
BUDALANGI DIVISION	67.57	3.31	27.48	2.50	45,655	30,848	1,511
Bunyala South	63.09	5.20	26.28	3.95	4,957	3,127	257
BUTULA DIVISION	67.68	3.76	24.16	2.52	89,571	60,624	3,367
Marachi Central	68.30	5.67	24.50	3.68	23,642	16,146	1,340
TIRIKI EAST DIVISION	59.10	5.95	23.74	3.65	58,764	34,732	3,496
Shaviringa	56.37	6.68	21.42	3.76	33,804	19,056	2,258
LOWER NYAKACH DIVISION	58.61	6.30	21.11	3.60	45,685	26,776	2,878

Source: CBS (2003)

Table 4.4 Urban Poverty Levels within Study Sites

District/Division/Location	Headcount Index: Percent of Individuals below Poverty Line	Standard Error of Headcount Index	Poverty Gap as Percent of Poverty Line	Standard Error of Poverty Gap	Number of Individuals from 1999 census*	Estimated Number of Poor Individuals	Standard Error of Estimated Number of Poor Individuals
NYANDO DISTRICT	9.00	4.60	2.00	1.38	29,586	21,329	917
LOWER NYAKACH DIVISION	71.28	6.63	27.22	4.27	1,967	1,402	130
N.E. Nyakach	71.32	5.27	27.13	3.45	1,967	1,402	103
LONDIANI DIVISION	27.74	6.20	7.64	2.03	4,328	1,200	268
Londiani	25.23	5.07	6.86	1.76	3,732	941	189
TRANS NZOIA DISTRICT	54.54	2.29	18.89	1.39	42,884	23,390	982
BUSIA DISTRICT	72.12	3.54	37.57	3.38	27,022	19,489	957
BUDALANGI DIVISION	74.09	3.90	37.95	4.02	5,417	4,013	211
BUTULA DIVISION	78.61	3.77	43.48	4.72	4,804	3,776	181
VIHIGA DISTRICT	78.06	3.57	44.19	4.35	25,032	19,539	894

Source: CBS (2003)

In order to overcome the obvious weaknesses of income poverty measures and to include important livelihood parameters, the concept of human poverty includes lack of capabilities, freedom and personal security, access to education, health and safe drinking water. Rather than measure poverty by income, the human poverty index (HPI) uses basic indicators of deprivation: illiteracy, malnutrition, early death, inadequate health care and limited access to safe water. Results for several districts in the target region are as shown below.

Table 4.5: Human Poverty Index (HPI) for Districts within Study Sites

South-West Rift Valley Region	Per cent of people not expected to live beyond 40	Adult illiteracy	People without access to:		Per cent underweight children below 5 years	HPI
			Safe drinking water	Health		
Kericho	33.0	22.4	64.6	45.1	13.9	33.9
Nandi	33.0	17.9	40.1	60.8	26.1	34.0
Trans Nzoia	27.0	31.6	41.4	54.1	33.2	
Busia	57.7	35.7	45.6	61.1	15.7	46.7
KENYA	**34.5**	**26.4**	**45.1**	**51.0**	**21.2**	**34.1**

UNDP, Kenya (undated)

Human Development Index (HDI) within Study Sites

Opportunity, security and empowerment are three essential ingredients of poverty reduction and human development. The Human Development Index (HDI) is a measure of human development derived from a composite of three indices: life expectancy, education attainment and standard of living as measured by income. Kenya's HDI value in the Global Human Development Report 2002 was 0.513.

Education is especially critical as it plays an important role in human development by empowering people to improve their well being and participate actively in nation building. The PRSP for the period 2001 – 2004 outlines the steps the government intends to take to ensure affordable and equitable access to education (including Special Education).

The table below shows the desegregated HDI results for various districts in the Western Kenya watershed. There exist significant differences in human capabilities and welfare within the basins. This could be useful in determining priorities for development interventions.

Table 4.6 Human Development Index (HDI) for Districts within Study Sites

South-West Rift Valley Region	Life Exp. index	Adult Literacy index	Primary School Enrol.	Secondary School Enrol.	Tertiary Enrol. Index	Education attainment Index	Annual per Capita Income PP	HDI Value
Kericho	0.593	0.776	89.2	23.2	4.7	0.751	16,493.6	0.550
Nandi	0.528	0.808	107.9	22.3	4.8	0.815	12,548.0	0.510
Trans-Nzoia	0.607	0.684	61.1	16.6	4.4	0.693	9,280.8	0.452
Busia	0.355	0.643	81.2	19.6	4.4	0.656	8,649.0	0.345
KENYA	**0.527**	**0.709**	**81.9**	**22.8**	**4.3**	**0.642**	**16,405.6**	**0.550**

UNDP, Kenya (undated)

Gender-related Development Index (GDI)

The role of gender in sustainable development is now indisputable, as there is a common understanding between economists, sociologists, policy makers and development planners, that development in any society cannot be sustainable without the participation of all its population.

Gender refers to the socio-cultural construction of the differences between men and women. Proper human development is about the well being of all people, without any discrimination. The gender-related development index (GDI) captures the differences between the achievements of men and women. The GDI measures achievements adjusted for gender inequality. It focuses on capabilities.

Table 4.7 Gender-related Development Index (GDI) for Districts within Study Sites

South-West Rift Valley Region	Life expectancy Index		Adult Literacy Index		Education index		GDI
	M	F	M	F	M	F	
Kericho	0.538	0.583	0.826	0.722	0.749	0.632	0.521
Nandi	0.568	0.603	0.842	0.805	0.769	0.740	0.536
Trans Nzoia	0.577	0.597	0.745	0.629	0.619	0.542	0.461
Vihiga	0.512	0.520	0.866	0.739	0.766	0.671	0.511
Busia	0.308	0.318	0.699	0.593	0.637	0.560	0.373
KENYA	**0.505**	**0.548**	**0.777**	**0.702**	**0.687**	**0.618**	**0.521**

UNDP, Kenya (undated)

4.2.4 Health

Waterborne and Water-related Diseases

Lake Victoria lowlands are classified as a holoendemic malarial zone. Part of the project area falls in this zone and the most diagnosed outpatient case in all health facilities in the project area is malaria. It is also the most important cause of high infant mortality in the area. Second to malaria is upper respiratory tract infection, although this generally results in very low mortality. Two species of parasites that cause bilhazia or Schistosomiasis occur in the region, *Schistosomiasis haematobium* and *Schistosomiasis mansoni*. Nonetheless, of the few reported cases over the years, *S. mansoni* is the most common among fishermen while *S. haematobium* is proportionately more common among the farmers.

HIV/AIDS

HIV/AIDS is discussed here because the rates of infection in Western Kenya are among the highest in the country and have left a growing number of rural households widowed or orphaned. The high mortality affects the productive members of the local communities mostly. This has a direct effect on the local economy. The possible positive impacts of the WKIEMP on HIV/AIDS include enhanced access to treatment facilities to a larger proportion of the affected population and increased cash income to pay for treatment. The negative impacts include slow implementation of the project due to absenteeism as workers grow weak, attend funerals or tend to their ailing relatives.

Table 4.8 HIV/AIDS prevalence in the provinces of Kenya

Province	Women 15-49		Men 15-49		Total	
	Percent tested	Percent HIV positive	Percent tested	Percent HIV positive	Percent tested	Percent HIV positive
Nairobi	54.5	11.0	49.3	7.1	51.9	9.1
Central	70.7	9.0	62.3	2.5	66.7	5.9
Coast	80.1	7.3	66.6	4.4	73.9	6.0
Eastern	76.1	6.2	75.1	1.7	75.6	4.1
Nyanza	90.8	17.0	86.8	10.6	88.9	14.0
Rift Valley	80.9	6.7	75.2	3.6	78.2	5.2
Western	88.0	6.1	82.7	3.8	85.5	5.0
North Eastern	75.6	0.0	73.3	0.0	74.5	0.0
Total	76.3	8.7	70.0	4.5	73.3	6.7

Source: Kenya Demographic and Health Survey 2003

5. GUIDANCE ON POTENTIAL IMPACTS

5.1 Overall Environmental and Social Impact

The proposed project will involve direct interventions in the biophysical and human environments. The potential environmental impacts can be categorized as biophysical, and social. These impacts can occur at various stages of project development and can be positive or negative. Mitigation measures for the negative impacts can be applied at each stage of project development.

Lessons learned from African and elsewhere demonstrate that community involvement in decision-making and management process may bring lasting improvement in the livelihoods of people, and can lead to better use and protection of the natural resource base. Consequently, environmental and social sustainability are fundamental to the success of the WKIEMP. There is, however, a critical balance between two contrasting scenarios:

- Firstly, under a scenario of a successful WKIEMP which works in accordance with the strategies and objectives set out in the project documents, a significant and positive contribution would be made to environmental and social sustainability by providing the tools and support to community driven development while ensuring rehabilitation and protection of the local and global environment;
- Secondly, under a scenario of a failing WKIEMP, activities supported and funded would contribute to further decline in environmental and social sustainability in these same areas, by not providing adequate support and guidance for community development, and perhaps to accelerate degradation of the local and global environment.

5.2 Potential Positive Impacts

Potential positive impacts will be realized at local, national and global levels. These include:

- At the local level the project is expected to generate many positive impacts on the socio-economic front, that could lead to improvements in alleviation of poverty, improved food security through better crop yields, diversified agricultural resource base, and improved household income. The project will also result in a multiplier effect on the local economy through development of entrepreneurial activities;
- The effective management and reversal of degradation of natural habitats through soil and water conservation techniques will lead to conservation of natural habitats and biodiversity. This will result in increased quantities and diversity of goods and services provided by the ecosystems to the local communities;
- Threats and barriers to integrated ecosystem management will be removed and in particular to conservation and sustainable use of biological diversity in natural habitats such as gallery forests, sacred forests, and reserves of medicinal plans, various types of woods, grass vegetation, microorganisms, birds and small mammals;
- At the national, provincial and district levels, the project will promote rural development strategies that integrate ecosystem concerns. The project will contribute to the decentralization process through community management of natural resources and Integrated Ecosystem Management (IEM) decision-making processes. The project will also strengthen local social organizational structures to evaluate ecosystem concerns that cover more than one village will also be realized through the project;
- At the global level, the project will contribute to the reduction of soil degradation, improvement of biomass production and sequestration of above and below ground carbon, and reduced siltation, and nutrient runoff to rivers systems draining into Lake Victoria;

- International waters of Lake Victoria and its tributaries will be protected through restoration of river banks from erosion and field encroachment, which is expected to significantly reduce pollution of international waters by sedimentation and agro-chemicals;

- The project will also contribute to the commitments made under several global conventions and treaties, in particular, Convention on Biological Diversity, Convention on Wetlands, UN Framework on Climate Change, and Convention to Combat Desertification;
- Pressure on natural habitats (remnant forests, riparian areas, wetlands, etc.) will be decreased through improved on-farm and off-farm biodiversity and agro-biodiversity;
- Capacity for local communities, farmer associations, national, and international institutions to identify opportunities, and formulate and implement policies in support of integrated ecosystem management (IEM) approaches, combining local and global benefits will be enhanced. However, communities are more likely to express demands for social and income-generating activities rather than for local and global and environment protection activities;
- Synergy between sustainable agricultural development and global environmental benefits such as mitigation of green house gases (GHG) accumulation in the atmosphere, forestry, biodiversity loss, and degradation of international waters will be examined;
- Soil microbial activity and micro-biodiversity will be improved through proper soil-water management, drainage, soil de-compaction, and utilization of organic manures to fertilize the soil;
- Contribution will be made to the decentralization process through community management of natural resources and Integrated Environmental Management (IEM) decision-making processes; and
- Partnerships with international, public and private development communities to acquire sustainable IEM financing capacity through various financial schemes will be established.

Therefore, the WKIEMP has the potential to make a significant contribution to Kenya's policies to protect and preserve the environment while reducing poverty in rural areas.

5.3 Potential Negative Impacts

On the whole, the project interventions will focus on implementation of specific activities that improve the long-term sustainability of the ecosystem. It is anticipated that few of the expected activities will have negative environmental impacts. Some land management activities may require assessment and mitigation.

The potential negative environmental and social impacts identified in the ESMF are likely to be localized impacts. These impacts may result from activities that are financed under local investment funds such as road upgrading, wetlands and ecosystem management, and small-scale dams that can be effectively mitigated. Those activities that are not addressed by the ESMF will be identified using the screening and review procedures outlined in the next chapter.

With regard to the critical habitats that include swamps, wetlands and forest and grassland fragments in western Kenya, none will be adversely affected by the project. The project will not be implemented in any protected area, but will target a number of critical natural habitats for biodiversity conservation. The project will focus on conservation strategies; hence there will be no degradation or conversion of habitats.

The anticipated potential negative impacts at local, national and global levels may include:

- Localized pollution and eutrophication of water bodies, and interference with wetland and animal ecology (particularly birds and fish).
- Alternative livelihoods and intensification of agricultural production (including livestock) which may result in community well-being, may also lead to an increase in areas brought under

cultivation and overall numbers of livestock units which may increase demand on natural resources or degrade the surrounding environment.

- Introduced systems of governance versus traditional systems may create conflict, or contradictions that may result in unsustainable agricultural or natural resource practices.
- Rising population pressures, desertification and drought due to climate change and intensification of agricultural systems may lead to an increase in land-related conflicts..
- Soil erosion can occur after removing vegetation cover for land clearing, exposing the soil to water and wind erosion.
- Localized agro-chemical pollution and reduction of water quality from agro-chemical use are likely to occur. Handling of pesticides and disposal of empty chemical containers requires serious attention.
- Improved cereal cultivation is likely to cause an increase in the population of such crop pests such as *Quelea quelea.*
- Rural livelihoods and environments are often complex, unpredictable and fragile (e.g. rural communities in Western Kenya are highly subdivided along clan and ethnic lines), and achieving effective participation by the marginalized, including women, youth and the poorest of the poor may not be easy;
- The initial involvement of persons that own land in contractual arrangements may change the employment equity of minority groups including the landless, younger persons and women and create negative feelings, beliefs or positions by residents of the impacted area regarding the proposed project;
- Differential impacts of WKIEMP capacity building efforts and investments (according to gender, wealth status, or livelihood strategy) may result in some groups relying to a greater extent than others on unsustainable use of natural resources;
- The successful establishment of trees on degraded lands will require that the current free grazing livestock systems on such lands will have to be restricted. This will lead to disruption in daily living and movement patterns as well as social network systems in some communities such as the Luo. In this community, restricting grazing land or fencing off land is considered to be a sign of being mean;
- Rapid institutional change in the formal community systems for governance and the implemention of new NRM initiatives may create competing institutions and decrease overall effectiveness, especially in budget allocation and management; and
- There are a significant number of NGO and development agency-financed projects throughout Western Kenya, with considerable rural development experience, that may be undermined by the financial weight of the WKIEMP if they are not effectively involved in the project.

The implementing agents of WKIEMP, particularly KARI and ICRAF, have considered these risks carefully in the preparation and design of the project. Table 5.1 below sets out the factors contributing to these risks and the features of the project design that will mitigate the risks.

Table 5.1 WKIEMP Risks Requiring Mitigation

Risk	*Explanation*	*WKIEMP approach*
Rural livelihoods and environments are often complex, unpredictable and fragile (e.g. rural communities in Western Kenya are highly subdivided along clan and ethnic lines), and achieving effective participation may not be easy.	Rural livelihoods are diverse and complex in nature; hence it is people living in a particular local area who understand the local environment, interactions within their society, and their economy more than outside intervening parties. It is also a challenge to achieve genuine participation on all sections of the community.	WKIEMP is based on a full-participatory demand-driven approach containing direct funding for community initiated subprojects including community contribution in kind and providing for mobilization of local resources through the support to agro-forestry based income generation activities. Through tools of PRA and PAPs these groups will be involved.
Lack of adequate capacity for environmental and social screening of small-scale activities may exacerbate existing environmental and social issues affecting communities within the target areas.	Kenya lacks adequate qualified staff and mechanisms for the screening and mitigation of impacts induced from activities such as developing small-scale infrastructure. This is especially important since subprojects will be community driven where such expertise may be lacking. This may exacerbate current environmental stress.	The project includes a component for training and capacity building for communities and government agencies. Villages will develop their plans, and use a predetermined screening procedure to determine those interventions that require mitigation.
The initial involvement of persons that own land, in drawing up "contracts" for the agroforestry land rehabilitation component, may change the employment equity of minority groups including the landless, younger persons and women who do not own any land. This may further create negative feelings.	Public attitudes are crucial in mobilizing the necessary local support for the project among minority groups because these will more often than not provide labour. Women will be most involved in farming activities; labour for planting trees will mostly be drawn from family members particularly the younger persons.	WKIEMP will carry out sensitisation workshops geared towards creating awareness on the project at all levels of the communities. Issues of land tenure will be dealt with on a site-to-site basis. The participatory approach of the project will be most useful in this regard.
Differential impacts of WKIEMP training and investments (according to gender, wealth status, or livelihood strategy) may result in some interest groups capturing benefits.	The relationship between poverty and environment is not always straightforward. Some sub-categories of the population which stand to gain like the elite groups may capture some of the intended village investments, whereas more disadvantaged groups may be forced to rely on an unsustainable use of their natural resource base.	Special attention will need to be paid to poverty targeting within villages to ensure that investments in support activities and subprojects are identified and implemented so as not to lead to unsustainable use or impacts on natural resources.
Alternative livelihoods and	Improved access to markets	Alternative livelihood strategies will

Risk	*Explanation*	*WKIEMP approach*
intensification of agricultural production (including livestock), which may result in improved well-being, may also lead to an increase in areas brought under cultivation and overall numbers of livestock.	may increase incentives to increase areas under production or increase animal numbers. In the absence of viable systems for land management and natural resource protection, this may lead to overexploitation or degradation of resources in some areas.	seek to strengthen and add value to existing systems. The integrated nature of the project will ensure counter measures to secure the natural resources, particularly through the agroforestry component.
For the successful establishment of trees on degraded lands, the current free grazing livestock systems on such lands will have to be restricted. This will lead to disruption in daily living and movement patterns as well as social network systems in some communities such as the Luo.	Competition between different land use systems is often a critical issue in agricultural related projects.	WKIEMP and the communities through the participatory approaches to be adopted will come up with mechanisms for the protection of trees on the degraded lands from destruction by grazing livestock and work out mechanisms acceptable by the communities on a site-to-site basis.
Considering current poverty levels, incentives for effective community management of natural resources in a sustainable manner (e.g. restricted harvesting of trees) may be weak in comparison to incentives for unsustainable use (e.g. charcoal burning).	The poor, in their need for immediate gratification of pressing needs such as household income for food and other basics, may not be in a position to wait out the long term benefits of agro-forestry based subprojects.	WKIEMP will carry out problem analysis and priority setting as part of participatory planning with communities (community development plan – local development plan). This approach offers the opportunity to ascertain communities' needs on the more effective management practices and to identify where immediate interventions are required.
Rapid institutional change in the formal community systems for governing and implementing natural resources and land management initiatives may create competing institutions and decrease overall effectiveness.	PRA's in the region revealed that there is general lack of large enough legally recognized community based institutions. However there were such organized groups as women groups, youth groups, clan groups, school development committees, etc. in most villages.	WKIEMP will seek to clarify decision-making responsibilities between individual small groupings and introduced systems (village development committees) and promote joint systems for effective management of land and natural resources.
Even where systems of governance are strong, incentives for effective community management of natural resources in a sustainable manner may be weak in comparison to incentives for unsustainable use.	A common assumption of development projects is that community management practices necessarily lead to sustainable resource management. Whether or not it actually does depends on the community decisions and effectiveness of the community management systems.	Capacity Building for Community Driven Integrated Ecosystem Management will focus on enhancing the capacity of communities to formulate decentralized action plans called Participatory Action Plans (PAPs) and providing technical assistance to promote adoption of integrated ecosystem management approaches.

Risk	*Explanation*	*WKIEMP approach*
Rapid institutional change in the formal national, provincial and community systems for governing natural resource areas may create competing or ineffective institutions within government.	Recent changes or trends in Kenya include the move toward decentralisation with the accompanying risk of ineffective restructuring, training and empowerment to ensure a successful transition.	WKIEMP support for institutional change will be monitored carefully, in full view of political sensitivities between the different systems, and be carried out with regular consultation with the affected parties.
There are a significant number of NGO and development agency-financed projects throughout Western Kenya with considerable rural development experience, which may be undermined by the financial weight of the WKIEMP if they are not effectively included in the process.	The financial size and scope of the WKIEMP is significant in comparison to the smaller scale NGO and bilaterally-funded development projects in rural areas. This may have implications for the relation between government administrations and NGOs, between existing projects, and communities, and for staff of government and NGOs.	WKIEMP will work to build capacity within national, provincial, and community administrations, and continue the collaborative approach; and consider making use of NGOs as service providers, in addition to private sector contractors where appropriate.
Rising population pressures, deteriorating resource base and intensification of the traditional production systems have led to an increase in the number of land-related conflicts, and introduction of investments in such areas may attract outside migrants that will increase pressure on existing resources.	WKIEMP investments may serve to bring back those who had migrated out in search of income earning alternatives into the recipient communities and they will also seek to benefit from the improvements. This could lead to friction or conflict and put additional pressure on limited resources.	WKIEMP will work carefully with communities to devise measures to support sustainable investments and ensure the inclusion of migrants into their communities.

Table 5.2 below describes many of the proposed investment activities that are likely to be undertaken by WKIEMP and predicts both positive and negative impacts. However, the screening and review process included in the ESMF will identify risks and recommend for further measures. The subprojects list presented here is not exhaustive as these subprojects will be selected and developed at the village level.

Table 5.2 Potential Environmental and Social Impacts of the WKIEMP

Activity/Types of Investments	Positive Impacts	Negative Impacts	Mitigation Measures
Feeder Road Improvement/ Infrastructure • Construction and repair of rural roads; • Construction	• Improvement of communication; • Connecting rural areas to principal road networks; • Access to markets, transportation of goods	• Destruction of vegetation in and near roadways; • Deforestation; • Increase in poaching and illegal and excessive removal of firewood and timber;	• Avoid infringing on protected areas, critical habitats or areas with significant biodiversity (e.g. wetlands); • Avoid areas of soil, slope or geological instability;

Activity/Types of Investments	Positive Impacts	Negative Impacts	Mitigation Measures
and maintenance of forest roads; • Construction of bridges and crossing structures; • Construction of road embankments; etc.	and services-overall positive impact on the economy; • Facilitation of communication between neighbouring villages; • Accessibility to village of forests or other areas for land development and use; • Protection against bush fires (firebreak); • Improvement of commercial exchanges; • Access to health and education centres.	• Destruction of wildlife habitat; • Impeding wildlife movement; • Reduction in biodiversity; • Water pollution and negative effect on surrounding ecosystem; • Loss of certain aesthetic values (visual impacts) from destruction of vegetative cover; • Acceleration of soil erosion due to poor maintenance and drainage of roads; • Social instability.	• Provide comprehensive community participation in planning, construction and management; • Migration issue to be resolved through local conflict resolution system; • Community decision-making in selecting sites for construction in order to avoid encroachment upon productive land.
Water Supply Infrastructure • Boreholes equipped with pumps; • Rehabilitation of boreholes; • Development and rehabilitation of wells; • Development of water storage reservoirs; • Maintenance of water supply/storage infrastructure; • Rehabilitation of water storage reservoirs, etc.	• Supply of potable water; • Improvement of pastoral activities due to availability of water for livestock; • Availability of water for agriculture and irrigation; • Development of lowlands for vegetable and crop production; • Improvement in raising the groundwater level; • Creation of ponds favourable for fishing; • Enrichment wildlife diversity; • Improvement in health; • Shortened distance to carry water, saving women's and children's labour; • Increase in economic activity.	• Increase in disease and insect vectors such as malaria, bilharzia, onchocerciasis, schistosomiasis, trypanosomiasis; • Contaminated water by chemical pesticides and fertilizers; • Soil degradation due to Stalinization or alkalisation, etc; • Loss of wildlife, vegetation and cultivated land; • Overuse of water and surrounding land resources due to increased population pressures; • Attraction of livestock and pressure on vegetation cover and soils with increase in erosion; • Lowering or drying up of groundwater level; • Lack of clear definition of user rights for wells and pumps may create exclusion of vulnerable groups.	• Protect groundwater sources from surface runoff and pollution; • Ensure planning, design and maintenance of infrastructure is appropriate to local needs, traditions, culture and desires; • Ensure sufficient community participation and organization for effective planning and management of infrastructure; • Include downstream water users (e.g. water supply, irrigation, livestock watering) in planning of water storage reservoirs; • Identify proper mechanism of rights and responsibilities over well/pump/reservoir usage through participatory village focus groups;

Activity/Types of Investments	Positive Impacts	Negative Impacts	Mitigation Measures
Social and Economic Infrastructure • Agricultural storage warehouses; • Cereal banks, etc.	• Improved storage and conservation of agricultural inputs and production; • Increased productivity; • Improved well-being; • Employment generation.	• Spread of disease from incoming laborers; • The vulnerable groups (women, poor children, migrants, trans-humant pastoralists) and the poor) may not benefit from infrastructure construction and rehabilitation; • Infrastructure investments may be misappropriated by government agencies;	• Ensure planning, design and maintenance of infrastructure is appropriate to local needs, traditions, culture and desires; • Conduct mandatory participatory focus groups with the vulnerable groups regarding infrastructure subprojects • Establish transparent monitoring and evaluation system
Soil and Water Conservation • Small dams; • Composting pits; • Riverine recovery and protection; • Re-vegetation; • Dykes and embankments; • River or stream bank protection, etc.	• Improved land use; • Improved drainage and runoff protection; • Land recovery for cultivation; • Improved soil quality (fertility); • Improved water retention; • Restoration of vegetative cover; • Erosion control; • Improved productivity; • Employment generation; • Improved food security.	• Soil and groundwater pollution if pesticides, herbicides and fertilizers are used; • Some households' livelihood opportunities may be restricted due to conservation efforts; • Alien invasive aquatic weeds infestation in dams; • Sediment flow into natural water bodies during de-silting.	• Employ suitable prevention and mitigation measures, including education of local population on proper handling, use and disposal of chemical pollutants; • Livelihood diversification opportunities identified through participatory needs assessment; • Conservation efforts need to be carried out with minimum disruption to productive activities; • Aquatic weeds control.
Structural Support for Improving Animal Husbandry • Grazing land rehabilitation; • Marking off pasture lands; • Strengthening of a land tenure system • Milk production improvement; • Improved pasture management and production; • Forage collection and storage (bales); • Forage storage structures.	• Modernization of agro-pastoral practices; • Secure access to pasture lands • Land tenure institutional mechanism established at village, district and provincial levels • Improved livestock productivity; • Improved pasture management; • Livestock manure collection and use; • Reduced conflict between livestock herders and farmers; • Improved animal health; • Improved human health; • Improved food security.	• Risk of concentrating livestock numbers; • Over grazing and loss of vegetative cover; • Pressure on water points and resulting risk of pollution; • Livestock diseases and sickness if numbers too high and too concentrated; • Increased conflict between livestock herders and farmers/local population; • Vulnerable groups' livelihoods made more insecure.	• Limit animal numbers or control access to grazing lands; • Control length of grazing time through introduction of rotational grazing, development of dry-season grazing areas and reserves; • Strategic development and placement of water points; • Establish conflict resolution mechanisms for the various subproject sites; • Integrate the vulnerable groups into each pasture management/land tenure subproject.

Activity/Types of Investments	Positive Impacts	Negative Impacts	Mitigation Measures
Structural Support for Improving Agricultural Production • Vegetable and multi-purpose gardens; • Construction and rehabilitation of irrigation schemes downstream of water reservoirs; • Modernization and diversification of agricultural production; • Strengthening of land tenure systems; • Improved fallows; • Flood control through small dams; • De-silting of water pans; • High value trees;	• Protection against soil erosion; • Improved soil fertility; • Diversification of crop production; • Intensification of crop production; • Improved land use; • Increased crop yields; • Food security; • Discouraging outward migration; • Livelihood security through improved land tenure and agricultural diversification/ intensification; • Improved food security.	• Loss of vegetative cover, decrease in soil fertility; • Possible pesticide, herbicide and fertilizer use leading to soil and water pollution; • Irrigation system may break down and not be repairable; • Conflict over user rights of irrigation systems; • Potential diversion of water resources from its natural course/location; • Vulnerable groups may loose access to water resources or land.	• Avoid infringing on protected areas, critical habitats or areas with significant biodiversity (e.g. wetlands); • Introduce integrated pest management (IPM) in agricultural lands; • Use containment basins during de-silting. • Educate population in the proper use, storage and disposal of potential chemical pollutants; • Ensure that construction and rehabilitation of irrigation systems are carried out by using materials easily accessible through local market; • Conduct needs and sustainability assessment for each agricultural activity (irrigation, vegetable growing, etc); • Ensure that the interests/rights of the vulnerable groups are integrated into the activities.
Structural Support for Improving Forestry • Development of natural and plantation forests; • Establishment of nurseries; • Protection/ conservation of nature reserves & fragile ecosystems; • Reforestation; • Develop plantations for firewood and other uses; • Reorganization and training of communities in village forest management; • Training in improved	• Qualitative and quantitative regeneration of vegetation; • Improvement in wildlife habitat; • Inward migration of wildlife; • Re-establishment of forest tree species through forest plantations; • Soil fertility improvement and erosion control; • Improved soil drainage; • Availability of firewood and wood for other uses; • Reduced energy consumption; • Reduction in bush fires; • Better organization of hunting; • Reduction in poaching; • Development of eco-tourism;	• Plantation made up of mono species more vulnerable to disease, insects, fire, etc; • Use of certain tree species can lead to decrease in soil fertility, nutrients, water, etc; • Harvesting by clear cutting can expose soil to greater evaporation, degradation, etc; • Increase in population pressures on forested areas with unintended results; • Introduction of foreign species may potentially disrupt eco-balance; • Households may lack fuel if alternative measures are not taken into an account; • People's livelihoods that are dependent on forestry/forest resources may worsen (e.g. hunters);	• Consider use of a variety of multipurpose and fast-growing indigenous tree species and management practices to enhance disease, insect, and fire resistance, and biodiversity. • Select tree species and management practices that promote sustainable soil and water conservation; • Educate local population on proper harvesting techniques and practices; • Include local population in the design, site selection, development and management of forested areas; • Take special care of not introducing foreign plant species that may cause disruption in eco-balance; • Introduce sustainable

Activity/Types of Investments	Positive Impacts	Negative Impacts	Mitigation Measures
firewood use; • Stream or river bank protection; • Wildlife protection; • Management of hunting and fight against poaching; • Development of apiculture in forested areas; • Development of ecotoursim; • Fight against bush fires or forest fires • Construction and maintenance of forest roads; • Joint management of gazetted forests.	tourism; • Recovery and restoration of deforested areas by direct seeding; • Introduction of agroforestry; • Enhancing general biodiversity; • Employment generation; • Reduced greenhouse gases (GHGs)	• Human-wildlife conflicts; • Biodiversity loss due to introduction of exotic species.	practices of fuel wood gathering and hunting (rather than just restrictive measures); • Problem animal control;
Human and Cultural			
• Poverty alleviation; • Waterborne and water-related diseases control; • HIV/AIDS; • Protection of sacred groves, historical and archaeological sites.	• Increased rural employment opportunities; • Improved health of participating communities; • Medicinal products; • Community well-being.	• High rates of population increase; • Potential increase of waterborne and water-related diseases; • Potential encroachment into sacred groves, historical sites and archaeological sites.	• Awareness creation on family planning; • Take prophylactic measures and apply biological control by introducing predator fish such as *Gambusa affinis* and *Tilapia zilli*; • Health education programs for the local people; • Gazette sacred groves; historical and archaeological sites as national monuments.

5.1 Localized Impacts

Most of the developments or subprojects planned under the WKIEMP will be small in scale. Consequently the significance of the direct negative environmental and social impacts is likely to be small. All the activities planned under the project will have significant positive environmental impacts especially when considering the integrated ecosystem management of the river basins linking upstream and downstream activities. Intensification of agricultural activities through development and introduction of agrobiodivesity can result in loss of existing biodiversity and increased human-wildlife conflicts.

5.2 Cumulative Impacts

Many of the subprojects may result in cumulative impacts on natural resources. Cumulative impacts are those that may result from individually small-scale activities with minimal impacts but which over time can combine to have a significant impact. Cumulative impacts can also be defined as impacts that potentially develop from the combined impacts of more than one subproject. Examples include:

- Deforestation due to exploitation of forest resources for such use as firewood, charcoal and construction materials;

- Upstream development which may have downstream impacts such as increase in erosion and eutrophication of Lake Victoria;
- Illegal poaching of wildlife due to expansion of land under cultivation or increased proximity to protected areas; and
- Attraction of immigrant populations to communities that have improved production systems and social infrastructure.

The stakeholders will be provided with an opportunity to learn how to avoid or mitigate localized impacts from initial subprojects so that measures can be integrated in subsequent activities. Chapter 6 provides a list of triggers, which can be used to determine whether subprojects may result in cumulative impacts, and if so, what tools to use for mitigation.

5.3 Strategic Impacts

The stated objective of the WKIEMP is to achieve significant local, national and global environmental objectives. The project also intends to concentrate on interventions to promote sustainable land use. These two directions are not mutually exclusive. If the WKIEMP succeeds in effectively promoting integrated ecosystem management, then the environmental objectives and the goal to promote sustainable development and reduce poverty will be achieved.

Other strategic issues that need to be addressed under the project are the issues of land degradation, pollution, pest management and sensitivity to vulnerable groups. These are discussed further here below.

5.3.1 Ecological Impacts and Land Degradation

A number of the proposed activities in the subprojects can lead to both localized and cumulative impacts on biodiversity, forests, wetlands, soils and water quality. Land degradation may arise due to subprojects that involve infrastructure development, intensification of agriculture, and concentration of livestock in particular areas. The environmental and social screening tools in Chapter 6 will be used to identify and mitigate the potential impacts as they relate to certain types of community investments.

5.3.2 Potential Sources of Pollution

The use of agro-chemicals such as inorganic fertilizers and pesticides, and organic manure can lead to pollution, especially due to surface runoff into adjacent watercourses, including infiltration into groundwater. This will be carefully monitored through annual reporting tools described in Chapter 6. Training will be provided to communities in proper handling and application of these materials as part of local capacity building component.

5.3.3 Pest Management

Successful Integrated Pest Management/Integrated Crop Management (IPM/ICM) is based on sound farmer knowledge of the on-going agro-ecological processes of the farming environment. Such farmers are, therefore, technically empowered to make informed decisions on the most appropriate management strategies to apply a specific period of crop development and production cycle. Furthermore, integrated crop/pest management is a farmer-centred management approach that addresses issues beyond pest management. It offers the entry point to improvement of the entire agricultural production system. It can be successfully adopted in the presence of a national Integrated Pest Management (IPM) policy framework and institutional support.

In all instances where high input-dependent crop/pest practices are adopted, pesticide misuse is known to be common and results in the following impacts:

- Destruction of crop pollinators leading to poor crop yields;
- Elimination of the natural enemies of crop pests and consequent loss of natural pest control that keeps the populations of crop pests very low;
- Development of pest resistance to pesticides, encouraging further increases in the use of chemical pesticides;
- Contamination of the soil and water bodies;
- Toxicity to fish and birds;

- Proliferation of aquatic weeds;
- Pesticide poisoning of farmers and deleterious effects on human health
- Unacceptable levels of pesticide residues in harvested produce and in the food chain; and
- Loss of biodiversity in the environment, particularly of the aquatic non-target species.

Considerable attention must, therefore, be paid to the environmental consequences of current pest management practices in Kenya. Project activities have some major environmental and other implications for crop/pest management. Key mitigation measures are, therefore, required to address these concerns as outlined in Tables 5.3 and 5.4 below.

Table 5.3 WKIEMP and Implications for Crop and Pest Management

Project Objective/Output	**Crop and Pest Management Implications**
1. Increase in agricultural/forest productivity while conserving the natural resource base.	Increased use and reliance on inputs (fertilizers and pesticides).
2. Increase in incomes from agricultural/forestry production.	Change in current pest on/off farm production management practices.
3. Agricultural diversification.	Change in pest control and intensification practices and reliance on pesticides.
4. Training in agricultural intensification.	Inclusion of IPM/ICM methods/techniques in training curriculum.
5. Promoting agricultural exports.	Reliance on chemical pesticides jeopardizes product quality (MRLs and EURO-GAP requirements).
6. Seed and plant nurseries.	Increased use of fertilizers and pesticides to protect seedlings.
7. Training in improved agricultural technologies.	Training curriculum may be strongly biased towards input (fertilizer and pesticide) use.
8. Agricultural research and extension services.	Lack of attention to IPM and non-chemical pest control methods.
9. Support to rural organizations.	Neglect of IPM/ICM awareness and capacity for IPM/ICM implementation.
10. Promoting monoculture cash and subsistence crops.	Increased dependence on chemical control.

Table 5.4 Mitigation Measures for Crop/Pest Management

Major Issues	Actions Required
1. Increased use and reliance	(a) Promote adoption of IPM/ICM on chemical pesticide practices through farmer education and training; and (b) Move farmers away from input-dependent crop/pest management practices and promote use of locally produced organic matter, botanical pesticides and biological control.
2. Change current pest management	(a) Allocate adequate resources to implement National Plant Protection Policy; (b) Increase IPM awareness amongst policy makers and farming community; and (c) Abolish free distribution of pesticides to farmers and promote safe handling and application of pesticides.
3. Enforcement of legislation	(a) Strengthen institutional capacity to effectively supervise compliance with pesticide legislation.
4. IPM research and extension	(a) Strengthen IPM research; (b) Strengthen IPM extension; (c) Strengthen collaboration for field implementation of IPM; and (d) Involve NGOs in promoting IPM activities.
5. Environmental hazards of pesticide misuse	(a) Create public awareness of pesticide misuse hazards through public awareness campaigns; (b) Undertake regular assessment of pesticide residues in irrigated agricultural production systems and in harvested produce; and (c) Carry out monitoring of pesticide poisoning in the farming and rural communities.
6. Increase in disease vectors	(a) Establish strong collaboration between the project and national vector-borne disease control programs such as malaria control program; and (b) Conduct regular vector surveillance.
7. Increased dependence on chemical control	(a) Support traditional mixed cropping systems to keep pest species from reaching damaging levels. (b) Promote proper disposal of unused agricultural chemicals and packaging materials.

5.4 Analysis of Alternatives

Several alternatives for the project were considered before the current proposal was prepared. The first was linking with IDA. The second was a stand-alone GEF project. The Government of Kenya has recognized the rapid decline in the natural environment and stagnation in agricultural production of Western Kenya as a priority. The Government, international donors, NGOs and community-based organizations, are implementing a number of jointly funded initiatives. An IDA funded community based development project is also anticipated in the next three years. Given the scale of land degradation, more interventions will be required to reach ecosystem sustainability.

The proposed GEF alternative seeks to capture the additional off-farm benefits generated by integrated ecosystem management activities. By integrating improved land use and environmental service functions, the GEF alternative generates global benefits and contributes to more sustainable agricultural productivity, and income.

Implementing the project in fewer river basins than all the lands covering Western Kenya was considered because the project will have an important demonstration effect and it is expected to attract further resources. In addition the learning opportunity provided by three river basins, which vary in agro-ecological and socio-economic characteristics, is likely to outweigh the benefits from increased coverage on just one river basin.

6. REPORTING AND RESPONSIBILITIES FOR THE ESMF

This chapter sets out the reporting systems and responsibilities of the officers in implementing the ESMF. The Chapter commences with details of the issues that will be addressed by the ESMF, and the specific steps to be taken to ensure adherence to the ESMF. It then describes the various elements of the ESMF including:

- Flowchart for reporting and advice;
- Screening checklist for subprojects;
- Annual environmental and social progress report format**;**
- Format for midterm environmental and social performance audit; and
- Description of roles.

6.1 Key Issues and Proposed Actions

Box 6.1 and Table 6.1 outline the proposed actions and measures to address them. These are:

Box 6.1 Proposed Actions for Implementation of ESMF

- At the national level, the Technical Advisory Group (TAG) will provide lead coordination and ensure that the results meet the targets set by the project;
- Day-to-day coordination of project activities will handled by the project coordination office (PCO) located in Kisumu;
- The seconded environmental and social specialists (SESS) will provide the technical backstopping on all aspects of environmental and social mitigation;
- An annual environmental and social progress report will be prepared by SESS;
- An independent consultant will conduct a midterm environmental and social performance audit. This audit report will be shared with TAG, KARI, the World Bank and other relevant government agencies.
- Consultancy inputs will assist in the training of key staff and the transfer of essential technical expertise.

Table 6.1 Issues Addressed by ESMF

Issue	Mainstreaming of Mitigation Measures	Responsibility for Action
1. Requirements for mainstreaming of the ESMF	a. Appoint PCO and SESS; b. Annual environmental and social progress report.	a.TAG b. SESS
2. Weak capacity for environmental and social management at district levels	a. Develop partnerships with NGOs for environmental and social management	a. SESS and PCO b. PCO and SESS
3. Opportunity to contribute to positive impact on natural resource management	a. Assign sufficient budget for support to improved NRM activities	a. TAG
4. Mainstreaming WB safeguard policies into the PCO	a. Provide sufficient training and support to PCO to understand and apply WB safeguard policies	a. TAG and SESS
5. Requirement for land tenure strengthening, and promoting decentralized governance	a. Engage community leaders and community associations, and stimulate thinking towards appropriate models for relation of communities with government	a. PCO and SESS
6. Cumulative impacts on some environmental resources	a. Carry out assessments of cumulative impacts of groundwater, surface water resources, and pastoral resources. b. Sensitise communities to the issues of cumulative impacts	a. SESS b. SESS
7. Optimum integration of technical advice with a demand-driven, participatory approach	a. Sensitise communities to the range of technical advice available, and their responsibility to choose which technical advice they require	a. PCO and SESS
8. Need to provide advice on relevant environmental laws to communities	a. Provide information on relevant environmental laws to communities	a. PCO and SESS

9. Opportunities for positive environmental subprojects	a. Develop potential list of positive environmental subprojects and raise awareness of PCO on these	a. SESS

6.2 Flowchart for Reporting and Advice

Proposed reporting lines, and advisory and support mechanisms that will be used in the ESMF are depicted in Figure 6.1, while Box 6.2 provides the summary.

Box 6.2. Proposed Reporting Lines and Support Mechanisms

- PCO, SESS and Contract Service Providers (CSPs) will work with communities to provide guidance and advice on potential environmental and social subprojects, potential negative environmental impacts and appropriate mitigation measures;
- In turn PCO and CSPs will receive technical advice and support from SESS and TAG;
- SESS will provide an annual environmental and social progress report and advice to both PCO and TAG;
- An independent consultant will conduct a midterm environmental and social performance audit. The audit report will be shared with TAG, NEMA, KARI, WB and Other relevant government agencies.

6.3 Screening for Subprojects

This ESMF that includes a screening process to assess the potential impacts associated with subprojects. The WKIEMP is expected to produce net benefits in terms of natural resource management and conservation but certain project activities related to improved land management may have environmental or social impacts that require mitigation. Hence the proposed project has been rated Category B under the World Bank Policy on Environmental Assessment (OP 4.01), requiring a partial Environmental Assessment (EA). The main purpose of the ESMF is to cover the unknowns. Using the screening and review process for subproject identification presented here will, therefore, help determine which of the safeguard policies are triggered and what measures will need to be taken to address the potential impacts.

In addition to the World Bank's OP 4.01 Environmental assessment, the WKIEMP has triggered OP 7.50 Projects in International Waters. This screening and review process will determine how and when a particular subproject will trigger a safeguard policy, and what mitigation measures will need to be put in place. It will also ensure that subprojects that may have potentially significant impacts will be studied in greater detail. The need for subproject specific EIAs will also be identified by this screening and review process.

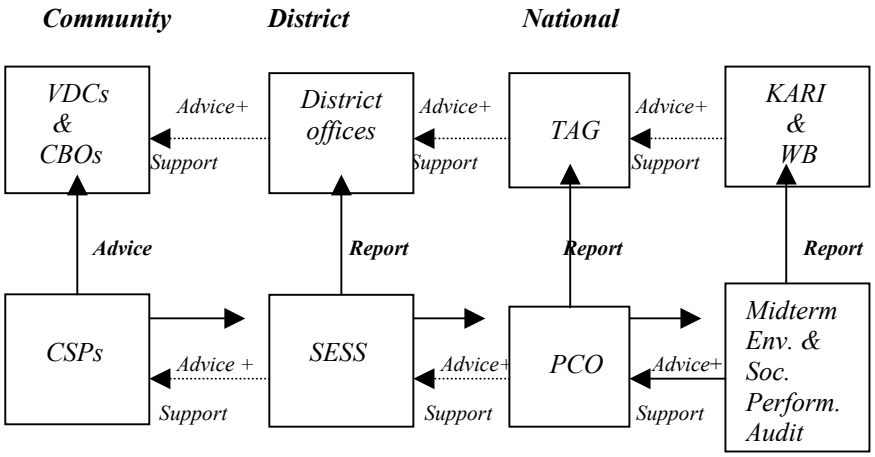
The seconded environmental and social specialists (SESS) based in Kisumu will provide assistance in the screening of the subproject proposals using the screening procedures and checklists outlined in this chapter. The subprojects will be given an environmental rating. This ESMF has included a suggested format for EIA, in case the need arises where a subproject is of environmental category A in nature. The SESS will be responsible for ensuring that the environmental and social impacts screening and review system set out in this Environmental and Social Management Framework (ESMF) is integrated into the subprojects cycles.

In order to ensure proper implementation of environmental and social screening, and mitigation measures, as well as effective natural resource management, the WKIEMP will undertake an intensive program of environmental training and institutional capacity building. Environmental training and sensitisation will be required at all levels including community workers, local government bodies, and SESS. The PCO, SESS, CSPs and additional experts will provide a diverse range of technical training on environmental issues to these groups.

Kenya lacks adequately qualified staff and mechanisms for the screening and mitigation of impacts generated by activities such as small-scale infrastructure and agricultural development. A safeguard specialist will give appropriate training to relevant institutions, organizations and individuals (NEMA, KARI, ICRAF, PCO, SESS Stakeholders, Community Representatives, Farmer Groups, NGOs, etc.) during the Project Launch Workshop. They in turn will train the groups and/or individuals responsible for screening the subprojects for environmental and social safeguard concerns. The safeguards specialist will

also brief the identified individuals who will be part of the committee to screen subproject proposals for potential environmental and social issues. The objective of the training will be to raise the level of environmental and social awareness in the communities and promote adoption of the screening checklist.

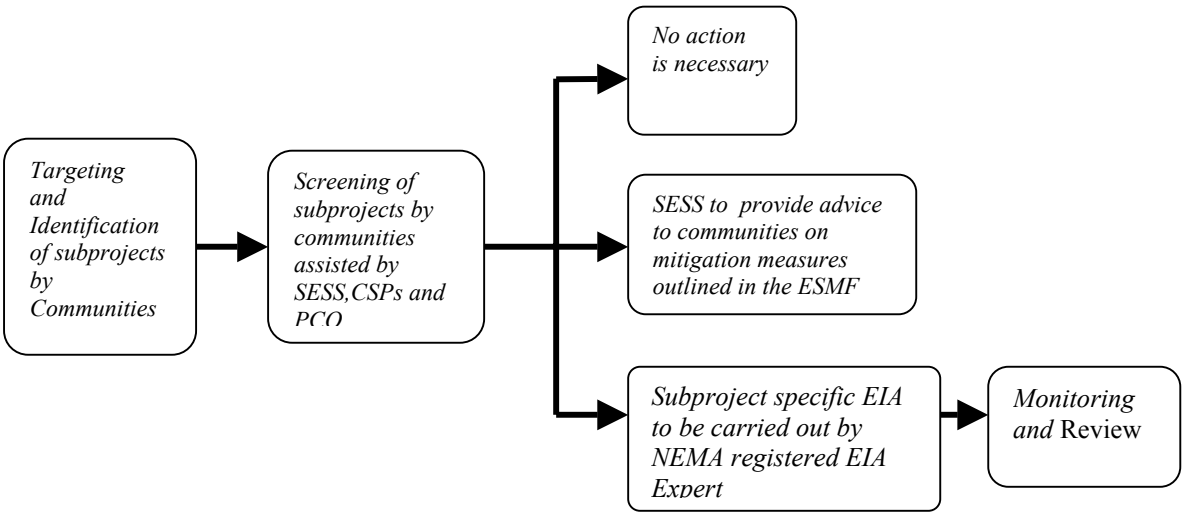
Figure 6.1 Flowchart of reporting and advice



The screening criteria outlined in this ESMF includes relevant questions which will help determine if any other safeguard policies are triggered and the measures need to be taken to mitigate impacts. The National Environment Management Authority (NEMA) will review and comment on the EIA before the sub-project can be appraised. This will ensure that subprojects that may have potentially significant impacts and require more detailed study receive national level approval as well as district level approval. With the approval of the ESMF by NEMA, not all subprojects will require EIAs to be undertaken. Where an EIA has to be carried out, this will be done by a NEMA registered EIA expert.

Figure 6.2 depicts the process that the PCO, SESS and CSPs will apply in working with the communities to avoid or mitigate negative environmental impacts for community subprojects.

Figure 6.2 Process of Screening for Community Subprojects



Communities will identify subprojects with the assistance of the PCO, SESS and CSPs. The proposed subprojects will subsequently be checked against the screening checklist **(Format 6.1).** PCO, SESS and CSPs will encourage communities to carry out this task themselves possibly by the teachers, extension agents, health workers or other literate members of the community. The checklist is a simple yes/no form culminating in whether specific advice to the community on environmental mitigation is required. CSPs

will give this advice, or in cases, will call upon the SESS for specific technical advice. The Screening forms will be reviewed quarterly at DSC meetings.

Box 6.3 Rationale for the Design of Screening Checklist

- There will be many subprojects supported by WKIEMP. Therefore, a system that is streamlined is required, and as far as possible, communities must be responsible for completion of screening;
- In most cases, communities will have very little knowledge of environmental and social screening, hence the need for CSPs and SESS assistance in using the screening forms;
- The screening prompts a list of yes/no answers in relation to questions on the location of the subproject and the anticipated impacts; if there are 'yes' answers to any of these questions, then the SESS, CSPs and communities are obliged to recommend a course of action;
- This action can be for the community itself to manage or avoid impacts; SESS, PCO and CSPs to provide specific advice; or if necessary, technical advice can be sought from elsewhere;
- Subproject specific EIAs, if recommended, can only be carried out by a NEMA registered EIA Expert;
- The forms will be reviewed by the PCO and SESS at the quarterly DSCs meetings before operations begin.

Format 6.1. Screening Checklist for Subprojects

Subproject name	[type here]
Estimated cost (KShs.)	[type here]
Approximate size of land area available for the subproject	[type here]
How was the site of the subproject chosen?	[type here]

Location

	Yes	No
Is the subproject prone to adversely affect environmentally sensitive areas or critical habitats such as Mau Forest, Cherangani Forest, Kakamega Forest, Saiwa Swamp, or Lake Victoria Wetlands (OP 4.04, OP 4.36)?	☐	☐
Are there endangered or threatened species of mammals (e.g. Sitatunga), reptiles, birds or insects) that could be adversely affected by the subproject (OP 4.04)?	☐	☐
Is the subproject sited within a strictly protected area, national park (Mt. Elgon, Saiwa Swamp), nature reserve (Kakamega, Chepkitale, OP 4.04))?	☐	☐
Is the subproject located within an area containing a natural/historical monument, or area of cultural heritage (e.g., Kit Mikayi, OPN 11.03)?	☐	☐
Does the project affect the aesthetic quality of the landscape?	☐	☐
Does the project reduce people's access (due to roads, location etc) to the pasture, water, public services or other resources that they depend on?	☐	☐
Will the subproject involve the relocation of people or herders' livestock from the site (OP/BP 4.12)?	☐	☐
Will the subproject be located in disputed land (OP 7.60)?	☐	☐

Impacts

	Yes	No
Will the subproject cause pollution of international waters of Lake Victoria (OP 7.50) by sedimentation and agro-chemicals (OP 4.09)?	☐	☐
Will the subproject lead to contamination of watercourses with pesticides (OP 4.09)?	☐	☐
Will the subproject lead to contamination of soil by pesticides (OP4.09)?	☐	☐

Will the subject reduce the quantity and quality of water for the downstream users?	☐	☐
Does the subproject involve drainage of wetlands or other permanently flooded areas (OP 4.04)?	☐	☐
Will the subproject encroach on an Important Bird Area (IBA) ?	☐	☐
Will the subproject lead to soil degradation or erosion through vegetation clearance during infrastructure development?	☐	☐
Will the subproject entail dam construction that is likely to adversely affect the quality or quantity of water flows into Lake Victoria (OP 7.50, OP 4.37)?	☐	☐
Does the subproject involve development of water storage reservoirs that are likely to increase the incidence of water-borne and water-related diseases such as malaria, cholera and bilharzia?	☐	☐
Does the subproject involve conversion of forestlands to agricultural production (OP 4.36)?	☐	☐
Will the subproject require construction and repair of rural roads leading to destruction of vegetation along and near roadways?	☐	☐
Will the subproject involve intensification of crop production requiring increased use of pesticides, herbicides and fertilizer that will lead to soil and water pollution (OP 4.09)?	☐	☐
Does the subproject have the potential to jeopardize threatened and endangered species or adversely modify their habitat (OP 4.04)	☐	☐
If the subproject advocates use of high value trees, will this adversely affect the indigenous biodiversity (OP 4.36)?	☐	☐
Will the subproject lead to increased human-wildlife conflicts?	☐	☐
Does the subproject have the potential of reducing plant and animal diversity?	☐	☐
Does the have the potential of introducing exotic plants or animals?	☐	☐
Will the subproject lead to the reduction of the cichlid species diversity of Lake Victoria (OP 7.50)?	☐	☐
If the subproject requires construction of dykes and embankments, will this lead to infestation of alien invasive aquatic weeds in dams?	☐	☐
Does the subproject involve major borehole or water point construction?	☐	☐
Will the subproject result in the lowering or drying up of groundwater level?	☐	☐
Will the subproject create pressure on water points resulting in risk of pollution?	☐	☐
Does the subproject have the potential of diverting the water resource from its natural course/location?	☐	☐
Does the subproject require large volumes of construction materials (e.g. gravel, stones, water, timber, firewood) leading to cumulative impacts?	☐	☐
Will the subproject use foreign materials that are not readily available in local markets leading to introduction of exotic plants and animals?	☐	☐
Will the subproject affect soil salinity and alkalinity?	☐	☐
Will the project result in restriction of grazing or fencing off land to keep livestock out?	☐	☐
If the subproject results in improved animal health, will this lead to overgrazing and loss of vegetative cover?	☐	☐
Will the subproject create waste that could adversely affect local soils, vegetation, rivers and streams or groundwater?	☐	☐
Will the subproject adversely affect small communal cultural property such as funeral or burial sites (OPN 11.03)?	☐	☐
Does the subproject encroach on critical habitats or areas with significant biodiversity (e.g. wetlands, forests and grassland fragments, OP 4.04)?	☐	☐
Will the subproject generate biohazardous waste (esp. HIV/AIDS when blood is tested)?	☐	☐
Can the subproject have a significant impact on cultural or lifestyle diversity and stability?	☐	☐
Will the subproject result in conflict or disputes among communities or ethnic groups?	☐	☐
Will the subproject result in the involuntary resettlement of individuals or families	☐	☐

(OP/BP 4.12)?		
Will the subproject lead to migration into a protected area (e.g. natural habitat, nature reserve or park, OP 4.04))?	☐	☐
Will the subproject adversely affect any indigenous people living in the area (OD 4.20)?	☐	☐
Will the subproject adversely affect the livelihoods and rights of women and vulnerable groups (the elderly, the poor, etc.)?	☐	☐
Will the subproject lead to changes in the distribution of people or of livestock?	☐	☐

Proposed action

Summarise the above:

☐ All the above answers are 'No'

☐ There is at least one 'Yes'

Guidance

- If all the above answers are 'No', there is no need for further action;

If there is at least one 'Yes', please describe your recommended course of action (see below).

Recommended Course of Action

If there is at least one 'Yes', which course of action do you recommend?

☐ Community / District Development Committees given full responsibility to mitigate environmental and social risks with assistance of SESS, CSPs, and extension agents;

☐ SESS will provide detailed guidance on mitigation measures as outlined in the ESMF.

☐ Specific advice is required from SESS regarding subproject specific EIA(s) and also in the following area(s):

[type here]

Expert Advice

☐ The Government of Kenya through the Department of Monuments and Sites of the National Museums of Kenya can assist in identifying and, mapping of monuments and archaeological sites.

☐ Subproject specific EIAs, if recommended, must be carried out by experts registered with NEMA and be followed by monitoring and review.

Completed by: [type here]
Name: [type here]
Position / Community: [type here]
Date: [type here]

6.4 Annual Environmental and Social Progress Report Format

The format for completion of the annual environmental and social progress report is set out in Box 6.4 below. The report will provide a means of communication between the districts and PCO, and between SESS and TAG. The report will also provide a paper trail of experiences and issues running from year to year throughout the project. The report will contain practical information from which the independent consultant can draw upon in preparing the midterm environmental and social performance audit.

Box 6.4 Annual Environmental and Social Progress Report Format

1. Introduction;
2. Objective;
3. Community subprojects approved;

4. Key environmental and social issues identified from subproject screening;
5. Mitigation actions undertaken;
6. Capacity building programs implemented;
7. Results of EIAs and other required safeguard management plans;
8. Analysis of cumulative environmental impacts;
9. Collaboration with NGOs, CSPs, and Government line agencies;
10. Conclusions (*Is WKIEMP contributing to improved natural resource management and community development?*) Explain.

6.5 Format for Midterm Environmental and Social Performance Audit

The mid-term environmental and social performance audit report should contain the following information as outlined in Box 6.5:

Box 6.5 Format for Midterm Environmental and Social Performance Audit

Executive Summary [Brief description of WKIEMP key results/impacts, and consultant's major findings/recommendations/lessons learned];

Description of the Project [Rationale, genesis, constraints/opportunities, accomplishments, problems, way forward for project implementation and approach];

Audit Purpose and Methodology [Types and sources of evidence and methodologies employed to complete the environmental and social performance audit];

Findings [Presentation of findings with supporting evidence as regards issues in the audit and other pertinent matters that should arise during the course of the audit];

Recommendations [Presentation and synthesis of pertinent recommendations from project participants/stakeholders as they regard ongoing planning, management and implementation of the WKIEMP, and matters of long-term sustainability and impact];

Lessons learned [Description and documentation of lessons learned from the project to date. Consideration to be given to internal project aspects, i.e., planning, design, management, implementation, and external factors such as policy contexts, other country/regional/global factors that have been constraining or supportive]; and

Lists of documents reviewed, organizations and persons contacted, workshops held, and workshop briefs/proceedings.

6.6 Description of Roles

The roles proposed under this ESMF are summarized as follows:

- TAG will provide lead coordination at the national level and ensure that the results meet the targets set by the project;
- PCO will handle day-to-day coordination of project activities;
- SESS will be responsible for ensuring that the environmental and social screening and review system set out in this chapter is integrated into the subprojects cycle and that it is implemented;
- Sensitisation of community groups, local government bodies,and CSPs to environmental and social issues will be a significant part of ensuring this integration, as will partnerships with governmental and non-governmental officers associated with the project;

- SESS will draw on the technical advice of government officers in other departments, or upon traditional technical knowledge particularly of natural resource management, land tenure practices, livestock management and the use of indigenous plant and animal resources;
- SESS will provide backstopping technical advice in environmental and social screening of subprojects;
- SESS will prepare annual environmental and social progress reports for submission to PCO, and TAG;
- PCO will provide guidance to CBOs, VDCs, local government bodiesCSPs, and SESS and provide the key link between the regional subprojects and TAG; and
- An independent consultant will undertake a midterm environmental and social performance audit. The audit report will be submitted to PCO and TAG and be shared with KARI, NEMA, the World Bank and other relevant government officials/agencies.

6.7 Monitoring and Evaluation

Two strategies are used to build a simple system for monitoring of environmental and social impacts:

- The PCO and SESS will consider the environmental and social criteria that require measurement (e.g. sediment levels). A list of initial proposals is given below; and
- Using this list of criteria, a set of indicators will be integrated into recording forms to be used in a participatory approach to environmental monitoring and evaluation.

6.7.1 Initial Proposals

The key issues to be considered in the WKIEMP include monitoring of water quality, biodiversity, carbon sequestration, soil fertility, agricultural production, income generation and population dynamics. The goals of monitoring will be to measure the success rate of the project, determine whether interventions have resulted in dealing with negative impacts, and whether further interventions are needed or monitoring is to be extended in some areas. Monitoring indicators will very much be dependent on specific project contexts.

Monitoring and surveillance of the WKIEMP subprojects will take place on a "sample" basis as it would be impossible to monitor all the subprojects. It is not recommended to collect large amounts of data, but rather to base monitoring on observations by project officers and stakeholders to determine trends of the indicators.

Monitoring of Participation Process

The following are selected indicators for monitoring the participation process involved in the WKIEMP activities:

- Number and percentage of affected households consulted during the planning stage;
- Levels of decision-making of affected people;
- Levels of understanding of subprojects impacts and mitigation;
- Effectiveness of local authorities to make decisions;
- Frequency and quality of meetings; and
- Degree of involvement of women or disadvantaged groups in discussions.

6.7.2 Monitoring indicators

Monitoring the Implementation of Mitigation Measures

Tables 6.2 and 6.3 list the recommended indicators for monitoring the implementation of mitigation measures.

Table 6.2 Possible Indicators for Environmental Monitoring of the WKIEMP

Environmental Indicator	Target

HYDROLOGY	
River velocity (speed)	Unaltered or minor alterations in river flow
River discharge (volume)	Minor reduction in water volume
WATER QUALITY	
Sedimentation load	Reduced sediment load in watercourses
Eutrophication level	Reduced phosphorus and nitrogen levels in key waterways
Water transparency	Transparent/clear water
SOIL CONDITION	
Organic content	Increase where soil management technologies have been adopted
Soil erosion incidence	Low rate or no soil erosion incidence
Soil compaction	No soil compaction
VEGETATION	
Tree cover	Increased tree cover on- and off-farm
Carbon sequestration	Increased sequestration of carbon in the project area
Biodiversity	Increased species diversity on- and off-farm
WILDLIFE	
Community conservation plans	Increase during project implementation
Species richness	Increased species richness in the project area
Endangered species	Enhanced protection of endangered species
Human-wildlife conflicts	Reduced human-wildlife conflicts in the project area
AESTHETIC QUALITY	
Change in natural terrain	Unaltered or minor alterations of natural terrain

Table 6.3 Possible indicators for social monitoring of the WKIEMP

Social Indicator	**Target**
SOCIO-CULTURAL	
Percentage of communities adopting IEM interventions	Increase during project implementation
No. of farmers, leaders trained	Increase
Number of PAPs formulated	Possible increase
Number of PAPs implemented	Possible increase
Per capita income	Increase
Headcount index	Decrease in people living below poverty the line
Health indicators	Decrease in diseases prevalent in the area
HIV/AIDS incidence	No increase in HIV/AIDS incidence
Cultural heritage	No loss of cultural heritage sites
INCOME GENERATION	
Number of adopted IEM interventions	Possible increase during project implementation
Number of IEM activities funded	Possible increase
Number of small enterprises	Possible increase

Evaluation of Results

The evaluation of results of environmental and social impacts mitigation will be carried out by comparing baseline data collected in the planning phases with targets and post-project situations.

7. CAPACITY BUILDING AND TRAINING REQUIREMENTS

In order to ensure proper implementation of environmental and social screening, and mitigation measures, as well as effective natural resource management, the WKIEMP will undertake an intensive program of environmental training and institutional capacity building.

7.1 Environmental Training and Sensitisation

Environmental training and sensitisation will be required at all levels including community workers, VDCs, local government bodies, and PCO. The SESS, CSPs and additional experts will provide a diverse range of technical training on environmental issues to these groups. Table 7.1 outlines the specific training requirements of these levels. The objective of this training is to build the capacity of these groups for implementation of the ESMF to be supported under the project. For each group, training will be provided to bring them to a different level of expertise in various areas. Capacity building will include:

- In-depth training to a level that allows the trainees to go on and train others, including the technical procedures where necessary;
- Sensitisation in which the trainees become familiar with then issues to a sufficient extent that allows them to demand their precise requirements for further technical assistance; and
- Awareness raising in which the participants acknowledge the significance or relevance of the issues, but are not required to have technical or in-depth knowledge of the issues.

Table 7.1 Training and Sensitisation Requirements

	PCO	**SESS**	**CSPs**	**Community***
Potential localized impacts of subprojects and suitable mitigation measures	**S****	**T**	**T**	**S**
Potential cumulative impacts	**S**	**T**	**A**	**A**
Potential environmentally positive subprojects	**A**	**A**	**T**	**S**
Use of ESMF (screening forms)	**S**	**T**	**S**	**S**
EIA procedures, relevant environmental policies, WB safeguards, and enforcement	**S**	**T**	**A**	**A**
Links between natural resource management, HIV/AIDS and disease prevention, and land tenure	**S**	**T**	**A**	**A**
Inter-villages and inter-districts lesson-learning and review	A	T	A	A

*** Community includes teachers, elders, extension agents, women groups, youth groups etc.**
**** S = Sensitisation to the issues, T = Detailed training, A = Awareness raising.**

7.2 Recommendations for Capacity Building

Capacity to implement the recommendations outlined above is low. Where staff exists, training in the application of the environmental and social screening is needed. In addition it will be necessary to have the SESS and PCO build awareness and knowledge in environmental and social screening amongst the local authorities.

The WKIEMP will address these deficiencies in accordance with the investment for capacity building across regional, district and inter-village administrations. Where gaps exist in terms of staff availability or qualified staff at each level of project implementation (national, district and community), measures will be taken throughout the project cycle to hire skilled personnel and train staff.

8. ESTIMATED COSTS

The breakdown of estimated costs for implementing the ESMF is provided in Table 8.1. This includes costs for undertaking capacity building as outlined in Chapter 7.

8.1 Costs for Environmental and Social Inputs

The WKIEMP has a five-year budget of US$ 4.5 million (GEF financing US$ 900,000). The cost of mainstreaming the ESMF in the WKIEMP is estimated at US $ 675,000. The budget lines contribute to capacity building and impact assessments to ensure that the ESMF has significant influence within the operations of the project, and is not sidelined.

Table 8.1 Estimated Costs for Mainstreaming Environmental Rrecommendations into the WKIEMP.

Component	Subcomponent	Activity	US$	US$
1. Capacity building for community driven IEM	1.1 Community mobilization for participatory action plans (PAPs) formulation	♦ Community mobilization	10,000 x 5	50,000
	1.2 Capacity building for CSPs and district and focal development committees for IEM	♦ Training ♦ Awareness raising	10,000 x 5	50,000
	1.3 Establishment of local learning and farmer to farmer linkages	♦ Sensitisation ♦ Awareness raising	5,000 x 5	25,000
	1.4 Capacity building for carbon finance administration and market development	♦ Training	100,000	100,000
		Sub-total		**225,000**
2. Scaling up and financing IEM interventions	2.1 Support to community identified PAP subprojects in improved land management	♦ Subprojects support	20,000 x 5	100,000
	2.2 Support to community ecosystem management activities	♦ Subprojects support	20,000 x 5	100,000
		Sub-total		**200,000**
3. Establishing a monitoring and evaluation system	3.1 Biophysical monitoring	♦ Monitoring and evaluation	20,000 x 5	100,000
	3.2 Net-net accounting for carbon sequestration	♦ Monitoring and evaluation	20,000 x 5	100,000
	3.3 Monitoring of project activities and impact	♦ Monitoring	10,000 x 5	50,000
		Sub-total		**250,000**
		TOTAL		**675,000**

8.2 Mainstreaming Costs

Some costs of environmental management and impact mitigation are directly integrated into the main project budget. Specifically these are:

- Costs related to mitigation measures for subprojects, which will be assessed and internalised as part of the overall project's cost;
- Costs related to mitigation measures for inter-village subprojects, which will be assessed and internalised as part of the overall project's cost; and
- Cost of studies related to strategic issues of natural resource management, which are internalised.

8.3 Costs of Training

The total estimated cost for expenses associated with training and sensitisation is included in Table 8.1. The estimate does not include the cost of deploying the SESS who will lead the facilitators of training programs.

9. TECHNICAL ANNEXES

Annex 1. Maps of the Project Areas

Figure 1. Map of Kenya showing the target river basins

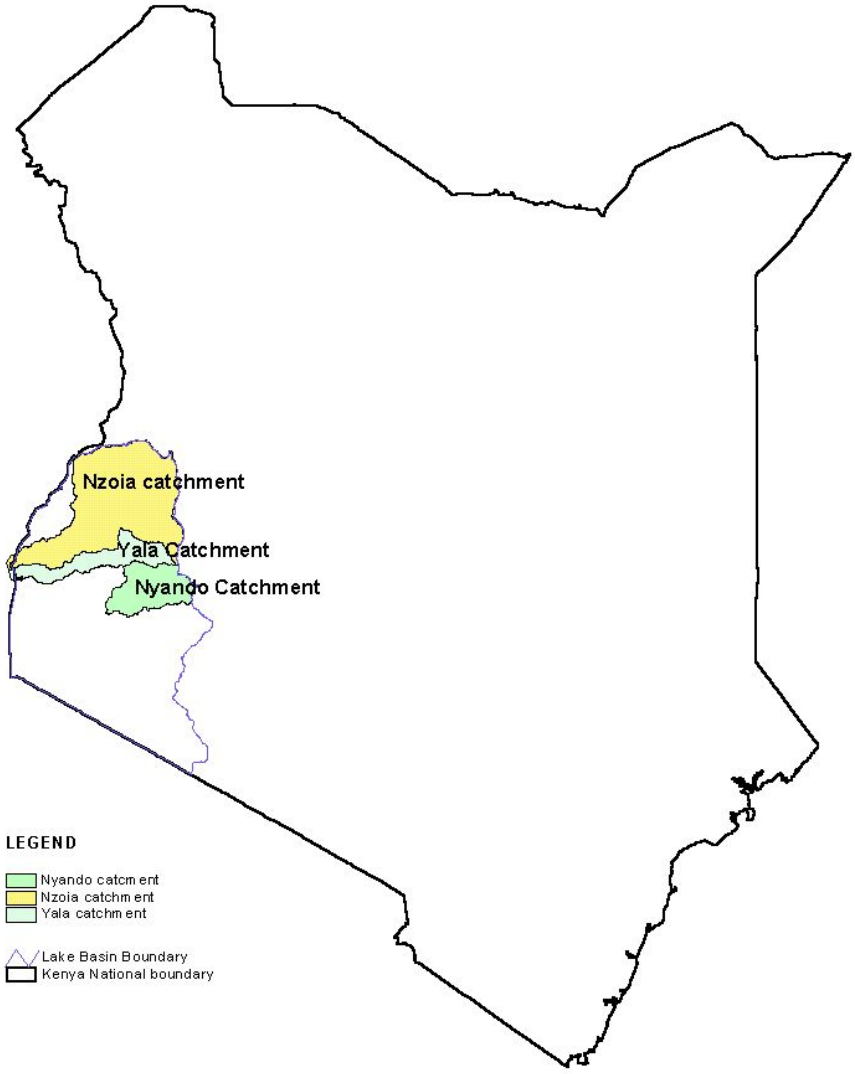


Figure 2. Map of Nyando River Basin showing the focal areas

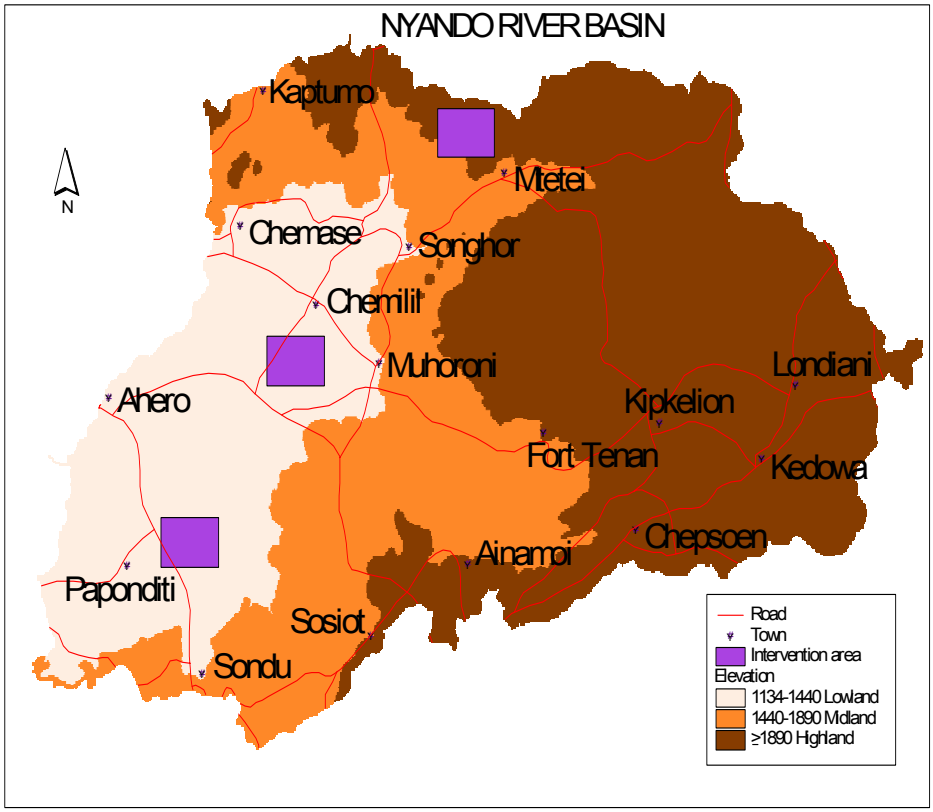


Figure 3. Map of the Yala River Basin showing the focal areas

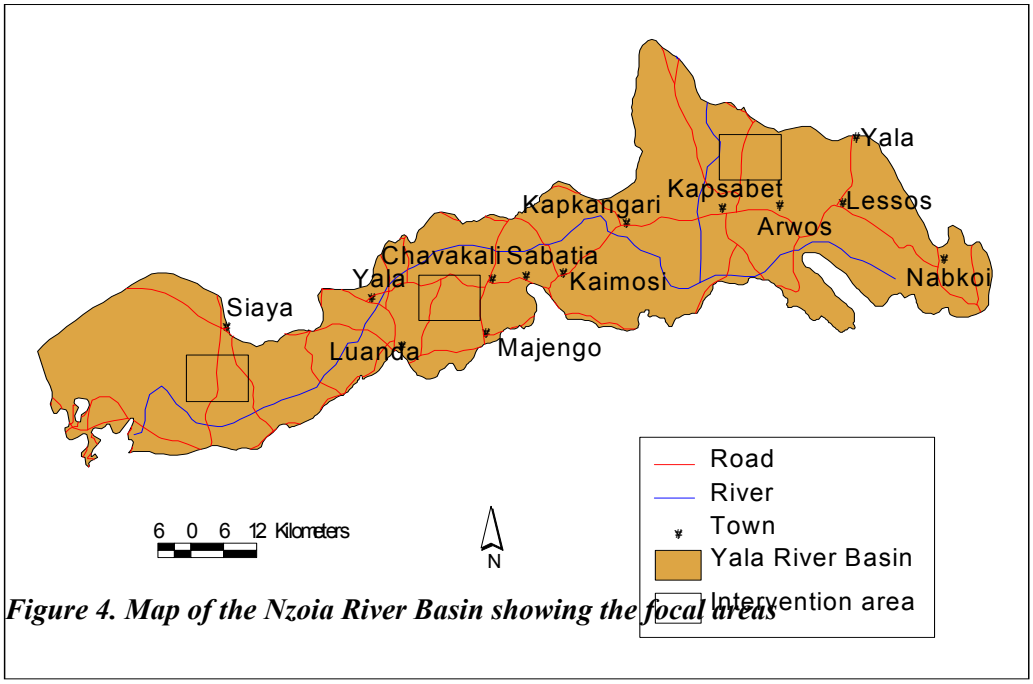
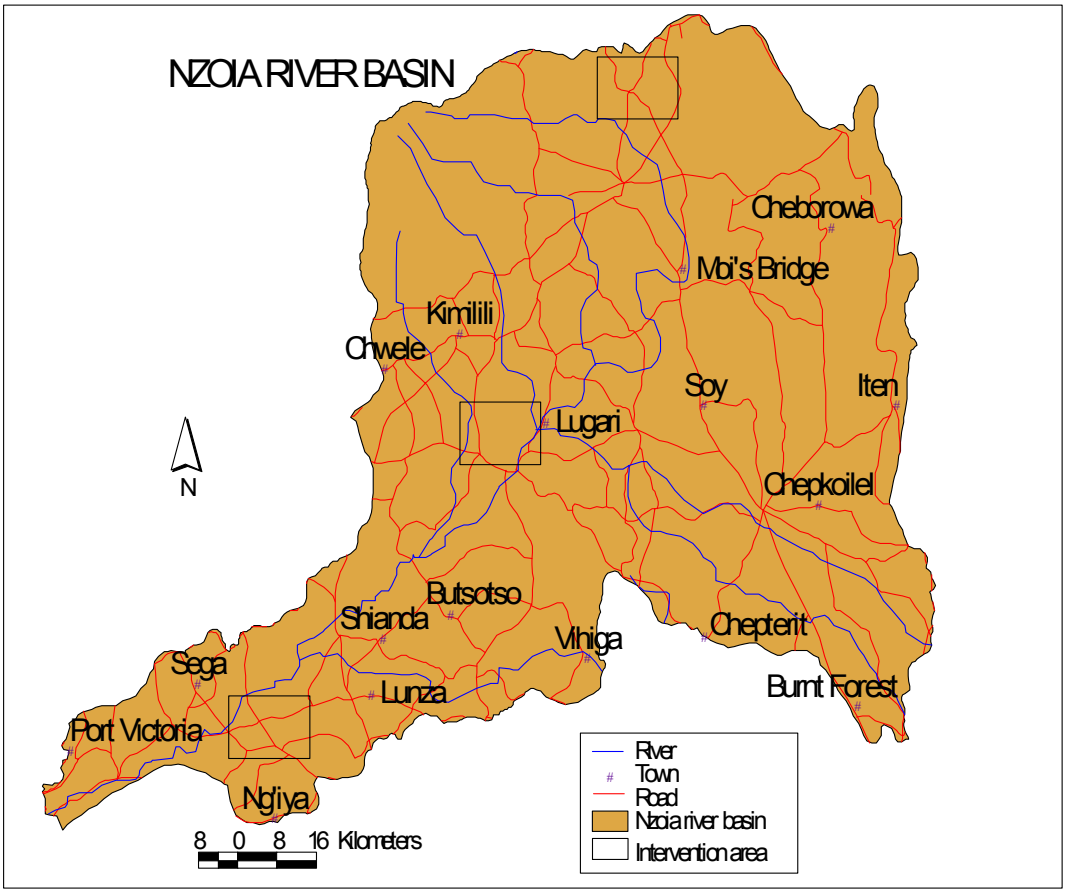


Figure 4. Map of the Nzoia River Basin showing the focal areas


NZOIA RIVER BASIN
Cheborowa
Moi's Bridge
Kimilili
Chwele
Soy
Iten
Lugari
N
Chepkoilel
Butsotso
Shianda
Vihiga
Chepterit
Sega
Lunza
Burnt Forest
Port Victoria
Ng'iya
8 0 8 16 Kilometers
River
Town
Road
Nzoia river basin
Intervention area

Annex 2. Itinerary of Field Visits

Thursday, 24 June 2004

1745h Limuru-Nairobi-Kisumu
1900h Document Review
2000h Fieldwork Planning

Friday, 25 June 2004

0900h World Agroforestry Centre (ICRAF), Dr. Markus Walsh
1030h ViAgroforestry Programme, Mr. Norman Kimanzu
1130h Lake Basin Development Authority, Ms. Joyce W. Opondo
1430h Osienala Friend of Lake Victoria, Dr. Obiero Ong'ang'a, Mr. William Ochieng, Mr. Frederick Aloo
1530h National Environment Management Authority, Mr. Maurice M. Otieno
1630h COSOFAP, Mr.Qureshi Noordin, Mr. Daniel Rotich, Mr. Zakayo Magara, Ms. Eva Gacheru

Saturday, 26 June 2004

0800h Katuk- Odeyo Block Site Visit (Nyando River Basin, Lowland)
0900h Field Investigations with Dr. Markus Walsh (ICRAF)and Mr. Luka Anjeho (ICRAF)
1100h Discussion with Farmer Mr. Dickson Ochola (Farmer)
1430h Tiriki East Block Site Visit (Yala River Basin, Midland)
1500h Field Investigations with Mr. Isaiah Livoywa (FA, Chairman), Mr. Titus Liuva (Farmer) and Mr. Geoffrey Khayega (Farmer).

Sunday, 27 June 2004

1040h Londiani Block Site Visit (Nyando River Basin, Highland)
1100h Field Investigations with Mr. Samuel Mwangi, Mr. Peter Mureithi, Mr. James Omurungi, and Mr. Charles Rono (All Londiani Farmers)
1300h Muhoroni Block Site Visit (Nyando River, Basin, Midland)
1600h Kisumu

Monday, 28 June 2004

1000h Siaya Block Site Visit (Yala River Basin, Lowland)
1100h Ng'iya Block Site Visit (Nzoia River Basin, Lowland)
1130h Field Discussions with Mr. Stephen Arodi Ogesa (Fisherman)
1300h Lugari Block Site Visit (Nzoia River Basin, Lower Midland)
1330h Field Investigations and Discussions with Mr. Christopher Liyala (Farmer)
1550 h Kipkaren Block Site Visit (Nzoia River Basin, Upper Midland)
1630 h Field Investigations and Discussions with Mr. John Sitienei (Farmer)
1900h Kisumu

Tuesday, 29 June 2004

0900h Kenya Marine and Fisheries Research Institute, Mr. Kenneth Werimo
1000h National Museums of Kenya, Kisumu, Mr. Peter Nyamenya
1120h Lake Victoria Environment Management Project, Mr. Stephen Njoka
1245h World Agroforestry Centre (ICRAF), Dr. Markus Walsh
1410h Kisumu -Nairobi-Limuru

Annex 2. Stakeholders Consulted

1. Anjeho, Luka, ICRAF, Senior Technician
2. Gacheru, Eva (Ms.), ICRAF, Training Officer
3. Khayega, Geoffrey (Mr.), Tiriki East FA, Farmer
4. Kimanzu, Norman (Mr.) Regional Director, VI-Agroforestry, East Africa
5. Livoywa, Isaiah (Mr.), Chairman, Tiriki East Focal Area, Farmer
6. Liuva, Titus (Mr.), Tiriki East FA, Farmer
7. Liyala, Christopher (Mr.), Bhukalalire Sublocation, Nzoia Basin, Farmer
8. Magara, Zakayo (Mr.), MoA/COSOFAP, Chairman, Regional Coordination Team
9. Mureithi, Peter (Mr.), Londiani Block, Farmer
10. Mwangi, Samuel (Mr.), Londiani Block, Farmer
11. Njoka, Stephen W. (Mr.), Project Coordinator, KARI/LVEMP
12. Nyamenya, Peter (Mr.), Curator, NMK, Kisumu
13. Ochola, Dickson (Mr.), Katuk-Odeyo Block, Farmer
14. Ogesa, Stephen Arodi, Nzoia River Basin, Fisherman
15. Okach, Ochieng, J. (Mr), Principal Fisheries Officer, LBDA
16. Omurungi, James (Mr.), Londiani Block, farmer
17. Ong'ang'a, Obiero (Dr.), Executive Director, OSIENALA
18. Opondo, Joyce (Ms). Regional Planner, LBDA
19. Otieno, Maurice N. (Mr.), Provincial Environmental Officer, NEMA, Nyanza Province
20. Noordin, Qureshi (Mr.), Development Facilitator, ICRAF/COSOFAP
21. Rono, Charles (Mr.), Londiani Block, Farmer
22. Rotich, Daniel (Mr.), KARI/COSOFAP
23. Sitienei, John (Mr.), Kipkaren, Murgusi Scheme, Nzoia Basin, Farmer
24. Walsh, Markus (Dr.) Coordinator, ICRAF, Kisumu Center
25. Wamuongo, Jane W. (Dr.), Assistant Director, Land and Water Management, KARI
26. Werimo, Kenneth (Mr.), Acting Director (Inland Waters), KMFRI

Annex 3. References

Akatch, S.O. 1996. Dying Lake Victoria: A Community-based Prevention Programme, OSIENALA. Initiatives Publishers, Nairobi, Kenya. 96 pp.

Central Bureau of Statistics. 2003. Geographic Dimensions of Well-being in Kenya. Where are the Poor? From Districts to Locations Vol. 1.

Central Bureau of Statistics. 2001. 1999 Population and Housing Census: Counting Our People for Development. Population Distribution by Administrative Areas and Urban Centres. Vol.I. Ministry of Finance and Planning.

Knausenberger, W.I., Booth, G.A., Bingham, C.S. and Gaudet, J.J. (Eds), 1996. Environmental Guidelines for Small-Scale Activities in Africa. SD Publication Series, Office of Sustainable Development, USAID Bureau for Africa, Technical Paper No. 18. June 1996. 202 pp.

KWS, 1998. Environmental Impact Assessment (EIA) and Administrative Procedures (Wetlands). Kenya Wildlife Service. 87 pp.

Mugo F., Swallow B., and Place F. (2004). Synthesis report for twelve Participatory Rural Appraisals conducted in the Nyando River Basin. TransVic: Improving land management in the Lake Victoria basin. World Agroforestry Centre, NALEP, Ministry of Agriculture

Nagarajan, V. and Okot-Uma, W. R., 1999. Environmental Assessment of Development Projects: A Guide for Planners and Managers. The Commonwealth Secretariat and SFI Publishing, London. 259 pp.

Ong'ang'a, O., Othieno, H. and Munyirwa, K. (Eds.) 2001. Lake Victoria 2000 and Beyond: Challenges and Opportunities. OSIENALA, Kisumu, Kenya. 118 pp.

Republic of Kenya, 1997. Vihiga District Development Plan 1997 - 2001

Republic of Kenya, 2000. The Environmental Management and Co-ordination Act (No. 8 of 1999). Government Printer Nairobi.

Republic of Kenya, 2001. Sessional Paper on National Wetlands Conservation and Management. 2nd Draft. June 2001. 64 pp.

Republic of Kenya, 2001. Nyando district Poverty Reduction strategy Paper 2001-2004

Republic of Kenya, 2002. Kericho district Development Plan 2002-2008

Republic of Kenya, 2002. TransNzoia district Development Plan 2002-2008

Republic of Kenya, 2002. Busia District Development Plan (2002-2008)

Republic of Kenya, 2002. The Water Act, 2002. Kenya Gazette Supplement No. 107 (Acts No.9), 24 October 2002, 935-1053 p.

Republic of Kenya, 2002. TransNzoia District Development Plan 2002-2008

Republic of Kenya, 2003. The Environmental (Impact Assessment and Audit) Regulations, 2003. Kenya Gazette Supplement No. 56 of 13 June 2003. Legislative Supplement No. 31, Legal Notice No. 101. Kenya Subsidiary Legislation, 2003. Government Printer, Nairobi. 237-297p.

The Nile Basin Initiative Secretariat (Nile-SEC), 2002a. Backgrounder Historique: The Nile Basin Initiative, A Precious Resource. 2 pp.

Annex 4. Policy, Legal and Administrative Framework

Statutes and institutions

There are about 77 statutes in Kenya that deal with environmental issues. Some of the legislative instruments have been in place for many years and are duplicated in other legislation. The most pertinent legislative instruments are the Water Act, 2002; the Public Health Act, Cap. 242; the Chief's Authority Act, Cap 128; the Local Authorities Act, Cap. 265; the Wildlife Conservation and Management Act, Cap.376; the Forests Act, Cap. 385; the Physical Planning Act, Cap.306, the Registered Land Act, Cap.300; the Agricultural Act, Cap. 318; the Trust Land Act, Cap. 288; and, the Environmental Management and Coordination Act, 1999; and the Lake Basin Development Authority Act, Cap. 442.

The Water Act, 2002 prohibits obstruction or pollution of watercourse or water resource and gives conditions in the water use permits. The Act prohibits among other things the unlawful interference with watercourses or bodies of water and prohibits the release of polluted water without treatment; and specifies penalties for polluting water used for human consumption. According to the Water Act, 2002, water belongs to the nation and water use requires permission from the Government of Kenya. The Act addresses conservation, control and apportionment and use of water resources in Kenya. The water resources management is decentralized into three levels, namely national, basin, and catchment area levels. The roles of these levels include the identification of vital water catchment areas, including wetlands, and the initiation of action for protection purposes.

The Agriculture Act, Cap. 318 defines the watercourses and catchment areas in relation to crop production and related activities. The Environmental Management and Coordination Act, 1999, provides for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya. Part VI (S.58) of the bill makes it mandatory for environmental impact assessments (EIAs) to be conducted before the commencement of projects involving urban development, water bodies, transportation, mining, agriculture and forestry related activities. The specific water related activities requiring EIAs include construction of dams, irrigated agriculture, flood control schemes and water transfer schemes.

The Lake Basin Development Authority (LBDA) Act, Cap. 442 stipulates, *inter alia*, that the Authority shall coordinate the abstraction and use of natural resources and set up an effective monitoring system; effect the protection and utilization of water and soils; ensure water and soil conservation measures are undertaken; identify and collect all data related to water uses and other resources for efficient forward planning; examine the hydrogeological and ecological effects of development; consider all aspects of development of the area and their effects on lake inflows and outflows; and monitor the operations and provide technical reports on any agreements or other arrangements between Kenya and other states on the use of the waters of the Nile and Lake Victoria.

There are over twenty institutions, which deal with environmental issues in Kenya. Some of the key institutions include the National Environmental Management Authority (NEMA); the Department of Resource Surveys and Remote Sensing (DRSRS), the Water Department; the Forest Department (FD); the Kenya Wildlife Service (KWS); the Kenya Forestry Research Institute (KEFRI); the National Museums of Kenya (NMK); and the Kenya Agricultural Research Institute (KARI). The Ministry of Environment, Natural Resources and Wildlife, through NEMA, is responsible for environmental management.

National environmental action plan

The purpose of the National Environment Action Plan (NEAP) is to promote and facilitate the coordination of strategies and measures to protect and manage the environment into plans and programmes for the social and economic development of Kenya. The Environmental Management and Coordination Act, 1999, establishes the NEAP to address the protection and management of the environment at district, provincial and national levels. The NEAP will be reviewed every five years and will be subject to the consideration and approval of the National Assembly. The NEAP will, among other things, identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general adverse impacts on the environment. The District Environment Committees and the Provincial Environment Committees are required to prepare action plans every five years. All development activities are supposed to be conducted in accordance with the Provincial and District Environmental Action Plans.

Relevant government sessional papers

Sessional Paper No. 1 of 2000 on National Population Policy for Sustainable Development is an update of Sessional Paper No. 4 of 1984 on Population Policy Guidelines. The paper addresses issues on environment, gender, poverty and problems faced by segments of the population including the youth, the elderly and persons with disabilities. Outline in the paper are population and development goals and objectives including improvement on standards of living and quality of life of the people; full integration of population concerns into the development process; motivating and encouraging Kenyans to adhere to responsible parenthood; and empowerment of women. The problem of HIV/AIDS is also addressed.

The Poverty Reduction Strategy Paper (PRSP) outlines the priorities and measures necessary for poverty reduction and economic growth. The twin objectives of economic growth and poverty reduction are borne out of the realization that economic growth is not a sufficient condition to ensure poverty reduction. In this regard, measures geared towards improved economic performance and priority actions that must be implemented to reduce the incidence of poverty among Kenyans have been identified.

Annex 5. Baseline Data

1. Biophysical

The scale of population increase in Western Kenya in the past half century has had significant effect on land and eater quality. High rural population growth coupled with stagnating urban job growth has accelerated the search for new agricultural land, resulting in a high rate of conversion of woodlands, forests, and wetlands into agricultural production. Furthermore, at the local level, there has been little restriction on encroachment practices on to steep slopes, wetlands and forests, despite the existence of laws and regulations against such practices. As such, evidence from studies indicate that the scale and rate of land and water degradation, and biodiversity loss in Western Kenya is extremely high.

Land Degradation

Studies conducted in the context of the Lake Victoria Integrated Land Management Project uniformly indicate occurrence of severely accelerated land degradation in the Nyando, Yala and Nzoia river basins. Large quantities of sediment, discernible from satellite images, are deposited at the outlets of the river basins in the Winam Gulf of Lake Victoria.

Measurements performed on sediment cores collected in the Nyando estuary show that sedimentation rates of the basin have increased to fourfold over the last 100 years (Walsh, pers.comm.). In addition, data show the lower portion (<1400 masl) of the basin, and a large area located between the northern boundary of the Mau and the southern boundary of Tinderet forests, may now be particularly vulnerable to erosion following significant rainfall (e.g. El Nino).

Using Cesium-137 measurements, a preliminary sediment budget (Table 5a.1) indicates that sediment source areas currently occupy >60% of the Nyando River basin, and that the rates of soil loss have not been offset by rates of sediment accretion in sink areas of the basin. This has led to an export of high sediment loads (e.g. 3.2 x 10^6 Mg yr^{-1} of sediment to Nyando River), and has severely compromised water quality in the four main rivers (Nyando, Yala and Nzoia) in the project area.

Table 5a.1. Sediment budget estimates for the Nyando River Basin (1963-present)

	Average	Range
Sources:		
Erosion rate (Mg $ha^{-1}.yr^{-1}$)	43.5	40.7-69.5
% of basin	61.1	58.3-62.4
Sinks:		
Accretion rate (Mg. ha^{-1} yr^{-1})	45.5	37.5-61.3
% of samples	38.9	36.4-41.1
Net erosion rate (Mg ha^{-1} yr^{-1})	8.83	3.81-27.5
Total soil loss (Mg x 10^6 $yr^{-1)}$	3.17	1.36-9.86
Sediment delivery ratio (%)	20.1	8.43-39.5

Source: World Agroforestry Center (ICRAF)

Water Quality Degradation

Land degradation of the above-described magnitude has significant negative impacts on soil fertility and water quality in the surrounding area. For example, eutrophication of Lake Victoria has led to rapid colonization of the lake by the water hyacinth and decreased fish and aquatic plant diversity. The economic impact of this has been great, for example, operations to keep hydroelectric generating turbines clean is costing Uganda US$ 600,000 per year. The fishing industry, which employs 500,000 people in the riparian countries, has also been affected. In addition, erosion and sedimentation have induced flooding (which now occurs annually in the Nyando basin) resulting in increased waterborne and water related diseases.

Biodiversity Loss

Existing rural activities and poor land management practices have also affected biodiversity in two ways: 1) by fuelling the demand for more agricultural land and therefore altering natural habitats; and 2) by altering the chemical properties and therefore reducing soil and plant diversity. Western Kenya is an area with unique habitats and biodiversity of local, national and global significance.

In the areas most affected by erosion and sedimentation, soils are universally depleted of major soil nutrients (N, P, K) and exchangeable cations, rendering them unsuitable for conventional agricultural land uses. Similarly, erosion affects soil physical properties such as texture and bulk density, which significantly decrease topsoil infiltration capacities and suitability for plant production. Increasing heterogeneity in the landscape will be necessary to create more niches for different types species and increase above ground and below ground biodiversity.

2. Socio-economic conditions

The primary livelihood strategy for about 80 percent of the population in the three river basins is farming. Livestock ownership forms an important part of the household asset base for both farmers and agro-pastoralists.

Busia District

Agriculture is the single most important sector in the district. The sector employs approximately 78 per cent of the district's labour force and generates annual income of approximately KShs. 1.42 billion. The fisheries and forestry sub-sectors are other important production sectors in the district. Cooking energy needs are mainly in the form of firewood and charcoal.

Table 4: Sub-sector priorities and existing constraints

Sub-sector	Priorities	Constraints
Crop development	Increased availability of disease tolerant cassava varieties. Improved marketing of cotton. Increased returns to sugarcane farmers. Increased utilization of soy beans Increased production of sunflower. Promote horticultural crops.	Diseases in cassava Poor market organization. Low rate of payment to farmers High cost of pesticides. High costs of transportation. Limited knowledge on utilization. Striga weed infestation Limited use of improved seeds and fertilizers. High pest and disease incidence. Poor crop husbandry practices. Limited acreage. Poor marketing systems. Lack of capital for investment in horticultural development. Lack of on-farm processing.
Livestock development	Improvement of genetic materials and husbandry practices of cattle. Promotion of poultry, pigs, and bee keeping.	Limited potential of the Zebu herds. Poor animal nutrition. Inadequate extension coverage. High incidence of animal diseases. Poor market organization. Traditional animal husbandry practices. High cost of feeds for poultry. Lack of credit facilities Non-availability of improved bee-keeping equipment.
Fisheries	Improve infrastructure and promote marketing	Destructive fishing methods. Exploitation by middlemen. High cost of fishing gear, nets and accessories. Lack of storage, cooling and processing facilities. Poor marketing infrastructure Inappropriate fish handling facilities.

Vihiga District

Agriculture and livestock are the two major resources currently being exploited in the district. Due to high population growth and subsequent land subdivision, the average farm holdings are small. Households produce maize, sorghum, sweet potatoes, beans, cassava, assorted vegetables, tea, coffee, sugarcane, French beans, pawpaws, bananas and avocadoes. The district generally has good soils and rainfall for the production of tea and coffee as cash crops. A significant number of households are engaged in the production of high value horticultural crops.

Nandi District

Agriculture and rural development sector is the backbone of the district economy. Over 90 per cent of the population is engaged in this sector. The main food crops cultivated are maize, beans, Irish potatoes,

sorghum, and millet while the main cash crops are tea, coffee, sugarcane and pyrethrum. The livestock breeds include zebu cattle, dairy cattle, sheep, goats and poultry.

Table 5: Sub-sector priorities and existing constraints

Sub-sector	Priorities	Constraints
Crop development	Increase acreage under food crop production. Increase maize yields. Increase acreage under horticultural crops e.g. kales, cabbages, bananas, tomatoes, pineapples, avocadoes, passion fruits and pawpaws. Expand industrial crops e.g. tea, coffee, pyrethrum	Poor crop husbandry High production costs. Poor quality inputs Lack of improved varietal seeds and certified seeds. Adverse weather conditions.
Livestock development	Develop intensive livestock production systems. Improve genetic potential of livestock. Disease control	Lack of relevant production technologies. Lack of marketing channels for products. Poor genetic potential of livestock. Diseases

Kericho District

Kericho District has agricultural potential. It has a climate conducive for food and cash crops production as well as rearing livestock. Agriculture plays an important role in the socio-economic welfare of the population. Major commodities marketed include tea, coffee, wheat, maize, horticultural produce and milk. The performance of the sector is relatively good owing to the high potential nature of the area in terms of soils and climatic factors.

In the livestock sub-sector, milk production is the biggest enterprise followed by beef production. Other enterprises include poultry production and rearing of sheep and goats.

Table 6: Sub-sector priorities and existing constraints

Sub-sector	Priorities	Constraints
Crop development	To promote food security Support for industrial crops	Scarce resources for major extension services; Poor marketing and infrastructure for agricultural development.
Livestock development	Improved milk production through improved animal husbandry and diseases control.	Lack of organized groups

Nyando District

The problems associated with agriculture and rural development in Nyando district includes:

- Lack of sufficient food.
- Poor agricultural technologies
- Lack of proper storage facilities.
- Erratic and unreliable rainfall and poor weather conditions.
- Increased livestock and poultry diseases
- High cost of seeds and other agricultural inputs.
- Poor road network.
- Lack of credit facilities.

Interventions and strategies

- Improvement of access to food for the poor, through the use of appropriate agricultural technologies;
- Exploration of the use of the canal system of irrigation from the rivers Nyando, Awach and Sondu Miriu, and water from Lake Victoria;
- Development and provision of fair cost, of improved livestock and poultry breeds;
- Development of disease control measures;
- Development of dams and building boreholes and wells for domestic and animal use and farming;
- Construction and rehabilitation of cattle dips.
- Provision of low cost agricultural inputs;

- Improvements in marketing of farm produce especially perishable goods like fish, vegetables and fruits.
- Improvement of farm access roads and beach roads.
- Development and expansion of agro-based industries by the government.
- Provision of soft loans and cheap credit facilities for purchase of machinery;

Trans-Nzoia District
Trans Nzoia district is agricultural based. The district produces both food and cash crops.

Table 7: Sub-sector priorities and existing constraints

Sub-sector	Priorities	Constraints
Crop development	Technology and skills development for crop production, storage, marketing and utilization. Effective networking for information sharing among stakeholders. Promote land and soil management practices. Promote crop diversification. Integrated pest management. Agro-based cottage industries.	Poor quality inputs. Lack of co-ordinated marketing channels. Lack of credit facilities Low rate of adoption of new technologies. Low rate of crop diversification. Poor infrastructures e.g. roads.
Livestock development	Dairy cattle improvements. Marketing of livestock and livestock products. Promotion of poultry and pig production, bees and dairy goats. Diseases and pest control.	Marketing constraints Inadequate funds and funding facilities. Diseases

Annex 6. Brief Matrix on Integrated Pest Management

Implementation of Integrated Pest Management

Introduction

Integrated pest management is a decision-making process for the selection, implementation, and evaluation of pest management practices. It utilizes all available methods to achieve the most economically and environmentally sound management program. IPM is the integration of available techniques to reduce pest populations and maintain them below the levels causing economic injury in a way that avoids harmful side effects.

Specific pest management needs vary with the crop, cropping system, pest problems, pesticide use history, socio-economic conditions, and other factors. There are, however, well-defined principles that guide the implementation of integrated pest management (IPM). Based on these principles, some guidelines can be offered for the development of and execution of IPM activities for community subprojects. The implementers of the subprojects should adopt these guidelines to the conditions found in their subprojects.

IPM can decrease pest losses, lower pesticide use, and reduce overall operation costs, while increasing crop yield and stability. Successful IPM programs have been developed for pests on various crops.

Steps to Implement IPM

Step 1. Assess IPM needs and establish priorities

- Consider the relative importance of agriculture in the overall project;
- Consider the relative importance of target crops as a source of community livelihood;
- Review pesticide use history, trends and availability of IPM technology;
- Identify training needs for farmers and extension agents; and
- Respect and use local knowledge.

Step 2. Identify key pests for each target crop

- Become familiar with key pests of target crops and the damage they cause; and
- Correctly identify the common pest.

Step 3. Monitor the fields regularly

- Inspect crops regularly to determine the level of pests and natural enemies;
- Solicit assistance of agricultural extension staff if necessary; and
- Determine when crop protection measures, perhaps including pesticides are necessary.

Step 4. Select appropriate blend of IPM tools

- Maximize the effectiveness of traditional and introduced non-chemical control techniques;
- Use pesticides only if no practical, effective and economic non-chemical control methods are available;
- Examples of Non-chemical Pest Management Techniques include;
    - Maintaining good soil fertility and a diverse agroecosystem;
    - Plant resistant crop varieties;
    - Selecting proper plant varieties for location and season;
    - Rotating crops;
    - Planting clean seed;
    - Correct planting and harvest periods;
    - Proper irrigation methods;
    - Correct fertilizer and rates;
    - Good crop sanitation;
    - Hand picking of larger pests;
    - Use of natural control agents (biological control); and
    - Using attractants and repellents on selected pests.

Step 5. Develop education, training, and demonstration programs for extension workers

- Conduct hands-on training of farmers in farmers' fields (as opposed to a classroom);
- Use the participatory "Farmers' Field School" approach; and
- Conduct special training for extension workers, government officials and the public.

Format for a Comprehensive Pest Management Plan

A comprehensive pest management plan (PMP) should contain, but not be limited to, the following information:

1. Introduction
   - 1.1 Pest and pesticides management implications of project activities;
   - 1.2 Environmental consequences of pest management practices;
2. Pest management approaches in Kenya;
   - 2.1 Overview of forest, livestock and crop management problems;
   - 2.2 Current crop/pest management approaches;
   - 2.3 IPM experience;
3. Pesticide use and management;
   - 3.1 Pesticide use in Kenya;
   - 3.2 Circumstances of pesticide use and competence to handle chemical products;
   - 3.3 Assessment of risks;
   - 3.4 Promoting IPM/ICM in the context of current practices;
4. Policy, regulatory framework and institutional capacity;
   - 4.1 Plant protection policy;
   - 4.2 National capacity to develop and implement IPM/ICM (IPPM);
   - 4.3 Control of the distribution and use of pesticides;
5. Implementing the pest management plan (PMP);
   - 5.1 Strengthening national capacities;
   - 5.2 Activities of the PMP;
6. Actors and partners;
7. Institutional arrangements for implementation of the PMP;
8. Phasing plan;
9. Sustainability;
10. Monitoring and evaluation;
11. Budget estimates.

Annex 1. List of pesticides approved for importation and use in Kenya;
Annex 2. Documents consulted in the preparation of this PMP;
Annex 3. Key contacts/persons encountered.

Annex 7. Suggested Format for EIA Studies

The environmental impact assessment study report will incorporate, but not be limited to, the following information:

(a) the proposed location of the project;
(b) a concise description of the national legislative and regulatory framework, baseline information, and any other relevant information related to the project;
(c) the objectives of the project;
(d) the technology, procedures and processes to be used in the implementation of the project;
(e) the materials to be used in the construction and implementation of the project;
(f) the products, by-products and waste generated by the project;
(g) a description of the potentially affected environment;
(h) the environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated;
(i) alternative technologies and processes available and reasons for preferring the chosen technology and processes;
(j) analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies;
(k) an environmental management plan proposing measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures;
(l) provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects;
(m) the measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
(n) an identification of gaps in knowledge and uncertainties which were encountered in compiling the information;
(o) an economic and social analysis of the project;
(p) an indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures; and
(q) any other matters as NEMA may require.