KENYA
Western Kenya Integrated Ecosystem Management

Project Brief

Africa Regional Office
AFTS2

Date: April 15 , 2004 **Team Leader:** Berhane Manna

Sector Manager: Karen Mcconnell Brooks
Country Manager/Director: Makhtar Diop
Project ID: P072981

Focal Area: M - Multi-focal area

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[ ] Loan [ ] Credit [X] Grant [ ] Guarantee [x] Other:

For Loans/Credits/Others:
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Total Bank Financing (US$m): 4.1

Proposed Terms (IDA): GEF

Financing Plan (US$m): Source	Local	Foreign	Total
BORROWER	2.75	0.00	2.75
PHRD	0.40	0.00	0.40
SIDA	2.30	0.00	2.30
GLOBAL ENVIRONMENT FACILITY	4.10	0.00	4.10
Total:	9.55	0.00	9.55

Borrower/Recipient: GOVERNMENT OF KENYA

Responsible agency: KARI
Kenya Agricultural Research Institute (KARI)
Address: P.O. Box 57811 Nairobi, Kenya
Contact Person: Dr. Romano Kiome, Director
Tel: 254-2-583-290 Fax: 254 (0) 20583344 Email: kiome-rm@kari.org

Project implementation period: 5 years

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A. Project Development Objective

1. Background:

Western Kenya supports one of the densest and poorest populations in the world, with up to 1200 persons/sq. km in some rural areas, and over 58 percent of households living in absolute poverty. Low agricultural productivity, high population pressure and lack of off-farm income opportunities have placed great pressure on the natural resource base. Traditional land management in western Kenya relied on fallowing of unproductive fields to restore fertility and decrease pest problems. High rural population growth has made this practice untenable, leading to wide scale abandonment of fallowing and the search for new agricultural land. At the local level, there has been little restriction on encroachment onto steep slopes, wetlands, or forests, despite the existence of laws and regulations against such practices.

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. (Walsh, unpublished data). Erosion loss has created large gullies that advance at rates up to 200 meters per year and large quantities of sediment – discernible in satellite images – are being deposited in the Winam Gulf of Lake Victoria.

Western Kenya's rich stock of biodiversity has suffered as a result of land degradation. For example, by the mid 1980's, some 400 endemic species cichlid fish were approaching extinction due to 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. Native plant communities in western Kenya include perennial grasslands interspersed with evergreen and semi-deciduous bushlands in lowland areas, *Cyperus spp.* in inland valleys and at the river's outlet, and evergreen broadleaf forest in the highlands. 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 C3 photosynthetic pathway) to vegetation dominated by grasses (characterized by a C4 photosynthetic pathway). Evidence from stable carbon isotope (i.e. d13C) studies, suggest that historically, grass and cereal crop based land use types (Walsh et al., in prep.) are strongly associated with elevated soil erosion risk in this environment.

Poverty reduction, land degradation, and sustainable agriculture are intricately linked in Western Kenya. Experiences from Central Kenya, where there is evidence of high productivity, high profits, and good land management, also are supportive of this relationship. Adoption of an ecosystem management (EM) approach focused on: (i) participatory planning of land use and natural resources management at the village, location, district, watershed and provincial levels; (ii) empowerment of communities with proven technology, information and financial resources to make the best natural resource management (NRM) investment decisions; and (iii) dissemination of agro-ecosystem management techniques such as improved soil fertility and erosion control techniques, will be necessary to address problems of natural resource degradation and achieve sustainable farming systems.

Better farming practices also provide global environmental benefits in areas of biodiversity, international waterways, and climate change. The recent Land-Use, Land-Use Change, and Forestry Report (2000) of the Intergovernmental Panel on Climate Change (IPCC) has identified conversion of degraded crop lands into agroforestry as the land-use practice with the largest potential to sequester carbon.

The Ministry of Agriculture and Kenya Agricultural Research Institute (KARI) have been actively involved in disseminating improved agricultural technologies in Western Kenya with various government and non-governmental partners. The proposed project would be implemented in Western Kenya with the main purpose of scaling up the existing successes and introducing an ecosystem-wide approach to achieve sustainable agriculture. The project is expected to demonstrate the value of such approach and will help leverage Government, IDA or other resources for scaling up project successes in the future.

2. Project Development Objective: (see Annex 1)

The project 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 approach. In order to achieve this the project will: (i) support on and off farm conservation strategies; 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) capturing local and global environmental benefits.

The project objectives would be achieved through a community driven development process whereby communities would decide on resources for infrastructure investments, technical assistance and implementation of ecosystem management activities.

Global Environmental Objective

The global environmental objective of the project is to promote a set of ecosystem management 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 watersheds that feed into the Nyando, Yala and Nzoia River Basins. The project will use an integrated ecosystem management approach within the three river basins.

3. Key Performance Indicators: (see Annex 1)

Progress in achieving the development objectives would be monitored by specific indicators designed to demonstrate or measure the following:

Performance Indicator	Target
Community participation in assessment, planning, decision making, implementation, and evaluation of integrated ecosystem management activities	50% community participation in village integrated ecosystem management planning exercises
Participation of local and regional institutions in planning and coordinating ecosystem management activities	60% of ecosystem management planning activities inclusive of local and/or regional institutions
Adoption rates of improved ecosystem management technologies or production practices	20% of households in pilot villages, 10% in surrounding villages
Change in soil fertility and in land quality on land where improved land management technologies are applied	20% increase in organic matter content of soils in plots where the improved SLM technologies have been adopted
Sequestration of above and below ground carbon as measured by ground survey and remote sensing	100,000 tons for 30,000 hectares of project adoption area (3.3 tons/ha)
Change in indigenous on- and off-farm biodiversity in the surrounding project area as measured by ground survey and estimates of eco-system richness	10 % increase in abundance and diversity on farms, 5 % increase in off-farm ecosystem richness indicator, 50% of communities identifying a conservation strategy for specific threatened or endemic species in community

	plans, 5 % reduction in encroachment rate in critical natural habitats in or around project areas.
Reduced erosion rates and sediment delivery in watercourses surrounding project areas as measured by soil spectral analysis	10% percent reduction in erosion rates from farming plots receiving interventions
Reduced phosphorous runoff from agricultural land into key waterways.	20% reduction in phosphorous loads in key waterways.

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)
Document number: 18391 **Date of latest CAS discussion:** September 2,1998

The Bank's next CAS is currently under preparation to take advantage of Kenya's recent submission of a PRSP action plan and changeover in government. The proposed project is consistent with the draft CAS, particularly with its focus on community based initiatives in the fight against poverty. In particular, this project is seen as an important pilot activity contributing to the formation of a community driven development project to be financed in 2007.

1a. Global Operational strategy/Program objective addressed by the project:

The proposed program activities support the objectives set out in the Operational Program # 12 on Integrated Ecosystem Management. The program specifically provides global benefits with regards to the 'conservation and sustainable use of biological diversity, 'reductions in net emissions and increased storage of green house gases', and the 'conservation and sustainable use of waterbodies'. Furthermore, the project supports OP12 outcomes for increased institutional capacity to implement integrated ecosystem management, and investments based on stakeholder participation to address both domestic and global environment benefits. The project further contributes to the GEF OP12 through the provision of investments for integrated ecosystem management in a manner consistent with stakeholder priorities through the application of a community driven methodology.

In particular, the project will build the capacity of village development committees (VDCs), District Steering Committees (DSCs), and other local institutions to identify and manage ecosystem issues and implement conservation or mitigation measures. Additionally, the project will address the linkages between upstream and downstream land use practices through the development of community managed integrated ecosystem management plans. Through supporting IEM planning, capacity building, awareness raising, and improved farm management practices, the project will increase the sustainability of agricultural land use and will protect habitats of critical importance. These two outcomes will have a significant effect on the global environment. In particular, integrated ecosystem management interventions such as sustainable land management will increase above and below ground carbon sequestration (the top one meter of soil contains about 1.5 times the amount of carbon as above ground biomass) while simultaneously reducing erosion and harmful agricultural runoff into waterways. The project will also target improvements in the health of wetlands and other critical habitats. Similarly, the protection and restoration of forest habitat for improved biodiversity will increase carbon sequestration, reduce soil erosion and maintain hydrological cycles thereby having a positive effect on both climate change and downstream land and water users.

Project activities are specifically linked to strategic priorities within OP 12 in the following areas:

International Waterways. Western Kenya is located in the Lake Victoria Basin, which supports a population of over 25 million and is fed by 11 major river basins in Kenya, Uganda, Tanzania, Rwanda and Burundi. In the past three decades, Lake Victoria has experienced significant environmental damage from eutrophication, pollution, over fishing, and invasion by water hyacinth. The Nyando River Basin is one the largest contributors of sediment flowing into the lake, with the highest sediment transport capacity. Phosphorous runoff associated with agricultural production in upstream basins is also reducing overall water quality including in Lake Victoria. Although regional efforts to mitigate environmental degradation are underway, coordination remains a challenge and current initiatives are not sufficient to reverse the damage. The project activities will focus on erosion control and water management on and off-farm, thus contributing to reduced sedimentation and phosphorous runoff in watercourses draining into the lake.

Biodiversity. Threats to critical biodiversity habitats in western Kenya include clearing or drainage of land for cultivation, overgrazing, tree removal for local fuelwood use, sedimentation of wetlands caused by erosion, and destruction of riverbanks through cultivation or removal of tree and plant vegetation. Many of the critical habitats are in densely populated areas and are under threat from agricultural induced encroachment.

The project will impact biodiversity in three ways: (i) through protection of small but important critical habitats in the primary project intervention area; (ii) through reduced pressure on critical habitats in the secondary project area (Nzoia, Yala, and Nyando catchments); and (iii) through increased biodiversity in the on-farm environment. The primary project area (900 km^2 sites in Nyando, Yala and Nzoia basins) includes several critical natural habitats that are being preserved by local communities. The project will assist communities to improve conservation strategies and maintain and improve the biodiversity in critical sites. Lack of data on smaller critical habitats prevents a full listing of biodiversity in the area but greater detail will be provided during project implementation. Community biodiversity surveys will be conducted as part of the project's community IEM planning activities and baseline data will be collected and monitored throughout the project.

Box 1 includes some of the major areas that are under threat from encroaching agricultural production. Dunga, Kusa and Yala papyrus swamps are home to cichlid fish species that are declining in population in the main lake. The swamps are also home to globally threatened bird species such as Papyrus Yellow Warbler and Papyrus Gonolek. The Kusa swamp is particularly close to one of the proposed project intervention areas in the Nyando catchment around the town of Paponditi. West Kano Bird Sanctuary is also in the Nyando catchment and is under threat from poor land management practices upstream. Other localized refugia (forest fragments, grasslands, shrublands) and riparian ecosystems around tributaries are located near several of the project intervention areas and are home to a number of different species.

Further, a number of species that are native to or have a migratory presence in the project area are on the IUCN red list as threatened by agricultural induced land degradation (see Annex 11 for a detailed listing).

In addition to critical habitat protection, the project is also expected to contribute to biodiversity conservation in the general catchments area through reduced pressure on critical habitats and soil fertility replenishment, which will enhance biodiversity by increasing heterogeneity in the landscape leading to increased above and below ground biodiversity. Increased heterogeneity will create more ecosystem niches and increase habitats for different species. Project activities such as tree fallows and other agroforestry systems will also contribute to satisfying the demand for fuel wood, leading to less encroachment on forests and woodlands.

Box – 1. Kenya is home to 25,000 species of animal and 7,000 species of plants. Western Kenya has a variety of forest, grassland and wetland habitats that include both common and endangered species. Several ecologically sensitive sites are under threat from agricultural induced encroachment. A few large forest reserves can be found in western Kenya, but many smaller forest fragments, grasslands and wetlands that are home to threatened or endangered species are not formally protected. Forest fragments, grasslands, wetlands and riparian areas are critical natural habitats that serve as important refugia for a variety of endemic and threatened species. Wetland areas in the project area play an important role as water filters, fish nurseries and migratory and endemic bird habitats. Traditional groves and other forest fragments are among the last remaining areas outside of protected forest reserves where a high density of endemic plant species can be found. The project area also has a number of small riparian zones around the major rivers and their tributaries. Riparian areas often form unique ecosystems that do not extend beyond the narrow boundaries of the river and are home to species not found in the general catchment zone. Grass or shrublands are easy targets for conversion to agricultural lands but are also important ecosystems for small mammal and bird species.

Critical habitats in the primary project intervention area include:

- Ainabngetuny, Mbogo, Nyando and Awach tributaries (Nyando catcthment)
- Nzoia and Yala river tributaries (Nzoia and Yala catchments)
- Forest fragments around Lugari and Kaimosi (Nzoia and Yala catchments)
- Yala Nature Reserve (Yala catchment)
- Yala swamp and Lake Kanyaboli (Nzoia catchment)
- West Kano Bird Sanctuary (Nyando Catchment)
- Dunga, and Kusa Swamps (Nyando Catchment)
- Localized refugia (all catchments)

Climate change. Integrated ecosystem management approaches will draw on agroforestry and other land management techniques that also deliver benefits in the area of carbon sequestration. The IPCC estimates of carbon accumulation rates range from 2 to 9 MT/ha/year, depending on the climate and the nature of the agroforestry practice. Although an important factor in reducing global levels of Greenhouse Gases (GHG), the potential for carbon sequestration is generally ignored at national and local levels in developing countries. Project activities incorporating carbon benefits have the potential to link global climate change priorities to local initiatives.

The project will also contribute to GEF operational goals by serving as a catalyst to promote integrated ecosystem management in Western Kenya. This is particularly important as many land management interventions in Western Kenya focus on the farm level rather than the wider ecosystem. The project's focus on capacity building and technical assistance will increase the ability of local and national institutions to achieve sustainable natural resource management.

2. Main sector issues and Government strategy:

Agriculture provides livelihood to nearly 75 percent of the Kenyans who live in rural areas. It has, however, suffered from stagnant (and at times negative) growth rates for a number of years. The decline in Kenya's agriculture sector and natural resource base are closely linked. Poor land management and high population density contributed to land degradation, which, in turn, lead to low agricultural productivity and expansion of cultivation into marginal or fragile lands. This cycle is readily apparent in Western Kenya where rural population density reaches up to 1200 persons per km^2 and average farm holdings have declined to half a hectare in some areas. Competition between cropping and other land use systems is increasing and the scale of land degradation is quite high. The region's erosion prone soil physical structure and high HIV/AIDS rate also contribute to low agricultural productivity. As a result, western Kenya, which has good rainfall, has nonetheless experienced increasing rates of poverty. Together, Nyanza and the Western provinces have among the highest incidence of poverty in the country.

The high levels of nutrient and soil loss that cause land degradation and biodiversity loss are primarily linked to accelerated water runoff, deforestation, human or animal induced vegetation loss on slopes and waterways, and deterioration in soil chemical properties from agricultural production. Communities have relatively limited awareness about upstream or downstream problems and mechanisms for addressing land degradation across administrative and geographical boundaries have been slow to develop. Watershed management falls within the mandate of several institutions namely the Ministry of Agriculture (MoA), Ministry of Environment and Natural Resources (MoENR), Ministry of Water Resources, and Local Government Administrations.

Kenya's PRSP Action Plan of September 2002, and the new Government's Economic Recovery Plan 2003-2007 have all identified mutlisectoral approaches to natural resource management as a priority for development. Emphasis has been placed on creating a more demand driven and pluralistic extension system through the implementation of the National Agricultural and Livestock Extension Program.

Government's reorientation towards more participatory and demand driven approaches has also been extended in the country's main research institutes. The Kenya Agricultural Research Institute (KARI) and Kenya Forestry Research Institute (KEFRI) have been restructured so that research activities are more client focused and participatory. Both institutes are active in developing and disseminating improved technologies through regional centers and have developed linkages with government and non-government extension agents. KARI and KEFRI have also partnered with the Ministry of Agriculture a number of sustainable land management initiatives in western Kenya such as the National Agriculture and Livestock Extension Program, Soil Management Project, Legume Research Network, Agricultural Technology and Information Response Initiative, and Lake Victoria Improved Land Management Program.

Kenya is also in the process of devolving greater power to local authorities with the twin objectives of utilizing existing capacity better and developing new skills where there is a gap aimed at improving service delivery and governance. The Government has launched studies on Local Government Reform and Constitutional Review in order to identify and remove bottlenecks to improved service delivery.

Kenya was among the early signatories of the Convention on Biological Diversity (CBD) and ratified the convention in 1994. It has actively participated in meetings of the Conference of the Parties (COP) to CBD, and hosted the most recent meeting (COP-5) with UNEP in May 2000. In order to demonstrate its commitment to biodiversity conservation, the government is implementing a series of initiatives including:

- Completion of the National Biodiversity Strategy and its corresponding Action Plan;
- Preparation of the first report to the COP in 1998 in accordance to the obligations under the CBD to report on progress made in respect to implementations of articles 6 through 8 of the CBD;
- Implementation by the national government of the GEF-supported *Tana River Primate National Reserve Project;*
- Implementation by the national government of two regional GEF-supported projects *Lake Victoria Environmental Management Project* and *East African Cross-Border Biodiversity Project*; and
- Kenya has designated several areas as important for conservation, including National Parks, Reserves, Wildlife Sanctuaries, National Monuments, Biosphere Reserves, World Heritage Sites and Ramsar sites.

The principles of the National Biodiversity Strategy (Ministry of Environment and Natural Resources, 2000) recognize that *"population and poverty issues are the ultimate causes of biodiversity loss, and can only be meaningfully addressed as national development goals."* Poverty alleviation, increased agricultural productivity, employment creation, and population control are all key elements in the National Biodiversity Strategy. Agrobiodiversity is particularly singled out in the Strategy and the

promotion of farming practices that conserve agricultural ecosystems is a key component of the strategy. Finally, the Strategy recognizes degradation of aquatic resources as a key element in biodiversity loss and recognizes impacts of upstream resource use on downstream ecosystems.

Finally, the objectives of this project are consistent with the aims and objectives of NEPAD (the New Partnership for Africa's Development) and corresponds to NEPAD priorities on agriculture, the environment and empowerment.

3. Sector issues to be addressed by the project and strategic choices:

The Government's Economic Recovery Plan singled out the Nyando and Nzoia river basins as priority areas for rehabilitation. The project will address the agricultural and natural resource management sector issues identified above 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. Reconciling conflicting goals and uses of land is a critical challenge for land management. Understanding how land-use decisions and management practices affect the production of different ecosystem goods and services is necessary for sustainable management of the agricultural landscape.

(b) Linking upstream and downstream interventions: Project interventions will be implemented in 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, to increase the effectiveness of ecosystem interventions. Detailed maps of each river basin and the areas of intervention are included in Annex 12.

(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 service delivery systems.

***(d) Incorporating global environmental benefits into local development priorities*:** The inclusion of environmental service functions (such as the erosion control provided by reforestation) into project activities would generate 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 which address these needs.

***(f) Seeking complementarity with other programs*:** The project seeks to build on and complement the success of other natural resource management projects in the area, such as the Soil Management Project (SMP), Agricultural Technology and Information Response Initiative (ATIRI), Legume Research Network Project (LRNP), and the SIDA sponsored Lake Victoria Project. Linkages with the second GEF-financed Lake Victoria Management Program (LVMPII) will also be further developed. While LVMP II

will focus on trans-boundary lake management issues, this project will support the on-the-ground improved watershed management investments which will improve the management of Lake Victoria.

(g) Laying the groundwork for future IDA financed projects: In developing the 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.

C. Project Description Summary

1. Project components (see Annex 1):

The project will utilize and integrated ecosystem management (IEM) approach. Ecosystems are important not only for the utility they provide in the form of production of "goods" or commodities, but also for the maintenance of critical "services" (water supply, soil fertility). Where goals for production of ecosystem goods and services conflict with one another, IEM is a means of balancing the increased production with environmental protection. The overall goal for the project is therefore to improve ecosystem performance in terms of biological productivity, integrity, maintenance and sustainability while at the same time ensuring that these improvements can be adopted by farmers and decision-makers at various levels and they result in poverty alleviation and farmers empowerment.

A key element of IEM in the project will be linking upstream and downstream communities to better management the river catchment as a whole. This will be accomplished through planning and financing of interventions that incorporate cross-community concerns.

The project will have three broad components:

Component 1: Capacity Building for Community Driven Integrated Ecosystem Management

Activities in the first component will focus on two areas of capacity building: (i) Strengthening the local development and IEM planning capacity of rural communities and local governments through organizational and managerial support and transfer of technical knowledge; and (ii) capacity building at local and national levels for piloting carbon financing mechanisms.

The project will work with village development committees that represent all stakeholders and are already active in village level development. The project will particularly encourage and support inter-village development coordination committees at micro-catchments, catchments and watershed levels. The expected environmental benefits from the first component are: (i) an acknowledgement of key ecosystem management issues within and across communities; (ii) creation of inter and intra-community land degradation mitigation and biodiversity conservation strategies; and (iii) development of mechanisms for creation and management of carbon assets.

Sub-component 1.1: **Strengthen Local Development and IEM Planning**. The project will strengthen local development and IEM planning capacities of communities to formulate, write, and submit Participatory Action Plans (PAPs) and proposals for donors funding. PAPs will be prepared at the community level using participatory rural appraisal (PRA) methods. The project will also strengthen the land/IEM planning and M&E capacity of local governments by providing them with necessary GIS database , equipment and training.

Pilot areas will be established to test and demonstrate PAP options, and to provide real-time learning as communities and households implement their project on their own land. The activities to be supported will include participatory adaptive on-farm research, farmer field schools, farmer-to-farmer exchanges, training of extension workers and rural development practitioners (NGOs, local development authorities, MoA extension staff), and development of extension messages. The project will also assist communities with the identification and preparation of relevant management plans for critical non agro-ecosystem sites. Inter-village plans will be established to address those key non-farm areas which currently aren't protected. Local refugia will be identified and where little is known about endangered or endemic biodiversity, special attention will be given to species identification, awareness raising and conservation planning.

Technical backstopping and facilitation of planning, implementing, and evaluating the program interventions would be provided by NGOs and other service providers as well as KARI, KEFRI and World Agroforestry Center. The District Agriculture and Livestock Development Offices would perform the key role of interfacing with farmer organizations and liaising with the project coordination office.

***Sub-component 1.2*: Enhanced Capacity for Developing Carbon Finance Proposals.** To facilitate the participation of targeted communities in the global carbon market, the project will build the capacity of the government, local institutions, and communities. In particular, the project will enhance the ability of target communities to develop carbon financing proposals, measure baselines, and establish the administrative processes required to enter into carbon sequestration contracts. The project will also provide support to apex farmers organizations at the provincial and national levels, departments in charge of global environment conventions negotiations and implementation in the Ministry of Environment, potential local and private sector operators willing to get involved in environmental markets. In particular the national carbon monitoring-evaluation and certification capacity will be enhanced by developing such capacity within the national agricultural research system including Kenyan universities.

Component 2: Scaling up and Financing IEM Interventions. The project will provide funds for the implementation of IEM activities identified in the first component. The component will also support two types of community-based sub-projects: village community sub-projects (involving one village) and inter-village community sub-projects (involving several villages), both types of sub-projects would be financed through a matching grant program that would require community contributions. Further, the component will fund a select number of infrastructure development such as closing of networks of gullies, protection of river banks, or lake banks, and upgrading of access roads.

Small projects identified in the PAP plans may also include development of village nurseries to support agro-forestry, development of existing bio-diversity resources, support for alternatives to control land degradation, reduce sediment loss, and land management interventions to sequester carbon in agricultural landscapes. Expected environmental benefits are: (i) increased carbon sequestration through use of cover crops, and tree planting; (ii) decreased sediment load in surrounding watercourses due to reduced erosion; and (iii) improved awareness and conservation of biodiversity at the community level.

Component 3: Establishing a Monitoring and Evaluation System. Monitoring and Evaluation activities are included as a separate component due to the technical requirements associated with quantifying environmental benefits and the importance of measuring progress on project objectives. The M&E system proposed for the project would provide information for directly assessing the outcomes and impacts of the project, and also for refining working methodologies and procedures. The M&E system would, in addition to project implementation, focus on two broad areas of impact, socioeconomic and biophysical. The expected environmental benefits are: (i) measurement of changes in carbon stocks and biodiversity levels over the project lifetime including a net-net accounting of GHG accumulation; (ii)

incorporation of environmental monitoring into local monitoring and evaluation exercises; and (iii) improved capacity for monitoring carbon stocks.

Monitoring and evaluation would be carried out using participatory mechanisms, coupled with a strong technical and scientific component associated with biophysical measurement. These will build on methods generated under the targeted research activities of the project, and will consist of a mix of field surveys and remote sensing, some of which were tested during the development of baseline data. The M & E system will be coordinated by the project coordination office (PCO), with World Agroforestry Center and KARI undertaking most of the M & E activities.

Measurement of carbon sequestration will be particularly challenging. Results of measurements will be accumulated to produce "net-net accounting" of GHG accumulation. Monitoring for greenhouse gasses will be in accord with the IPCC guidelines to the extent possible. Most of these procedures, however, were developed for Annex 1 countries for national reporting and may not be appropriate for village level projects in developing countries. Thus, provision is made for some targeted research activities to explore more cost effective monitoring options.

Monitoring activities will also involve community level monitoring of action plans, using the "Impact Monitoring and Assessment" tools. Progress on the social, economic, agricultural and environmental objectives of the action plans will be assessed. Poverty levels will be assessed at the start of the project based on the 1999 census. In addition, household data to assess change in poverty during the term of the project will be collected. The project will also monitor erosion and nutrient loss, the incidence of pests and diseases, and the impacts of these on the welfare of farmers in the project area.
Efforts was put into the scientific element of the M&E system to ensure that it would be cost effective.

Indicative Project Cost by Component

Component	Indicative Costs (US$M)	% of Total	Bank financing (US$M)	% of Bank financing	GEF financing (US$M)	% of GEF financing
1. Capacity Building for Community Driven Integrated Ecosystem Management	4.6	47.0	0.00	0.0	1.1	20
2. Scaling up and Financing IEM Interventions	1.65	18.0	0.00	0.0	1.25	28
3. Establishing a Monitoring and Evaluation System	1.3	14.0	0.00	0.0	0.75	17
Project Coordination	1.40	15.0	0.00	0.0	1.0	22
Total Project Costs	9.55	100.0	0.00	0.0	4.1	100.0
Total Financing Required	4.1	100.0	0.00	0.0	4.1	100.0

2. Key policy and institutional reforms to be sought:

The small scale of the project and its relatively narrow scope makes it an unlikely instrument for policy and institutional reforms. The institutional arrangements for project implementation are based on a decentralized model of governance, and the project is expected to benefit from further decentralization. Implementation would be coordinated by a committee of implementing institutions based in the field, and stakeholder oversight of program implementation by the coordination committee would be provided by a technical advisory group (TAG).

3. Benefits and target population:

Target population. The project will be implemented in Nyando, Yala, and Nzoia River Basins, which together, support a population of nearly 7 million. Approximately 75% of the area within these basins is classified as agro-ecosystems. The total area of the three basin is about 20,000 sq. km (Nyando 3,550 sq. km., Yala 3,364 sq. km., and Nzoia 12,984 sq. km.). The project area will consist of approximately nine 100 sq.km focal areas (FA's), three for each river basin. Focal areas within basins will be stratified by elevation zones to include: *Lowlands*, 1134-1440 m, *Midlands*, 1440-1890 m and *Highlands* >1890 m a.s.l. slope.

Focal areas will represent 8.5% of the land area of Nyando basin, 8.9% of Yala a and 2.3 % 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.

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 households rely on for income. People from six major ethnic groups (Abagusii, Luo, Masai, Abasuba, Kuria and the Kipsigis) inhabit the districts falling within the project area. 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 pastoralists. HIV/AIDS rates in Western Kenya are among the highest in the country and have left a growing number of rural households widowed or orphaned. Women headed households represent up to 35 percent of households in some project areas.

Benefits.
Benefits from the project would have impact at local, national and global levels.

At the local level the project would contribute to mitigating the problems of unsustainable land-use practices, declining productivity, environmental degradation and food security, and improve the livelihoods of the people. The project would promote IEM approaches that can provide multiple benefits (increased nitrogen in the soil, increasing on farm fuel wood production, reduced erosion, carbon sequestration, etc.;). In addition, cultivation of medicinal plants would bring additional income to households practicing agroforestry and tree crops.

At the national, provincial and district level the project would promote rural development strategies that integrate eco-system concerns – including targeting, and prioritization of activities. The project would also support local social organizational structures (village and rural community) which are able to address and evaluate ecosystem concerns, particularly those of importance to more than one village.

At global levels the project's contribution would be to reduce soil degradation, improve biomass production and sequester above and below ground carbon, and reduced erosion and phosphorous runoff into watercourses draining into Lake Victoria. Carbon sequestration is expected to be significant with land use conversion to agro-forestry systems particularly in the sub-humid areas of western Kenya. This would provide benefits towards mitigating greenhouse gas effects on the global climate. The project would also benefit several unique habitats in this area that are of national and global significance. Finally, the project would contribute to commitments made under several global conventions, in particular the Convention on Biodiversity, UN Framework on Climate Change, and Convention to Combat Desertification.

4. Institutional and implementation arrangements:

The program will be demand-driven and implemented under a decentralized institutional arrangement. At the village/community level, village development committees (VDCs) will be the main bodies for planning and implementing approved development interventions. Members of the VDC include ex-officio, assistant chief of the particular sub-location, representative of NGOs, and the Development Agent (DA) responsible for extension services. To ensure safeguards, community representatives from the constituent villages will be represented in the village development committee.

The VDCs will receive technical backstopping from KARI, KEFRI, World Agroforestry, MoA extension agents, NGOs, and other partners. All of these institutions are members of the Consortium for Scaling up Options for Increased Farm Productivity (COSOFAP) in western Kenya. The objectives of the consortium are to create forums for sharing information from users and service providers, exchanging experience among various stakeholders engaged in improving farm productivity and rural livelihoods, identifying existing capacity in the project area, and facilitating capacity building among communities to demand for technologies and services.

The existing Location Development Committees (LDCs) consisting of extension agents, project staff or service providers, would help prepare and collate VDC plans.

Implementation of selected proposals will be carried out under the close supervision of the project coordination office and the District Steering Committees (DSCs). The DSCs (covering a number of villages in the designated area and consisting of representatives of line ministries, NGOs and communities) will ensure that selected proposals are implemented and that results meet the targets set by the project. Because capacity varies between the districts, training modules will be developed based on need assessment and analysis.

At the national level, the Project Advisory Group (PAG) will provide lead coordination, and ensure that results meet the targets set by the project. The PAG will be chaired by the Director of KARI and will meet quarterly.

The day-to-day coordination and monitoring of project activities would be managed by the project coordination office (PCO) located in Kisumu. The PCO will be established through recruitment and will consist of a project coordinator, a financial officer, a procurement officer, monitoring and evaluation officer, and two to three field staff (gender balanced) with satisfactory qualification and experience in natural resources management and agroforestry. The role of the coordination office will be to release funds against agreed work plans, and coordinate monitoring and evaluation of the project as a whole. It will facilitate and account for the flow of funds, raise awareness, mobilize technical assistance, and assist districts with their procurement where needed. The main tasks of the field staff will be to supervise and ensure smooth implementation of community sub-project activities. Activities relating to mobilizing community self-help groups, organizing exchange of visits, community based study programs for community leaders and their members, and developing training materials will be contracted out to service providers.

The institutional arrangements for the project will be further refined during appraisal and in the Project Implementation Manual.

Financial Management: The project's financial management system is designed to support efficient and effective delivery of outputs. Under the proposed arrangement, CBOs, and farmer groups shall prepare quarterly fund accountability statements to be reviewed and consolidated by VDCs. These shall be remitted to District Administration through LDCs. The District Accountant shall be responsible for their

summarization and reporting to the PCO. The PCO financial officer shall provide technical oversight capacity building, monitoring and coordination functions. He/she shall also be responsible for consolidation of district input into quarterly financial monitoring reports (FMR) and project financial statements.

Qualified and experienced independent auditors will be appointed on approved terms of reference. The external audit will cover both the Grant Funds as well as the counterpart funds at all levels of project execution.

Disbursement Arrangements and Flow of Funds: Project funds will be controlled through special bank accounts managed by a PCO. The Government, through KARI, will maintain a separate Project Account where counterpart funds are deposited in agreed amounts and managed by the PCO to fulfill counterpart financing requirements. The chart in Annex 6B illustrates the proposed banking and funds flow arrangements.

Procurement: Most of the procurement in the project will be in the form of small transactions taking place locally at the sub-location, location and district levels. Each participating district will receive funds in tranches before applying for a second fund tranche. Financing will depend on application received from communities and their procurement details will depend on the needs identified by the communities. Procurement would be carried out in accordance with simplified procurement procedures in Bank procurement guidelines. The PCO will be responsible for ensuring compliance of these guidelines. Ex-post reviews of random sub-projects will be conducted periodically by the Bank and through independent technical, if necessary.

Monitoring and Evaluation: Monitoring and Evaluation activities will be coordinated by the M&E officer in the PCO and implemented primarily by KARI and World Agroforestry Center. Socio-economic data will be gathered at the community level during the project start-up phase, at midterm, and towards the end of the project. The World Agroforestry Center will undertake biophysical measurements (remote sensing as well as on site data collection) in collaboration with soil science department at KARI. Further information on M &E activities is contained in Annex 7.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

Several alternatives for the project have been considered before presenting the current proposal:

Linking with IDA or a stand alone GEF project. The baseline status of environmental management and agricultural production in Western Kenya is unsustainable. Evidence from studies indicate an extremely high rate of ecosystem degradation**.** In addition, key contributors to the problem of land degradation such as high population density and expanding cereal based cropping systems, are unlikely to change significantly in the short term.

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 (see table below) are being implemented by Government, international donors, NGOs and community based organizations. An IDA funded community based development project is also anticipated in the next three years. These activities, which represent a move towards a sustainable baseline scenario, focus primarily on improved land use at the community and farm level. However, given the scale of land degradation, more will be needed 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 environmental benefits and contributes to more sustainable agricultural productivity, and income.

Geographic focus and coverage of the project: The first project proposal considered covering all lands in western Kenya that fall within the Lake Victoria watershed. The priority districts were to be selected taking into account several criteria of GEF, carbon sequestration and biodiversity increment potential, severity of land degradation, and the proximity to reserves with significant degradation due to external pressure. This idea was abandoned because the area was too large and the piloting of IEM approaches together with mainstreaming and scaling up of IEM interventions would have had very little impact including high transaction costs. Instead, more impact can be achieved by focusing on a few river basins over the life of the project. The project will begin implementation in the Nyando River basin and extend activities to the Yala and Nzoia River basins in the following years. Implementing the project in fewer river basins was also considered however, because the project will have an important demonstration effect and is expected to attract further resources, three river basins was judged appropriate. In addition, the learning opportunity provided by three basins, which vary in agro-ecological and socioeconomic characteristics, is likely to outweigh the benefits from increased coverage on just one river basin.

Working only through the extension organization of MoA: Divisional and locational extension staff of the MoA will participate in implementation of the project. In order to broaden the range of expertise available, however, and to give communities choice among providers of services, other entities, such as NGO's, COSPFAP, and others, will also be enlisted to provide advice and assistance.

2. **Major related projects financed by the Bank and/or other development agencies (completed and planned).**

Description	**Project**	**Supervision (PSR) Ratings (Bank-financed projects only)**	
a) Bank financed		**IP**	**DO**
Agricultural research	National Agricultural Research Project 2 (NARP II)	S	S
Rehabilitating ecosystem of Lake Victoria for the riparian communities (GEF)	Lake Victoria Environment Management Project(LVEMP)	U	U
Pastoral communities sustainable development, Infrastructure development and drought management	Arid Lands Project I (ALP)	S	S
Biodiversity and environment improvement in national reserve	Tana River National Reserve Project	S	S
(b) Planned			
Agricultural Technology Generation and Dissemination	Kenya Agricultural productivity Project	NA	NA
(c) Other development agencies			
Causes of soil fertility decline and development of low cost technologies for soil recapitalization	Soil Management Project (SMP)		

To promote use of legumes to improve smallholder farm productivity and to conserve environment	Legume Research Network Project (LRNP) GoK		
Study options for rural credit to facilitate chemical fertilizer purchase	Rural Credit Project (DfID)		
Improved land management in Lake Victoria	Lake Victoria Improved Land Management Project (SIDA)		
Improved extension services	National Agricultural and Livestock Extension Project (GOK and SIDA)		

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory), NA (Not Applicable)

2a. Linkages to other GEF initiatives

UNEP/GEF is currently implementing an MSP in the Lake Baringo catchment which is due to close in February 2004. UNEP/GEF is also implementing regional projects in Kenya's northern and southern drylands (Desert Margins Program and, Management of Indigenous Vegetation for Rehabilitation of Degraded Rangelands in the Arid Zone of Africa, and a targeted research project on Land Use Change (LUCID). The Bank is currently managing a multi-country initiative the Lake Victoria Environmental Management Project (LVEMP I) that includes a component for Kenya and is being implemented through KARI. Furthermore, KARI has been involved in a number of ecosystem management projects including the KEFRI-KARI-World Agroforestry Center Pilot Project in Vihiga and Siaya Districts.

Although a number of different projects are active in the Lake Victoria region, none are focused on IEM. This project will complement other projects but will be unique in focusing on an integrated ecosystem management approach.

3. Lessons learned and reflected in proposed project design:

PDF- B funds were provided to assist the Government of Kenya in the preparation of a project proposal based on baseline studies on biophysical and social aspects of the project area. The completed studies provided the following inputs that helped shape the project design:

(i) Inventories of soils, land use and land cover identified the poor fertility status of the soils, as well as the extent and hot spots for erosion and soil degradation. Analysis of the results provided guidance on investment opportunities in agroforestry and other complementary activities to improve soil fertility, promote value added production, and promote global environmental benefits.

(ii) Promotion of IEM interventions under the project must take into account the socio-economic aspect and community needs. The socio-economic surveys in Nyando have revealed that 54% of the rural populations live in poverty, and among the Luo people, about 35 % of the farms are headed by widows. Markets are primarily local, maize remains the dominant crop, but livestock activities are expanding.

(iii) A spatially registered, GIS data base has been established for the Nyando basin, consisting of Landsat, Spot and some QuickBird images. Preliminary analysis has identified high and low sources of erosion, as well as depositional areas for sediments. These findings are important for all present and future project activities to improve water quality in Lake Victoria as well as for carbon sequestration.

(iv) Some preliminary estimates of carbon stocks were completed, and have to be extensively checked and improved. Nonetheless, they provide valuable opportunity for refining the monitoring of carbon over the life of the project.

(v) Finally, procedures were identified to monitor poverty, sustainability, and project impacts. Much effort was also put into monitoring procedures for greenhouse gasses (CO2, N2O, and CH4), since current procedures are not well adapted for developing countries.

Similarly, lessons drawn from the implementation experience of previous land management and agro-forestry projects in Kenya include the following:

(i) The experience of the pilot project on soil recapitalization shows that institutional arrangements for project management and coordination work better if located in the field nearer the beneficiaries, and when stakeholders are closely associated with implementing organizations in the decision making processes.

(ii) Farmer empowerment is essential for successful planning and implementation, and to ensure maintenance of assets in future.

(iii) Capacity building programs should cover the rural communities, but also the implementers and service providers, e.g. the NGOs, CBOs, private trade and business partners.

(iv) Awareness raising must be an essential element of pre-project activities, and continued during the term of the project and thereafter.

(v) Promoting program that enable household-led activities to be managed as community-led umbrella projects should be part of the project strategy. Individual smallholder farmers, acting alone, are unlikely to reap optimal social and environmental benefits.

4. Indication of borrower and recipient commitment and ownership:

The Government of Kenya is strongly committed to improving the natural resource base in western Kenya. The Government has sponsored a number of sustainable land management initiatives such as the National Agriculture and Livestock Extension Program, Soil Management Project, Legume Research Network, Agricultural Technology and Information Response Initiative, and Lake Victoria Improved Land Management Program.

A good indication of the client's commitment is the production of project proposals and baseline surveys by Kenyan institutions. KARI has been actively involved in the design of the project during preparation of the concept note and through implementation of PDF B activities. Initial development of the project occurred after discussions with rural development partners in western Kenya and a stakeholder meeting in Nairobi in December 2000, after which the first draft of the project concept paper was prepared. These consultations included: (i) staff from Western and Nyanza provincial extension services; (ii) the National Environmental Secretariat (the GEF Focal Point); (iii) representatives from research and development partners active in western Kenya including SIDA/NALEP, UNSO-UNDP, GTZ, FAO, TSBF, RELMA, MICWP, SCODP, NAC; and (iv) farmers who are active in the KEFRI-KARI-World Agroforestry Center Pilot Project in Vihiga and Siaya Districts. A workshop on "Reversing Environmental and Agricultural Decline In The Nyando River Basin" was held in December 2002 to help further refine project objectives. Scientists, representatives from the Ministries of Agriculture, Health, and Water Resources, the National Environment Management Authority (NEMA), World Agroforestry Center, NALEP, non-governmental organizations, donor agencies, and farmers attended this workshop.

Through PDF B funding, KARI and the World Agroforestry Center supported project preparation by completing baseline surveys, designing project interventions and geographic areas, and creating monitoring and evaluation systems. KARI and World Agroforestry Center completed the following baseline surveys: (i) a biophysical baseline of soil, vegetation, and current land use practices; (ii) socio-economic baseline; and (iii) carbon baseline to assess carbon stocks in different farming systems above and below ground.

5. Value added of Bank and Global support in this project:

The Bank/GEF possess comparative advantage in securing inter-country cooperation, and have the added advantage of making available considerable knowledge and experience in project design and institutional arrangements for implementation that have worked in similar African conditions. The proposed project includes objectives that would generate global benefits i.e. improving water quality in international waterways, mitigating climate change through carbon sequestration, and enhancing biodiversity in critical habitats.

E. Summary of Project Analysis

1. Economic

Evaluation methodology and cost/benefit analysis

The demand-driven nature of the project leaves undetermined the specific investments that will be made under the project, thereby making impossible any rigorous ex-ante estimation of costs and benefits for the entire project. However, it is possible, with reasonable assumptions, to assess the profitability of the various types of investment that are likely to be made under the project and to indirectly estimate approximately the break-even economic rate of return (ERR) below which the project would not be economically viable.

Given the difficulty of quantifying certain ecosystem interventions, the analysis has been confined to a sub-set of activities, namely the profitability of various agricultural enterprises in which the communities and farmers groups are likely to invest in through adoption of improved soil fertility practices. The analysis reviewed the ex-post cost and benefits data of soil fertility management technologies tested on farm and on station during the past decade in Western Kenya by World Agroforestry Center and KARI, and whose adoption the project is expected to upscale. Actual and potential adoption data for the said technologies were also reviewed to assess the likelihood of their profitability and economic viability. Available data on the potential biophysical and economic impact of adoption of the technologies on Lake Victoria were reviewed, as well as potential earnings from carbon trading, to assess potential external costs and benefits of the project. Finally, the break-even economic rate of return that would make the project economically viable was estimated under a set of conservative assumptions.

The results of the economic analyses of technologies suggest that adoption of the new sustainable land management (SLM) technologies in Western Kenya would lead to substantial increases in returns to land and labor. For example, the results of the reviewed studies indicate that tithonia biomass transfer could increase net returns to the income of poor farmers, by as much as 77 percent annually when applied on kales and by 50 percent when applied on tomatoes. The results also suggest that improved fallows with species such as Tephrosia and Crotalaria are capable of improving net returns to labor, by 33 percent on average in maize fields. Carbon sequestration is estimated to reach about 200,000 tons at the end of the project implementation period (World Agroforestry Center) with a value of about one million US dollars, for conservative prices between 4 and 6 dollars per ton by the end of the project implementation period (year 2009). Given the above parameters, low adoption rates of sustainable land management technologies in the order of 14%-18%, the average incomes of households (about US$1/day) and of

villages in Western Kenya, the financial and economic rates of returns to the investment to be made under the project were calculated.

The results obtained by adding carbon sequestration benefits to the economic benefits suggest that the break-even social rate of return of the project is about 12 percent. The project would have to increase the annual growth rate of income in Western Kenya from an assumed 5 percent income growth rate (without the project) to at least 8.4 percent in order to economically and socially justify the investment planned under the project. The minimum expected productivity growth from available improved technologies rate of 33 percent and low adoption rate of 14 to 18 percent produce a social rate of return of at least 15 percent, while the medium and high productivity growth rates of 50 percent and 77 percent suggest much higher social rates of returns of 28 and 47 percent respectively, even after assuming relatively conservative adoption rates of 14 to 18 percent. The rates of return do not take into account of the potential economic gains from improved technologies for the Lake Victoria's economy. Thus, the project appears economically viable.

Variation in Social Rate of Return of Project to Real Village Income Growth (%)

Assumed real annual growth in village income without the project	Assumed Productivity Growth rate of SLM technologies 1/	Real annual growth in village income, with the project	Assumed real annual growth in village income resulting from the project	Implied Real Village Income Increase over the project period 2004-2009	Resultant Social Rate of Return (SRR)	Benefit/Cost Ratio at 12 percent Discount Rate
5.0	77	16.5	11.5	72.3	47	2.70
5.0	50	12.2	7.2	41.5	28	1.82
5.0	33	9.1	4.1	22.2	15	1.26
5.0	30	8. 4	3.4	18.2	12	1.00

1/ applied to only 14%-18% of farmers (adoption rate), SLM = sustainable land management

2. Financial

Fiscal impact of the project. The Government will not incur significant fiscal obligations from the project as the bulk of project money will be spent on interventions managed by individuals or community groups. The project will fund community based sub-projects, including some community infrastructure, but proposals for such funds will be judged against the community's demonstrated ability to maintain the assets. The project also builds on existing initiatives in government and non-governmental institutions, thus reducing the fiscal burden arising from the project and easing the flow of counterpart funds.

The project is also unlikely to encounter resource constraints during implementation. GEF would meet more than 70% of the total cost of the project of 5 years duration estimated at US$6.25 million. A satisfactory system of accounting and financial management is already in place for the pilot on soil fertility recapitalization. For the institutional dimension, a World Bank Financial Management Specialist (FMS) will be assigned to review the financial procedures of the implementing agencies and provide recommendation during preparation and the execution of the project.

3. Technical

Biophysical measurements. The primary technical issues arising from biophysical measurements center on accuracy of baseline measurements and monitoring systems. The ability to accurately measure carbon

sequestration and perform net-net accounting (balancing carbon absorption with emissions of other GHGs, N2O and CH4) will be critical to evaluate environmental benefits. Likewise, accurate measurement of biodiversity and soil erosion control will be necessary for accurate evaluation of project interventions. In assessing soil erosion vulnerability, the nature and erodibility of topsoil as well as the weathering profile of underlying rocks will be investigated.

Biophysical measurements will rely on a data gathered through ground surveys and remote sensing. Two complimentary approaches for measuring biodiversity will be used. The first will estimate ecosystem richness using existing land cover data and the second will use pair-wise plant checklists of 84 useful, common exotic and indigenous plants. Large scale diagnostics of land degradation will be done using spectral analyses of soil samples, based on a reference soil spectral library. Deforestation will be monitored along forest margins using remote sensing. Sediment and nutrient loads in rivers will be monitored by collecting water samples at 14 day intervals during the rainy season, and less frequently during the dry season.

Currently available procedures and models for assessing greenhouse gases are not well developed for tropical countries. Consequently, the project will concentrate initially on Tier 1 assessment, but with the view of improving the coefficients and moving towards Tier 2. Also, the World Agroforestry Center will conduct some targeted research on refinement of remote sensing techniques for carbon monitoring.

Appropriate farm conservation technologies. There are two technical issues in the project: (i) availability of appropriate technologies; and (ii) technical capacity in communities, NGOs, and Government agencies to utilize them. Technologies to address agro-ecological issues under the proposed project have been developed by KARI/World Agroforestry Center/KEFRI over the last ten years, tested in field trials and demonstrations, and further honed to suit local conditions during their application on farms under farmer-led initiatives such as the western Kenya Soil Fertility Recapitalization Project. The technologies define appropriate practices related to conservation and sustainable use of natural resources such as improved land and water management, soil fertility replenishment and maintenance techniques, landscape scale planning and management. In addition the overall planning of the development interventions would be organized following the integrated ecosystems management approach, and this would help integrate poverty reduction activities focused on small holder farmers with Kenya's national priorities (also subserving global objectives) for degraded land rehabilitation, adaptation to climate change, and biodiversity. Further work will be done in the first years of the project to collect baseline data for Yala and Nzoia basins and will provide guidance for appropriate technologies and interventions.

Overall, technical capacity is likely to be a major constraint on project implementation. The project therefore will have a funding provision for workshops, on-the-job training, and use of mass media for extension. Attention will be paid to the appropriateness of the technical design as well as to the specific location in which the project should be implemented.

Finally, an appraisal carried out by the World Agroforestry Center show that there is an acute shortage of seeds and seedlings for most of the preferred species (i.e. Grevillea, Melia, Kie apple among others). It is therefore necessary to establish tree nurseries to satisfy the demand for tree/ shrub/fruit seedlings to farmers at an affordable price. Although the project will support increasing the number of plant species on farms, it will promote the use of indigenous species and the introduction of alien invasive species is not envisaged.

Linkages to other ecosystem interventions. The project focuses primarily on both agricultural and natural ecosystems. Project activities will be implemented on-farm as well as critical habitats such as forests fragments, wetlands, riparian zones, and localized refugia. Initiatives in these areas will be central to the rehabilitation and conservation of the river basins. The project will depend on local government

and non-government actors for both planning and implementation of project activities, and should, therefore, be linked to ongoing or future activities dealing with other aspects of the ecosystem.

4. Institutional

The primary institutional issue surrounding the project is the capacity of local government units to implement project activities. Administrative and fiscal decentralization will be the core delivery mechanisms for the project and implementation will be based on a pluralistic service delivery system. The nature of project activities necessitates cooperation from a range of institutional actors inside and outside of government.

At the district level, district steering committees would oversee project implementation and facilitate ground level community-based program implementation. The districts are well represented by all line ministries but the capacity of districts to provide oversight of community sub-projects is constrained by the large size of the district coordinating body and the relative frequency with which it meets. District administration units consist of technical, administrative and political actors who coordinate district development activities through the District Development Committee (DDC) that meets quarterly. Districts are empowered to manage funds allocated to the districts, but, the bulk of current public investment is channeled through line ministries. To avoid bottlenecks at the DDC level, the project will utilize a smaller technical working group consisting of technical personnel from relevant line ministries and other stakeholders. This arrangement has worked well elsewhere, most notably in the Arid Lands Resource Management Project, a Bank financed CDD project. Support from the PCO field staff will also provide a mechanism to speed approval and procurement of community sub-projects.

At the grassroots level, farmer and community organizations would be the main implementers duly assisted by government and non-government service providers. The project's use of multiple service providers is designed to avoid over-reliance on the government's extension services, which are over-stretched. A number of NGOs present in western Kenya, many with a focus on agricultural development and natural resource management. The Consortium for Scaling up Options for Increased Farm Productivity (COSOFAP) has a membership of 70 organizations and will be the primary source of service providers.

4.1 Executing agencies:

Community-based organizations at the grass root level, district committees supported by the district agriculture development offices at the district level and the consortium of research institutions based in Western Kenya acting through an already constituted and functioning coordination committee at the project level would be the main implementing agencies. While the lead coordinating agency identified for the project is KARI, the primary executing agencies for the project include World Agroforestry Center, KEFRI, and district administrative units.

KARI has extensive experience with Bank financed projects and was the primary recipient of capacity building funds under the Bank financed National Agricultural Research Project (NARP) I and II. KARI maintains a headquarters office in Nairobi and has substantially decentralized research and dissemination activities to its regional centers. There are two such centers in western Kenya, in Kakamega and Kisii. KARI has successfully implemented community based technology dissemination initiatives such as the Agricultural Technology Information and Research Initiative (ATIRI), which supported demand driven technology adoption through community organizations. Through ATIRI and other initiatives, KARI has developed effective working partnerships with local extensions agents and non-governmental organizations.

The World Agroforestry Center, will play a significant role in project execution through the provision of technical backstopping for community sub-projects and monitoring and evaluation. Already, it is involved in technology dissemination and natural resource management and maintains an office in western Kenya. It is a member of the Consultative Group for International Agricultural Research (CGIAR) system and is currently an implementing partner in the Lake Victoria Improved Land Management Project. It also works with Ministry of Agriculture in implementing National Agriculture and Livestock Extension Program (NALEP).

4.2 Project management:

As described earlier, a Technical Advisory Group (TAG) will provide overall guidance for the project. Although KARI will act as chair, the TAG incorporates a range of stakeholders involved in agricultural technology dissemination and ecosystem management in Western Kenya. The project's use of a PAG provides a means to coordinate across the project's geographic area, an important element of the integrated ecosystem approach. The PCO will operate under the guidance and supervision of KARI. The location of the PCO in Kisumu is designed to speed up implementation of the project and ensure adequate technical assistance from PCO staff to implementing agencies at the district level.

4.3 Procurement:

Procurement using funds made available by GEF would be made in terms of the Government and implementing agency rules which are consistent with IDA guidelines. Because of its focus on communities, the project would follow simplified procedures that are designed for community based development projects and are applicable to grass root level agency procurements under the IDA guidelines. During negotiation consistency between the Government and IDA guidelines would be secured and agreed procedures included in the project Grant Agreement.

4.4 Financial management:

An assessment of the financial management arrangements of the project included a review of the systems of accounting, reporting, auditing, flow of funds and internal controls. The project's financial management arrangements are rated acceptable and are capable of recording transactions and balances, supporting the preparation of regular and reliable financial statements, safeguarding assets, and are subject to auditing arrangements acceptable to the Bank.

The Project financial management risk is likely to be moderate once the financial management and other operational systems are well defined and documented, and personnel are trained. A financial management system will be developed in accordance with the Financial Management Assessment Report presented in Annex 6B. The PCO will be tasked with producing a financial management timeline to effectiveness that includes realistic timing for the procurement of: (i) PCO personnel, (ii) accounting systems, (iii) external auditors, (iv) consultants to design and produce manuals; and (vi) staff training.

5. Environmental

5.1 Summarize significant environmental issues and objectives and identify key stakeholders. If the issues are still to be determined, describe current or planned efforts to do so.

Kenya is a signatory to the Convention on Biological Diversity (July 1994), the Convention to Combat Desertification (June, 1997) and the UN Framework Convention on Climate Change (Auguse, 1994). It has developed and adopted a Conservation Strategy, and the Environmental Policy.

Environmental rehabilitation is a key component within the project. The proposed project seeks to build up and sustain the natural resource base by improving the management of natural resources at the community level. The main activities to be pursued under the project such as conservation agriculture, water management, agroforestry, and biodiversity conservation, make it an effective instrument to mitigate climate change through carbon sequestration, enhance biodiversity conservation on and off-farm, and reduce sediment loading in critical waterways. The project would have a positive impact on environmental management and would not involve alteration of the physical landscape outside of household or community initiated soil fertility, agroforestry or ecosystem management activities.

An Environmental Analysis of the WKIEMP was completed in February 2004. The report identifies environmental issues relating to the project and recommended measures to be integrated into the planning, design and implementation early in the implementation stage.

The general findings of the EA were that:

(i) Given the participatory manner in which the project is being implemented, the actual interventions and timing of the interventions are difficult to predict;

(ii) Most of the potential environmental and social impacts are positive and are expected to lead to less natural resource and environmental degradation, which in turn will lead to better environments and sustainable livelihoods;

(iii) The benefit from the project outweigh any adverse impacts that the project may have provided.

5.2 Environmental category and justification/rationale for category rating: B - Partial Assessment

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. These include reduction of surface and ground water availability due to afforestation, and pollution of water bodies as a result of use of fertilizer. To address these predicted environmental impacts, the report recommends for an environmental management plan at the implementation stages of the project.

5.3 For Category A and B projects, timeline and status of EA

EA start-up date:	October 1, 2003
Date of first EA draft:	February 23, 2004
Expected date of final draft:	June 30, 2004

5.4 Determine whether an environmental management plan (EMP) will be required and its overall scope, relationship to the legal documents, and implementation responsibilities. For Category B projects for IDA funding, determine whether a separate EA report is required. What institutional arrangements are proposed for developing and handling the EMP?

An Environmental and Social Management Framework will be developed to address the issues around natural habitats, resettlement and environmental management in project implementation. The Environmental and Social Management Framework will detail the roles and responsibilities of relevant

institutions and individuals involved in developing and implementing various aspects of the project. The ESMF will also shape development of the project's operations manual.

Institutional responsibility for development and disclosure of the EMP and consultation with stakeholders will rest with the implementing agency, KARI. The National Environmental Management Authority will also provide technical expertise in developing the ESMF.

5.5 How will stakeholders be consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed EMP?

Consultations on environmental management issues will be participatory. A three day workshop on project development took place with the participation of farmer groups, government agencies (KARI, Ministry of Agriculture, KEFRI), NGOs and international organizations. Further consultation will take place during the development of the ESMF and overall project design. Implementation of the project will be coordinated by KARI, but the project envisages the participation of ICRAF, farmers, NGOs, and other community organizations both benefiting from the strengthened institutional capacity and participating in the payment for environmental services and the management of protected areas. The entire process of planning and project preparation would be participatory, and the project monitoring and evaluation would also be carried out with farmer participation. The key performance standards would provide for output and impact indicators to measure farmer and community participation, capacity building of the community institutions, indicators for incomes and poverty reduction, and outcomes of a sustainable agriculture.

5.6 Are mechanisms being considered to monitor and measure the impact of the project on the environment? Will the indicators reflect the objectives and results of the EMP section of the EA?

The project will monitor and measure the impact of project activities on the environment. Where negative impacts from the project are anticipated the ESMF mitigation plan will be implemented and monitored. Component III of the project is dedicated to M&E and environmental issues will be well covered.

6. Social

6.1 Summarize key social issues arising out of project objectives, and the project's planned social development outcomes. If the issues are still to be determined, describe current or planned efforts to do so.

The community approach adopted for the project is expected to improve the community responsibility for the environment and facilitate community participation in planning and implementation. Higher output and improved income are expected to make a positive social impact through reducing poverty and migration due to related factors.

One of the main objectives of the project is to provide small scale farmers, particularly women headed households, with an alternative to make a sustainable use of their land while protecting the environment. The project proposes special attention to gender matters during implementation. The project will mobilize women as active partners and stakeholders. The project will also identify constraints on women’s access to resources and will encourage other stakeholders to develop and adopt mechanisms to reach women directly.

The EA report identified the creation of social disparity due to differences in access to project resources. The key social issues will be adequacy of targeting at local level, degree of voice of the beneficiary farmers in decision making processes on issues affecting their well-being, conflicting demands on the

same resources, the risk of adverse social impacts to the Bank's intervention, and impact on demand for labor. In addition to selecting carefully the participating communities on account of wealth ranking, ethnicity, clans, etc, mitigation ought to be about appropriate ways to work with communities, based on a social analysis. The social impact of project interventions will be reviewed and addressed by a social scientist in the course of project implementation.

6.2 Participatory Approach: How will key stakeholders participate in the project?

The project will proactively pursue the promotion of local partnerships between rural community organizations and various stakeholders such as small-scale farmers (particularly women-headed households), service providers (public, non-Government and private), community-based organizations, research institutions (KARI, the World Agroforestry Center, KEFRI) and NGOs. Through its community driven approach, the project would enable community organizations to seek technical assistance, guidance and advocacy support from the partnering civil society organizations and other providers.

Many of the civil society organizations participating in the implementation of the project are legally registered and members of the umbrella organization COSOFAP, which is chaired by the provincial representatives of the Ministry of Agriculture. Civil society participation will be facilitated by district steering committees and district agriculture development offices. While the overall implementation of the project will be coordinated by KARI, the project envisages the participation of the World Agroforestry Center, farmers, NGOs, and other community organizations all of which would benefit from the strengthened institutional capacity and participation in IEM.

Furthermore, the entire process of planning and implementation would be participatory. At the village/community level, VDCs will be the main bodies for planning and implementing approved development interventions. To ensure safeguards, community representatives from the constituent villages will be represented in the village development committee.

Local communities will also be involved through the monitoring and evaluation process. Initially, focus group discussions with local leaders and community members will be used to introduce the project to the area and to assist the local community with the identification of the major natural resource management constraints faced by the community. Focus groups will be asked to rank problems and possible interventions for these by consensus and results will be synthesized as reference documents for each community. As outlined in the M&E plan, farmers will also be responsible for the selection of the net project area.

Finally, to ensure adequate and continued stakeholder participation, key performance standards would provide for output and impact indicators to measure farmer and community participation, capacity building of the community institutions, indicators for incomes and poverty reduction, and sustainable agricultural production and productivity.

6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

The project will pursue the promotion of local partnerships of rural community organizations and various stakeholders such as the service providers (public, non-Government and private), input/output trade, faith-based organizations, local government village and area level entities. Through its community driven approach, the project would enable community organizations to seek technical assistance, guidance and advocacy support from the partnering civil society organizations or other providers. Many of the civil society organizations participating in implementation of the project are legally registered and members of the umbrella organization COSOFAP.

6.4 What institutional arrangements are planned to ensure the project achieves its social development outcomes?

The participatory nature of the project will ensure the project achieves it social development objectives. Farmers and farmer groups will guide the entire process and would be in charge of planning and implementation of the development interventions.

6.5 What mechanisms are proposed to monitor and measure project performance in terms of social development outcomes? If unknown at this stage, please indicate TBD.

The key performance measuring criteria would include output indicators to assess improved rural livelihood's and economic performance of local, small scale farming systems, gender, and implications for demand for labor. Details would be finalized during project appraisal.

7. Safeguard Policies

7.1 Do any of the following safeguard policies apply to the project?

	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)	Yes
	Forestry (OP 4.36, GP 4.36)	No
	Pest Management (OP 4.09)	No
	Cultural Property (OPN 11.03)	Yes
	Indigenous Peoples (OD 4.20)	No
	Involuntary Resettlement (OP/BP 4.12)	Yes
	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

7.2 Project Compliance

(a) Describe provisions made by the project to ensure compliance with safeguard policies which are applicable.

An Environmental and Social Management Framework will be developed to address the issues around natural habitats, resettlement and environmental management in project implementation. The Environmental and Social Management Framework will detail the roles and responsibilities of relevant institutions and individuals involved in developing and implementing various aspects of the project.

8. Business Policies

8.1 Check applicable items:

Financing of recurrent costs **(OMS 10.02)**

Cost sharing above country 3-yr average **(OP 6.30, BP 6.30, GP 6.30)**

Retroactive financing above normal limit **(OP 12.10, BP 12.10, GP 12.10)**

Financial management **(OP 10.02, BP 10.02)**

Involvement of NGOs **(GP 14.70)**

8.2 For business policies checked above, describe issue(s) involved.

NGOs would play an important role in supporting community-based planning and implementation of the development interventions. They would engage in a number of activities depending on the expressed need

of the farmer organizations and the competencies of by the concerned NGOs. NGOs, singly or along with other providers, would have a role in farmer training and capacity building, providing technical assistance in preparation of community action plans and micro or small projects, technical/specialist support during implementation, monitoring implementation progress, advocacy and facilitation. Funding would be available under the proposed project to meet costs of NGO participation and support as above.

F. Sustainability and Risks

1. Sustainability:

The project strategy has been designed based upon lessons learned from previous experiences in order to ensure the sustainability of GEF-supported activities beyond the GEF funding period. Sustainability will be achieved through: (i) focusing on capacity building of local technical resource services, and producers; (ii) recognizing and capitalizing on the crucial role of local governments and local producer and community organizations to organize, promote, monitor and assess implementation; and (iii) utilizing existing institutional structures to implement project activities and deliver outputs. Additionally, the project will fund community-based sub-projects, including some community infrastructure, the required funds for which would be judged against the community's demonstrated ability to maintain the assets over the long-term. With a view to further ensure sustainability of the activities beyond the project period, the project builds upon existing initiatives in government and non-governmental institutions, thus reducing the risks associated with the establishment of new initiatives.

The principal concern with regards to financial sustainability is the maintenance of investments resulting in effective gains in incomes and improved ecosystem management in the target communities, to the extent that farmers in the area will be economically and environmentally self-sustaining over time. The project's financial management system is designed to support efficient and effective delivery of outputs. Furthermore, the project will place funds in the hands of communities and facilitate provision of technical assistance through public or private sector. By making application and screening procedures for community proposals as simple as possible and by providing ample funds for capacity building at all levels, it is expected that project funds will flow at a relatively faster speed.

1a. Replicability:

It is expected that the experiences gained in farmer-led initiatives for defining appropriate practices related to the conservation and sustainable use of natural resources will be replicated within Kenya and potentially in other countries with similar agro-ecological situations. Replication will be more effective as a result of the project's emphasis on capacity building at both the community level by providing technical assistance to promote adoption of integrated ecosystem management activities and at the government and local institutional levels by training personnel and staff. In particular the project would enable and enhance the ability of the target local institutions and communities to develop carbon finance proposals, measure baselines, and establish the financial and administrative processes required to enter into carbon sequestration contracts. This is intended to become a best practice guideline for future replication.

Replication Plan: Dissemination of best practices to other countries in and outside the region will be done by both the project staff and key stakeholders directly involved in project development and implementation. The project support for the dissemination of lessons learned, designed and implemented under Component 2, would be consistent with the GEF Outreach Strategy. A budget will be earmarked for such public outreach activities. In particular, resources would be allocated to create awareness within a wider audience about the project's activities, its impacts and principle lessons. Such awareness would be created through: (i) public awareness campaigns for local rural communities, farmer's associations, farmer-to-farmer contacts, extension agents, NGOs and other stakeholders; (ii) consultations and

information dissemination workshops; (iii) participation of project staff in national and international seminars and outreach workshops; (iv) training of extension workers and rural development practitioners (NGOs, local development authorities, MoARD extension staff); (v) preparation of outreach material (pamphlets and brochures) for the general public; (vi) preparation of audio visual material for media campaigns; and (vii) community level documentation centers.

2. Critical Risks (reflecting the failure of critical assumptions found in the fourth column of Annex 1)

Risk	Risk Rating	Risk Mitigation Measure
From Outputs to Objective		
Beneficiaries or may redirect the funds available to purposes other than generating environmental services.	M	To reduce such risk, the generation of funds would be strongly tied to measurable indicators to ensure the proper use of funds.
Community members are not able to work together to manage communal resources	N	Project is designed to maximize community participation and to ensure that capacity building support is available to communities.
Insufficient technical assistance resulting in non-adoption of technologies intended to promote IEM.	N	Association of research institute as implementers would minimize this risk.
From Components to Outputs		
Difficulty in identifying changes which will have the desired effects	M	The project will develop an effective M&E system to monitor the effects of the project interventions and to adjust the list of interventions and targets based on observed outputs.
Untimely input delivery.	N	Simplified Bank procedure will applied with procurement taking place locally to ensure timely delivery.
Implementing agencies already overtaxed with existing and pipeline work loads resulting in less effective program coordination.	M	Project funds will enable hiring additional staff. Also implementation and coordination role would be put in place in the field.
The large number of transactions involved, the small value and multiplicity of contracts, and the scattered locations of the subprojects makes ex-ante controls across all individual sub-projects difficult	H	Implementation of a project financial management system that ensures self regulation by communities and optimal use of established government administrative systems
Community groups may lack the necessary capacity.		Incorporation of capacity building component in project design.
Community representatives may not be truly representative of the community (i.e. elite capture of institutions and political interference)	M	Early identification of project focal points and involvement of communities in decision making processes
Risks associated with the handling of substantial cash transactions including theft and fraud	M	Self regulation through active community involvement and inclusion of cash holding limits in CDD financial manual

Overall Risk Rating	M	

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

3. Possible Controversial Aspects

There are no serious issues where the Government and the Bank differ.

G. Main Loan Conditions

1. Effectiveness conditions

(a) The Government will have appointed a Project Coordinator, a Finance Officer, a Procurement Officer, and a Monitoring and Evaluation Officer with experience and qualification satisfactory to IDA.

(b) The Government will have established the project accounting and financial management system satisfactory to IDA.

(c) The Government will have opened the Project Account in a commercial bank and deposited therein the initial deposit of KSH……..….

(d) The Government will have appointed an external auditor for the project satisfactory to IDA.

2. Other:

(a) The Government will have completed the work program, including the budget and procurement plan for the first year of project implementation, satisfactory in form and substance to IDA.

Other assurances obtained at negotiations.

(a) Preparation and furnishing to IDA annual progress reports on procurement activities under the project.

(b) The Government will furnish to IDA a realistic and satisfactory project implementation plan (PIP).

H. Readiness for Implementation

Drafts of the PIP and procurement plan will be ready during negotiations.

I. Compliance with Bank Policies

This project complies with all applicable Bank policies.

Annex 1: Log Frame Matrix

KENYA: Western Kenya Integrated Ecosystem Management

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Sector-related CAS Goal:	**Sector Indicators:**	**Sector/ country reports:**	**(from Goal to Bank Mission)**
To foster economic growth and reduce poverty within the framework of the PRSP by developing sound natural resource management practices	• Per capita income • Percent and headcount of people living below the poverty line	• National statistics • National environment report • Annual sector reports • Bank reports	Sound natural resource practices exist and information dissemination about benefits can be generated.
GEF Operational Program:	**Outcome / Impact Indicators:**		
Project Development Objective: Improved productivity and sustainability of land use systems in Nzoia, Yala and Nyando river basins.	• 80% of targeted communities adopting and implementing integrated ecosystem management interventions in project intervention area and in surrounding villages	• National Environment reports • Annual Reports • Local level surveys	• Continued institutional and political support for the implementation of the project. • Sound national policy and administrative framework in place.
Global Objective:	**Outcome / Impact Indicators:**	**Project reports:**	**(from Objective to Purpose)**
Improved regional and on-and off-farm biodiversity, carbon sequestration, and rehabilitation of degraded lands and catchments.	• Reduced erosion and sediment delivery into watercourses draining into Lake Victoria: 10% percent reduction in erosion rates from farming plots receiving interventions, improved phosphorous parameters in major waterways feeding into Lake Victoria. • 20 % reduction in phosphorous loads in key waterways • 5 % reduction in encroachment rate in critical habitats in or around project areas • Eco-system richness - 10 % increase in abundance and	• Project sponsored biophysical evaluations and field inventories • Local level surveys	• Number of beneficiaries are sufficient to produce significant impact • Completion and implementation of National Environmental Policy.

	diversity on farms in project area, 5 % increase in ecosystem richness indicator (off-farm) • Sequestration of 100,000 tons of carbon in 30,000 ha of SLM project area		
Output from each Component:	**Output Indicators:**	**Project reports:**	**(from Outputs to Objective)**
1.Capacity Building for Community Driven Integrated Ecosystem Management: Improved capacity for local communities, farmer associations, and national institutions to formulate integrated ecosystem management plans Identification of non-farm sites of global importance and the development of land management plans including upstream-downstream linkages.	• Number of community based organizations or groups established based on a community driven development model. • 50% community participation in village land management planning exercises • Number of community participatory action plans (PAPs) created. • Number of farmers, extension experts, and service providers trained. • Number of persons and institutions at local and national level trained or participating in IEM planning. • 40% of community plans including conservation strategy for endangered or endemic species • Inclusion of global environmental benefits (upstream-downstream linkages) in community plans.	• Project reports • Supervision mission reports • Evaluation reports (midterm and final) • District and national plans	• Capacity building, creation of PAPs and extension support will result in implementation of IEM interventions by communities • Adequate Government financing for interventions. • Community leadership for adoption of low cost interventions by communities.
2. Scaling up and Financing IEM Interventions: Implementation of community driven IEM activities and PAP identified sub-projects.	• Number of PAP sub-projects implemented • Number of IEM activities funded. • 20% increase in organic	• Project reports • Supervision mission reports • Evaluation reports	• Extension services, research activities and farmer field schools have large impact on farm management activities.

	matter content of soils in plots where the improved SLM technologies have been adopted	(midterm and final)	• National capacity sufficiently developed to coordinate and implement project activities.
3. Monitoring and Evaluation for project Impact: Cost effective monitoring and evaluation to measure social, economic and environmental impact of project activities.	• Above and below ground carbon sequestration in project areas monitored and assessed. • Social and economic impact of project activities monitored and assessed • Environmental impact of project activities monitored and assessed • Net-net accounting and carbon tradeoffs identified • Feasible and accurate procedures for accounting and evaluating carbon absorption resulting from project activities	• Project reports • Bank Supervision reports (semi-annual) • Evaluation reports (midterm and final) • Disbursement report • Project sponsored biophysical evaluations and field inventories • Carbon monitoring verification protocol	• Monitoring systems can accurately capture environmental benefits • Data and indicators produced by the project are available, registered and maintained in project database.
Project administration Support implementation, monitoring and evaluation of project components to measure social, economic, and environmental impacts of project activities	• Disbursements • Adherence to project work plans	• Progress report (annual and quarterly) • Disbursement report (quarterly) • Bank supervision report (semi-annual) • Audit reports (annual)	• Financial resources adequate • Technical capability of staff adequate
Project Components / Sub-components:	**Inputs: (budget for each component)**	**Project reports:**	**(from Components to Outputs)**
1. Capacity Building for Community Driven Integrated Ecosystem Management *sub-component 1.1* a) Community mobilization for PAP formulation *sub-component 1.2* c) Capacity building for service providers and district and focal development committees for integrated ecosystem management d) Establishment of local	USD 4,700,000	• Progress reports (annual and quarterly) • Bank supervision report (semi-annual)	• Communities able to mobilize to form groups and formulate PAPs • Effective Government and NGO services

learning centers and farmer to farmer linkages *sub-component 1.3* e) Capacity building for carbon finance administration and market development			
2. Scaling Up and Financing IEM Interventions a) Support to community identified PAP sub-projects in improved land management b) Support to community ecosystem management activities	USD 1,750,000	• Progress reports (annual and quarterly) • Bank supervision report (semi-annual) • Community Participatory Action Plans	• Maintenance of investments taken on by communities
3. Establishing a Monitoring and Evaluation System a) Biophysical monitoring b) Net-net accounting for carbon sequestration c) Monitoring of project activities and impact	USD 1,650,000	• Progress reports (annual and quarterly) • Bank supervision report (semi-annual)	
Project Coordination	USD 1,250,000	• Disbursement report (quarterly) • Bank supervision report (semi-annual) • Audit reports (annual)	• Policy environment supportive of project

Annex 2: Incremental Cost Analysis

KENYA: Western Kenya Integrated Ecosystem Management.

1. Project Objectives and Design

The project seeks to improve the sustainability of land use systems in Nyando, Yala, and Nzoia river basins through adoption of an integrated ecosystem management approach. In order to achieve this the project will pursue an integrated ecosystem management approach to: (i) improve on and off-farm conservation strategies; and (ii) improve capacity for local communities, farmer associations, and national institutions to identify, formulate and implement sustainable land management activities capturing local and global environmental benefits.

Project objectives would be achieved through a community driven development process whereby communities direct and coordinate resources for investments, technical assistance and implementation of ecosystem management activities.

2. Global Environmental Objective

The global environmental objective of the project is to promote integrated ecosystem management so as to capture the benefits of reduced greenhouse gas (GHG) accumulation in the atmosphere, improved on- and off-farm biodiversity, and decreased erosion in watersheds that feed into the Nyando, Yala and Nzoia River Basins.

Summary Matrix of Main Features and Issues Addressed

FEATURES/ISSUES	Western Kenya Integrated Ecosystem Management Project
1. Focal area/global benefits	
• biodiversity	x
• climate change	x
• international waters	x
• ozone	
2. Operational program coverage	12
3. Spatial scale of conservation	
• local/provincial	x
• national	
• regional	
4. Domestic benefits	
• same physical outputs	
• same economic outputs	
• greater benefits (see costs avoided/ scope of analysis)	x
5. Threat analysis	
• proximate	x
• intermediate	x

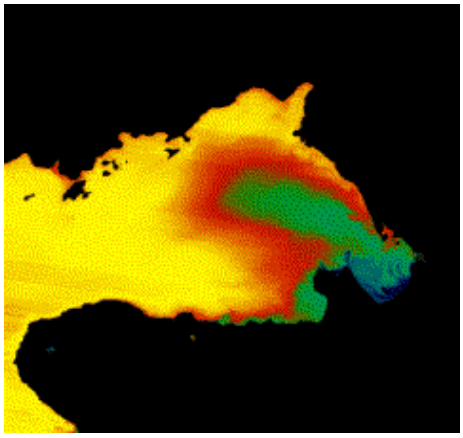
• ultimate • difficult to define	
6. Baseline strategy/activity • sustainable • not sustainable • trend: towards sustainable • difficult to define	x
7. Alternative strategy/activity • substitution to baseline • additional to baseline	x

3. Baseline

Traditional land management in western Kenya has relied on the fallowing of unproductive fields to restore fertility and decrease pest related losses. A rapid increase in population density, however, has led to wide scale abandonment of fallowing, making the practice untenable. The scale of population increases in Western Kenya in the past half century has also had significant effect on land and water 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 onto steep slopes, wetlands, and forests, despite the existence of laws and regulations against such practices. As such, evidence from studies indicate 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 the occurrence of severely accelerated land degradation in the Nyando River Basin. Large quantities of sediment – discernible in satellite images – are being deposited at the outlet of the Nyando River basin in the Winam Gulf of Lake Victoria (Fig. 4.1; reported in Science, 2000).

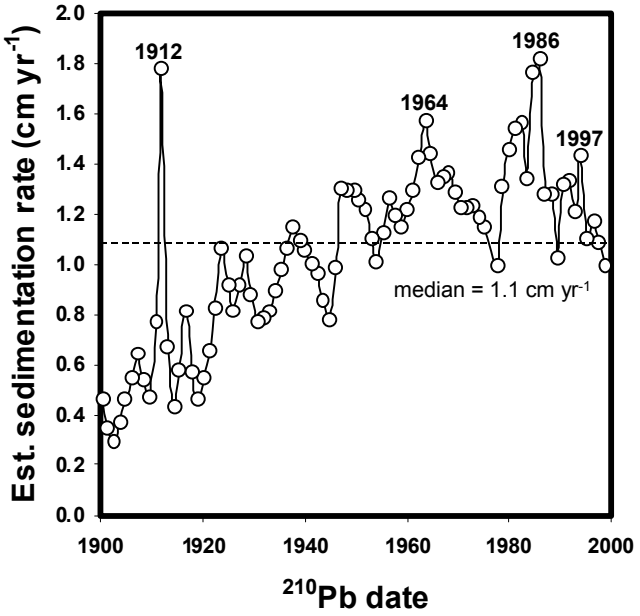
Fig 4.1. Nyando sediment plume (~40 km^2) in Winam Gulf, Lake Victoria
Source: based on Landsat ETM data Feb. 2000



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 (Fig. 4.2; Walsh, unpublished data). In addition, data show the lower portion (< 1400 m a.s.l) of the basin, and a large area located between the

northern boundary of the Mau and the southern boundary of the Tinderet forests, may now be particularly vulnerable to erosion following significant rainfall events (e.g. El Niño).

Fig 4.2. Estimated 100-year sedimentation rates in the Nyando River Basin



(Walsh, World Agroforestry Center)

Using Cesium-137 measurements, a preliminary sediment budget (Table 4B. 1) indicates that sediment source areas currently occupy >60% of the basin, and that rates of soil loss in source areas have not been offset by rates of sediment accretion in sink areas of the basin. This has lead to an export of high sediment loads (e.g. 3.2 x 10^6 Mg yr^{-1} of sediment to the Nyando River), and has severely compromised water quality in the four main rivers (Nyando, Sondu-Miriu, Yala and Nzoia) in the project area.

Table 4B.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

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 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 $600,000 per year. The fishing industry, which employs 500,000 people in the riparian countries, has also been severely affected. In addition, erosion and sedimentation have induced flooding (which now occurs annually in the Nyando basin) resulting in increased water related diseases.

Biodiversity Loss: Existing rural activities and poor land management practices have also affected biodiversity in two ways: (i) by fueling the demand for more agricultural land and therefore altering natural habitats; and (ii) by altering soil 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. (See Annex 11)

Evidence from areas most affected by erosion and sedimentation show soils 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 of species and increase aboveground and belowground biodiversity.

3.2 Movement Toward a Sustainable Baseline

The Government of Kenya has recognized the rapid decline in the natural environment and stagnation in agricultural production of Western Kenya as key development priorities. As a result of this recognition, a number of jointly funded soil fertility and land rehabilitation initiatives are being implemented by Government, international donors, NGOs and community based organizations.

While these projects represent a move towards sustainability, full fledged ecosystem sustainability remains elusive. Many of the initiatives focus primarily on improving agricultural production at the farm level with little focus on broader ecosystem management. In addition, these projects leave many areas un-addressed since certain types of ecosystem degradation take place on land that is not farmed (e.g. abandoned land, roadsides, river banks) and result from agricultural production systems that inadequately account for negative environmental externalities.

<u>Capacity Building for Community Driven Integrated Ecosystem Management:</u>
GEF funding will build on similar activities in Western Kenya focused on increasing local capacity to disseminate improved technologies and extension messages. GEF funding will be unique in that it will be the only project to focus on an integrated ecosystem management approach.

The National Agricultural and Livestock Extension Program II, which will be funded jointly by SIDA and GoK, will be implemented in 43 districts in the country, 8 of which are located in western Kenya. Total financing for the project is USD19.9 million (SIDA estimated to contribute USD 5 million) with relevant co-financing equaling USD1.3 million (USD1.0 million GoK, USD 0.3 million). The relevant objectives of this project are to: (i) increase local participation in research and extension ; (ii) empower local communities; and (iii) introduce environmentally sustainable land management practices.

The Lake Victoria Land Management Project includes land management interventions in the project area with relevant co-financing from SIDA. This project aims to provide extension workers, policy makers and researchers with information, methods, technologies and approaches for improving land productivity while enhancing local and regional environments in the Lake Victoria basin. More specifically, the project aims to: identify and evaluate land management 'hot spots' in the basin; evaluate technologies, institutional arrangements and policies for alleviating poverty while protecting the regional environment; quantify the impacts of promising management interventions on human welfare and the environment;

enhance the links between research and extension services working on improved land management in the basin.

Scaling up and Financing IEM Interventions:
GEF funding will build on USD 0.5 million government financing currently being used for localized interventions for community based land management activities. Specific relevant activities include small-scale local investments in improved soil management.

Monitoring and Evaluation for Project Impact:
GEF funding will build on GoK co-financing of USD 0.25 million which will be committed as in-kind contributions based on government extension and staff costs related to monitoring land management in the project area. Additional baseline funding results from a trust fund grant in the amount of USD 0.4 million for developing local and national capacity for the design and monitoring of carbon finance activities.

4. The Proposed Alternative

Current interventions centered on erosion control and improved soil fertility could slow the pace of degradation, but, given the scope and scale of the problem, further interventions will be needed to reach ecosystem sustainability. Baseline data obtained as part of the project preparation implies a sustained, large-scale rehabilitative effort would be required to reduce non-point source pollution loads and restore primary production capacity of critical river basins. Self-reinforcing interactions between soil erosion, fertility depletion, loss of infiltration capacity and woody vegetation cover decline preclude the possibility of spontaneous recovery of this area. While restoration of the Basin to its historical state would be impossible or costly in many cases, targeted measures are needed to protect these areas from further deterioration.

The GEF alternative seeks to achieve greater ecosystem sustainability by scaling up current land rehabilitation interventions and broadening them to include integrated ecosystem management practices. By focusing on an integrated ecosystem management approach, the proposed GEF alternative addresses not only agricultural production, but also the larger ecosystem in which operates. The IEM approach will focus on increasing agricultural productivity as well as capturing benefits in terms of biodiversity, reduced GHG emissions and improved international water quality. Through setting such integrated targets, this project captures the additional off farm benefits generated by agroforestry and soil fertility activities, namely, the mitigation of GHG accumulation in the atmosphere, increased on-farm biodiversity, and reduced sedimentation and nutrient loads in watercourses. By increasing the sustainability of current agricultural lands, the project also reduces the need for encroachment into protected areas, thereby conserving off-farm biodiversity.

Other interventions may have a marginal impact in the above areas but without an explicit focus on environmental service functions, the impact is likely to be limited. Thus, the incremental value provided by the GEF alternative includes: (i) those environmental benefits generated by the project's focus on integrated ecosystem management (including improved ecosystem health and the maintenance of ecosystem functions); and (ii) the increased capacity for communities and districts to participate in the design and implementation of integrated ecosystem management processes. The GEF alternative also contributes to the sustainability of agricultural production and thereby furthers poverty reduction goals.

Additionally, one possible outcome of the project is the creation of certified carbon emission units, which could, in future, create a source of funds for communities engaged in agroforestry activities and, in turn, increase the sustainability of such activities. The GEF alternative will help break constraints in knowledge and coordination that prevent development of carbon financing options.

5. Scope of Analysis

The incremental cost analysis includes the significant changes caused by the decision to undertake the alternative strategy instead of the sustainable baseline scenario. Two scenarios are costed: (i) the sustainable baseline scenario with localized interventions in agroforestry and improved land management; and (ii) the GEF alternative. Costs for the sustainable baseline are based on current land rehabilitation and soil fertility activities described in sections above. Incremental expenditures associated with the GEF alternative are based on inclusion of activities that provide environmental services to local, national, and global communities in the areas of biodiversity, climate change, international waters and land quality.

6. Costs and Incremental Cost Matrix

Component 1: Capacity Building for Community Integrated Ecosystem Management. (Total cost US$ 4,700,000, GEF financing US$ 900,000)

GEF funds will finance the costs associated with activities relating to integrated ecosystem planning by communities and localities. Incremental financing is necessary for community awareness raising activities, technical assistance, training, and preparation of Participatory Action Plans (PAPs). GEF funds will be used for institutional capacity building, primarily training and equipment, to incorporate environmental service functions into land planning and management activities. This will also include developing institutional capacity to explore carbon finance opportunities.

Component 2: Scaling up and Financing IEM Interventions (Total cost US$ 1,750,000; GEF financing US$ 1,250,000)

GEF will fund activities to scale up agroforestry, control erosion into watercourses draining into international waterways, develop biodiversity resources, and sequester carbon so as to reinforce global environmental benefits and address land degradation on an integrated ecosystem scale. These activities will expand both the scale and scope of existing activities, and represent incremental costs above the baseline. GEF funds will also be used to finance technical assistance, procurement of necessary inputs and supplies, and investments identified through PAPs for those activities that exceed sustainable baseline activities (farm level soil fertility and land management interventions).

Component 3: Monitoring and Evaluation for Project Impact (Total cost US$ 1,650,000; GEF financing US$ 1,000,000)

GEF funds will finance the costs of monitoring and evaluation of biophysical impact from project activities, particularly the impact on net carbon absorption, which is currently not being measured in western Kenya. GEF financing will include monitoring of greenhouse gasses, biodiversity, wetlands, erosion and nutrient loss, and pests and diseases. GEF funds will also finance the incremental costs generated by monitoring socio-economic impacts associated with the GEF alternative.

Project Administration (Total cost US$ 1,250,000; GEF financing US$ 750,000)

GEF funds will be used to finance the operating costs associated with the GEF alternative, specifically those associated with community level ecosystem planning, implementing of ecosystem management plans, and monitoring of environmental benefits.

Incremental Cost Matrix

	Sustainable Baseline (SB) (to address land degradation issues)	**Alternative (A) (to adapt & modify baseline activities to include a integrated ecosystem management approach)**	**Increment (A-SB)**
Global Biodiversity Benefits	• Increased agro-biodiversity due to localized adoption of agroforestry activities	• Greater protection of natural habitats • Increased agro-biodiversity and use of indigenous species in agroforestry and soil fertility improvement	• Improved natural habitats • Improved agro-biodiversity and increase in density of indigenous species
Global Climate Change Benefits	• Unmeasured carbon sequestration benefits from increased biomass and vegetative cover	• Development of carbon monitoring system • Increased above and below ground carbon sequestration	• Greater carbon sequestration • Monitoring of carbon sequestration rates
Global International Waterway Benefits	• Erosion control benefits from localized improvements in erosion runoff and soil fertility improvements	• Greatly increased erosion control through interventions targeted at key watersheds	• Reductions in sediment and nutrient loads in watercourses draining into Lake Victoria
Domestic Benefits	• Economic benefits due to increased agricultural productivity	• Increased economic and environmental benefits from functions and services provided by improved ecosystem	• Improved rehabilitation of natural systems and greater sustainability of agricultural production
Activities/Costs by Component:	**(US$)**	**(US$)**	**(US$)**
1. Capacity Building for Integrated Ecosystem Management	**3,800,000** • Institutional costs (government extension and research staff) associated with community based land management • Project to empower local communities in the allocation of research and extension resources with a focus on ensuring environmental sustainability. • Project to fund small-scale and localized land management investments.	**4,700,000** • Institutional costs (training, staff costs, services) of integrated ecosystem management approach to community and river basin planning. • Scaling up of local empowerment and expansion of decision making control over resources. • Scaling-up and refinement of land management investments.	**900,000** • Community PRA activities • Identifying IEM interventions and plans for 3 river basins • Building KARI and other institution's capacity to measure environmental service functions (equipment, training, etc.)
2. Scaling Up and	**500,000**	**1,750,000**	**1,250,000**

	Sustainable Baseline (SB) (to address land degradation issues)	**Alternative (A) (to adapt & modify baseline activities to include a integrated ecosystem management approach)**	**Increment (A-SB)**
Financing IEM Interventions	• Provision of inputs for localized interventions in community based land management	• On farm, community, and intra-community interventions focused on ecosystem management and environmental services	• Inputs (seedlings, small scale infrastructure, tools, etc.) associated with community PAPs and intra-community ecosystem management activities
3. Establishing a Monitoring and Evaluation System	**650,000** • Government extension and staff costs associated with monitoring localized interventions in land management. • Project to develop the capacity to design and assess the feasibility of carbon finance projects.	**1,400,000** • Monitoring and evaluating the impact resulting from IEM interventions. • Establishing the capacity for local communities to measure carbon sequestration.	**750,000** • Monitoring of biodiversity, GHG accumulation, and socio-economic changes resulting from project activities
Project Administration	**500,000** • Operating costs associated with government research and extension services	**1,500,000** • Operating costs associated with IEM approach	**1,000,000** • Operating costs associated with IEM plans, community PRA, monitoring and evaluation and IEM services delivered by project partners
Total	**5,450,000**	**9,950,000**	**4,500,000**

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Annex 3: STAP Technical Review and IA Response

KENYA: Western Kenya Integrated Ecosystem Management.

Yokohama, 3 January 2004

Hiroshi Kadomura
Emeritus Professor, Tokyo Metropolitan University
Special Advisor, Open Research Center,
Graduate School of Geo-Environmental Science, Rissho University

Email address: hkd@n04.itscom.net
Postal address: 1-39 Sumiregaoka, Tsuzuki-ku, Yokohama 224-0013, Japan

Introduction

This is a STAP review report on Western Kenya Integrated Ecosystem Management Project (WKIEMP). Background information and knowledge for this review are based on: reviewers own experience of geomorphological and geo-ecological field work in Western Kenya and other parts of tropical Africa, including patterns and processes of land degradation/desertification; consultative work on desertification control and rural development programs conducted by the Japanese governmental organizations and NGOs; and a member of the International Panel of Expert on Desertification (IPED/INCD). Most of directly relevant material and information closely related with the proposed project came from the web pages published by: World Bank, FAO, UNDP, UNEP, Government of Kenya, particularly KARI, KEFRI, KWC, and KMD, WAC/ICRAF, USAID-Kenya, SIDA-Kenya, GTZ-Kenya, JICA-Kenya, CARE-Kenya, KWDP, KEEP, ReliefWeb, The Daily Nation, and East African Standard. Among others, the web pages of Improved Land Management in the Lake Victoria Basin (SIDA-ICRAF/MoARD); Lake Victoria Environment Management Project (LVEMP) (IAD/GEF); and National Agricultural and Livestock Extension Project (NALEP) (GoK/SIDA) were particularly useful. However, the views expressed here are my own and any errors that remain are also my own.

2. Background to and Objectives of the Project

The background and the objectives of the project to be reviewed are described in The Terms of Reference (TOR) for a SATP Review as follows:

Background

Western Kenya supports one of the densest and poorest populations in the world, with up to 1200 persons/sq. km in some rural areas, and over 58 percent of households living in absolute poverty. Conversion of woodlands, forests, and wetlands into agricultural production has accelerated in recent years with significant negative impact on the natural resource base.

Poverty reduction, land degradation, and sustainable agriculture are intricately linked in Western Kenya. Experiences from Central Kenya, where there is evidence of high productivity, high profits, and good land management, also are supportive of this relationship.

Objectives of the Project

The proposed project would be implemented in Western Kenya and seeks to improve the productivity and sustainability of farming systems through a set of interventions designed to promote adoption of improved land management techniques and value added production in selected watersheds in the Nyando, Yala, and Nzoia River Basins of Western Kenya.

In order to achieve this, the project will:

(1) rehabilitate degraded lands through interventions focused on improving soil fertility, agroforestry, and introduction of value-added cropping systems; and
(2) improve the capacity of local communities and institutions, farmer associations, and national institutions to identify, formulate, and implement sustainable land management activities capturing local and global environmental benefits.

The global environmental objective of the project is to promote integrated ecosystem management so as to combat land degradation, capture the benefits of reduced greenhouse gas (GHG) accumulation in the atmosphere, improved on and off farm biodiversity, and decreased erosion in watersheds that feed into the Nyando, Yala and Nzoia River Basins.

Project Implementation and Expected Results

The project objectives would be achieved through a community driven development process whereby communities would decide on resources for infrastructure investments, technical assistance, and implementation of ecosystem management activities. The project is expected to demonstrate the value of such approach and will help leverage Government, IDA or other resources for scaling up project successes in the future.

3. Required Analysis and Specific Assignment

The TOR requires the reviewer to conduct following analysis and review:

Analysis

The consultant should expound on global and regional experience to date, on current best practices, and that evaluate the risks, constraints and benefits of the approach adopted in the project. The consultant should also point out the weaknesses of the project proposal, the difficulties that are likely to be encountered in the implementation of the project, and provide constructive operational suggestions and alternative approaches that could strengthen the project. The analysis would include impact of the project on biodiversity, climatic changes, and international waters. The recommendations of the analysis will be incorporated into the proposed project.

Specific Assignment

The consultant will:

(a) Review the scientific and technical soundness of the project including the degree of involvement of stakeholders. More specifically, will the approach taken in the project proposal achieve the objectives of conserving biodiversity? What are the risks and constraint associated with the approach? Is there any gap in the project? Are there any controversial aspects about the project? Have all the threats to the ecosystem been adequately considered? Does the type of interventions proposed require further research? Are there legal instruments aspects that should be dealt with? How will the model of sustainable use outlined in the project be developed? How effective will

the proposed model be? Is there sufficient evidence in the document that the project offers the best long-term solutions?

(b) Identify the global environmental benefits that will result from the interventions. Does the area of intervention have a global importance in terms of ecosystem?
(c) Review how the project fit within the context of the goals of GEF;
(d) Review the importance of the area of intervention from a conservation perspective in the project area.
(e) Review the scope for replication of the project. Could the intervention be replicated elsewhere on the basis of experience and learning?
(f) Review the potential for continuation of the changes the project aims to achieve. How will the project activities and impact be sustained after the completion of the project?
(g) Review if the project design is consistent with the operational strategies of other focal areas and avoid negative impacts in focal areas outside the focus of the project.
(h) Review if the linkage to other programs and action plans is sufficiently addressed.
(i) Review other beneficial or damaging environmental effects of the project intervention.
(j) Does the project contain adequate mechanisms for participation and influencing the management of the project?
(k) Review if adequate attention been paid to capacity building aspects?
(l) Review the innovativeness of the project.

4. General Comments and Suggestions on the Project Design

General comments, with suggestions for the improvement of the project design, which have been derived from glancing through the Project Appraisal Document, are summarized as follows:

1) The objectives of the project are clear. Methodological frameworks and techniques to be applied, and implementation processes planned sound appropriate for realizing the objectives. The expected results of interventions will contribute not only to the better soil and water resources management at local level with enhanced capacity building of local populations, but also to the global environmental issues closely related with the four Focal Areas of GEF; Land Degradation, International Waters, Biological Diversity, and Climate Change. All these suggest that the proposed project deserve to be funded by GEF.

2) However, the present form of the project design still includes a number of inadequacies, weaknesses, difficulties, insufficiency, gaps, and other shortcomings at various degrees, as exemplified below:

3) The title of the project "Integrated Ecosystem Management" is too broad in its meaning and seems to be unsuitable, since the interventions in the present project will focus on the land management related with agricultural activities, and will not cover natural ecosystems such as forests, wetlands, protected areas, and game reserves. In view of this, the most suitable alternative title may be "Integrated Agroecosystem Management."

4) If the title "Integrated Ecosystem Management" remains unchanged, the interventions should be extended beyond the cropping lands and even to the above excluded areas. Extensive affrorestation and reforestation activities in the fringes of Mont Elgon, Kakamega, North Nandi, South Nandi, Northern Tinderete, Tinderete, Londiani, and other forests, and degraded lands will be most preferable and realistic. The creation of riparian green corridor networks along river courses, and wise management of wetland ecosystems both in the upper and lower reaches of rivers are the major options which will afford room for consideration. These interventions will contribute greatly to the basin-level ecosystem management by increasing the biodiversity and the capacity of carbon sink than the projected interventions alone.

5) If these interventions will be out of the scope of the present project, it is necessary to address the necessity of these activities and linkages and/ or complementary actions with programs and projects dealing with these aspects.

6) It should be noted that the most serious weakness of the proposed project may be the lack of the visible grand design foreseeing the project goals for the whole target basins. Concrete procedures and timetables for intervention processes need to be prepared in connection with the below-mentioned comments 8).

7) The spatial coverage of the target basins seems to be still too large to be covered with the limited number of Focal Areas and to realize the projected programs within five years with limited resources.

8) No concrete procedures, how to extend the methodologies and techniques for erosion control and soil fertility management acquired through the forerunning programmes in the Nyando River Basin to the Nzoia and Yala River basins, are given. The applicability of the "Nyando model" in erosion control and soil management to other basins with different physical, social, and cultural aspects should be carefully tested during the early appraisal stage.

9) No detailed proposals are found for the two most important elements of the project, i.e., agroforestry and value-added cropping systems. For the clarification of these systems, for instance, possible new, alternative tree species (including new variety fruit trees) and cropping systems (types, methods, grafting technologies, etc.), and their effectiveness to increasing the income as well as to local and global environmental services need to be illustrated explicitly, on the basis of ample background data accumulated in the WAC and KARI.

10) The word "on and off farm biodiversity" used elsewhere in the text is vague and needs annotation what it means in terms of biodiversity conservation for both plants and animals including soil organisms. "Agrobiodiversity" also needs clarification, with its assessment methods and indicators.

11) For biodiversity in the farming systems, issues related to alien species, particularly invasive alien species should be addressed.

12) For the contribution of agroforestry and improved land management to the reduction of emission of GHGs and carbon balance, particularly the issues regarding the creation of certificated carbon emission units and the development of carbon credit option, thoughtful examination should be given to these matters, in relation to the progress made in the realization of actions based on the Kyoto Protocol /UNFCCC. For details of most recent information, consult the UNFCC-COP9 document "FCCC/SBSTA/2003L.27 Draft decision - /CMP.1 Modalities and Procedures for afforestation and reforestation project activities under the clean development mechanism in the first commitment period of Kyoto Protocol."

5. Comments and Suggestions on Specific Assignments

(a) Review the scientific and technical soundness of the project including the degree of involvement of stakeholders. More specifically, will the approach taken in the project proposal achieve the objectives of conserving biodiversity? What are the risks and constraint associated with the approach? Is there any gap in the project? Are there any controversial aspects about the project? Have all the threats to the ecosystem been adequately considered? Does the type of interventions proposed require further research? Are there legal instruments aspects that should be dealt with? How will the model of sustainable use outlined in the project be developed? How effective will the proposed model be? Is there sufficient evidence in the document that the project offers the best long-term solutions?

Comments and Suggestions:

Scientific and technical soundness: Generally good. Suggestions for the enhancement of the scientific and technical bases are scattered in this and other sections of the report.

Involvement of stakeholders: Fairly well considered.

Biodiversity conservation: Well addressed. However, the effectiveness of the project intervention may not be overestimated. Exclusion of the conservation of forests, wetlands, and other important ecosystems from the project intervention is problematic (cf. 4. 2-5).

Risks and constraints: One of the most critical risks, that may hinder the successful achievement of the interventions, will derive from the vastness and complexity of the targeted basins, and time constraints (cf. 4. 6-8). Cautious attention should be paid to avoid the risks of repeating unsatisfactory performance of the LVEMP.

Gap: Logical linkages among the project components need to be strengthened.

Controversial aspects: 1) The word used in the title "Ecosystem" (cf. 4. 3); 2) Exclusion of forests, wetlands and other natural bio-ecosystems (cf. 4. 4-5; 6. 6); and 3) Methodologies for setting net Focal Areas and related plots (cf. 6. 7-9).

Threats to ecosystem: Besides the threats to Lake Victoria, those to forests and their animals by cropping land encroachment, woodfuel collection, and other activities within the river catchments are not well considered. Threats to the wetlands, river bed, and riparian ecosystems are almost neglected.

Further research: Needed particularly on the methodologies and procedures for the selection of net Focal Areas and related plots (cf. 6. 7-9); feasible methodologies and procedures for extending the "Nyando model" to the Nzoia and Yala River Basins (cf. 4. 6-8); and the issues related to the carbon credit option (cf. 4. 12)

Legal instruments aspects: Not well addressed. Thoughtful investigation into issues related to the land ownership and other legal aspects in land and water management is strongly recommended.

Sustainability of the model: At the farm-level interventions, the model can only be maintained through the application of low-cost, easily-mastered techniques, or improvement of appropriate indigenous technologies that are used for daily life. On the other hand, the operation of monitoring and assessment systems requiring high cost and skills can only be achieved by the routing commitments of the governmental institutions with the donor support.

Effectiveness of proposed model: Each component (sub-model) of the project such as soil and water management, agroforestry with improved fallow systems, and value-added cropping systems may be effectively implemented to meat the respective objectives. The effectiveness of proposed model as a whole may depend on better coordination and integration among the components.

Sufficient evidence for the best long-term solutions: Not enough. Mention should be made of how the objectives of the project will be achieved through time and in the three different River basins and within a basin, by exemplifying expected evidential effects.

(b) Identify the global environmental benefits that will result from the interventions. Does the area of intervention have a global importance in terms of ecosystem?

Comments and Suggestions:

Among the three GEF focal areas of global importance, the contribution to International Waters may be accomplished by reducing sediment influx to Lake Victoria, hence to the Nile. In contrast, the benefits to the other two areas, Biodiversity and Climate Change are difficult to estimate and may not be overestimated. For these two areas, there is much room for further investigation and improvement.

(c) Review how the project fit within the context of the goals of GEF;

Comments and Suggestions:

The project, while focusing on Land Degradation issue, inclusively addresses the possible contribution to International Waters, Biodiversity, and Climate Change. If weaknesses involved in the last two areas (cf. 3) will be allowed, the project fits well the context of the GEF goals.

(d) Review the importance of the area of intervention from a conservation perspective in the project area.

Comments and Suggestions:
It is rational to give a high priority to the hotspots of land degradation and soil fertility loss in setting the Focal Areas to be intervened. On the other hand, however, the Focal Areas are planned to be selected at randomly from the three altitudinal zones. Since this approach is rigid and rough, an alternative, flexible approach need to be considered as suggested in 6. 7-9).

(e) Review the scope for replication of the project. Could the intervention be replicated elsewhere on the basis of experience and learning?

Comments and Suggestions
Yes, it could be particularly replicable to the tropical humid to sub-humid, densely populated and intensively cultivated areas, which are characterized by high soil erosion risk due to the combined effect of high rainfall erosivity and highly erodible soil conditions. In replicating to the rain forest areas where slush and burn cropping systems prevail, some modifications may be necessary according to cropping systems, physical and socioeconomic conditions.

(f) Review the potential for continuation of the changes the project aims to achieve. How will the project activities and impact be sustained after the completion of the project?

Comments and Suggestions
Cost-effective on-farm activities may be sustained by the empowered farmers, extension workers and other stakeholders, as long as farmers' economic incentives and government's political will maintained. Such items needing costly investment and high-technologies as monitoring and assessment of soil erosion, sediment transport, carbon balance, etc. may not be maintained without continued financial assistance. For this problem, mention should be made of possible permanent and practical observation systems after the completion of the project.

(g) Review if the project design is consistent with the operational strategies of other focal areas and avoid negative impacts in focal areas outside the focus of the project.

Comments and Suggestions
It is not clear what the question, particularly "other focal areas" means.

(h) Review if the linkage to other programs and action plans is sufficiently addressed.

Comments and Suggestions
Not sufficiently addressed. Past (at least during the past 10 years) success stories, influential programs and action plans in the related fields, including small-scale ones, should be listed and lessons learnt be summarized.

(i) Review other beneficial or damaging environmental effects of the project intervention.

Comments and Suggestions

Downstream effects of soil and water management and soil fertility improvement activities need to be critically checked. Environmental effects of use or introduction of exotic plant species in erosion control, agroforestry, and cropping systems also need careful investigation (cf. 4. 11).

(j) Does the project contain adequate mechanisms for participation and influencing the management of the project?

Comments and Suggestions
The action plan for this matter stated in "Sub-component 2.1: Strengthen Local Development and NRM Planning" and elsewhere will meet the question.

(k) Review if adequate attention been paid to capacity building aspects?

Comments and Suggestions
The action plan for this matter stated in "Sub-component 2.1: Strengthen Local Development and NRM Planning", "sub-component 2.2: Enhanced Capacity for Developing Carbon Finance Proposals", and in "E. Summary of Project Analysis: 3. Technical" will meet the question. Of biophysical measurement for carbon financing, concerned target groups or implementers need to be clarified.

(l) Review the innovativeness of the project.

Comments and Suggestions
The project has several innovative aspects, including: 1) Intending to fulfill local and global environmental benefits at the same time, through the local achievement of integrated land management activities with a view to increased income generation and capacity building at farmer's level; 2) For the global benefits of the project, the contribution to the four GEF Focal Areas (Land Degradation, International Waters, Biodiversity, and Climate Change) is explicitly addressed; 3) Adopting a river basin-oriented approach with hierarchically arranged net focal areas to be intervened; 4) Adopting a set of new techniques for monitoring and assessing soil erosion and sediment transport; and 5) Seeking the ways to increase the rate of on-farm carbon sink/stock for the global benefits and to be involved in the processes of the carbon credit options of the Kyoto Protocol/UNFCC, for creating of found for ensuring sustained commitment even after the end of the project. However, most of these still need further study and on-farm verification.

6. Additional Comments and Suggestions

Following additional comments and suggestions have been prepared for further improvement of the project design, and for the effective implementation of the project.

1) The project will be implemented under unavoidable effects of changing climate and globalization. For climate impacts, the targeted river basins of Western Kenya have frequently been attacked by adverse climate events, particularly extremely heavy rains, floods, and severe drought, such as the 1997/98 El Nino-related heavy rains resulting in unusual floods, drastic soil erosion, and rapid sediment transport, and the 1999/2000 La Nina-related drought. Mention should be made of the latest floods occurred in the three targeted basins during late April-September 2003, with the worse results of persistent inundation in the lowermost reaches of the Nzoia River. Although the main cause of the food events was heavy rainfall in the headwaters, particularly in the Cherangany Hills and on the Mt. Elgon slopes, deforestation and land degradation, which might have changed hydrological regime and accelerated downstream river bed sedimentation, have been blamed for an important factor contributing to the extension of flood damage. In view of this, it is advisable that the project design will include response strategies to cope with these adverse climate impacts, within the framework of

soil and water conservation component. Close linkages with flood hazard assessment and drought monitoring information systems operated by the GIEWS/FAO, FEWS NET/USAID (particularly the Pilot Flood Risk Monitoring Project for the Nzoia River), and RANET-Kenya should be considered.

2) Thoughtful attention should be paid to the diversity in the physical conditions in the target region, in terms of landforms, geology, soils, and vegetation, by river basins and within a basin, in selecting Focal Areas and related sites to be intervened.

3) Careful attention should also be paid to the diversity and complexity in socioeconomic aspects, in particular socio-cultural aspects derived from ethnicity and tradition by rivers basin and within a basin, in selecting Focal Areas and related sites to be intervened. For the ethno-sociological aspects, a good summary can be found in "Improved Land Management in the Lake Victoria Basin: Annual Technical Report July 2000-June 2001, Working Paper 2001-4/ICRAF" and "Design Principles for Land and Watershed Management in Western Kenya, Discussion Paper 2001/ICRAF". (These documents also include various relevant suggestions used for the improvement of the project design).

4) Strengthen the linkages with the ongoing and planned related projects and programs on natural resources management and agricultural development.

5) Reinforce the quantifiable baseline data, both physical conditions and human dimensions. Quantify key performance indicators as much as possible both for the baselines and the goals/targets of the achievements. For the Yala and Nzoia River Basins, even the baseline data are almost completely lacking.

6) Although the tracts of protected areas, wetlands, large-scale commercial agricultural areas, urban areas, etc. will be excluded from the net project area (p. 66), the roles played by these tracts in the basin hydrological cycle and controlling of and affecting on sediment yield and transport should not be ignored. Water collecting stations should be selected systematically so as to enable to estimate the contribution to sediment budget not only from targeted areas, but also non-targeted areas including these tracts. Intimate linkages with other programs and projects which cover the excluded areas within the targeted basins are strongly advisable.

7) The framework of hierarchical arrangement of the net target areas, FAs-Clusters-(Control Plots)-Stocking Plots may be innovative, but appears to be highly rigid and mechanical. Selection of locations and numbers of areas and plots to be intervened and monitored should be flexible according to the size, complexity in physical conditions, land use types, and other socioeconomic conditions, including ethnic and cultural aspects. Seriousness of ecological degradation with both in- and off-site effects should be properly used for an important criterion defining priority areas.

8) Macro physical setting and land surface division according to the elevation zones, i.e., Lowland, Midland, and Highland, although this zonation is correlated with some baseline indicators (p. 66), is too rough to depict the spatial variation of ecosystems. This altitudinal zonation primary corresponds with temperature regime and dose not necessary relate with other physical factors such as rainfall, soil and its fertility, vegetation, etc.

9) In view of this, more sophisticated and detailed approach need to be adopted for setting the Focal Areas and for subsequent monitoring and assessment. A suggested alternative approach is the geomorphology-based land system mapping technique that will produce meso-scale land system units delineated by the combination of landforms, geology, and soil types. These land units may be described as Mt. Elgon Volcano, Cherangany Hills, Hasin Gishu Plateau, Nandi Highlands, Nandi Escarpment, Kitale Plateau, Kakamega Plateau, Maragoli Hills, Nzoia Bottomlands, Nzoia-Yala

Deltaic and Marshy Plain, Tinderet Mountain, Nyando Escarpment, Kano Plains, etc. and will give more realistic images. A synoptic map covering whole region can be compiled easily based on existing material, the Explanatory Soil Map of Kenya (1:1,000,000) by rearranging its legend, with the help of satellite data.

10) For the Nzoia and Yala River Basins, erosion risk maps, which is based on the same techniques and procedures as applied in producing the map for the Nyando River Basin, are need to be prepared. "Hotspots" of land degradation and other related issues should be demarcated on the maps. Compilation of soil, vegetation, and carbon use maps for the Nzoia and Yala River Basins is also indispensable.

11) In addition to the above basin-scale maps, prepare an eco-climatic (or agro-climatic) zone map covering the whole target basins. Mapping of the spatial distribution of rainfall erosivity and its probability is also desirable.

12) As a general rule in the humid and sub-humid tropics in equatorial Africa, in the Western Kenya Highlands and Plateaus, underlying rocks have been deeply weathered and have provided thick erodible material. Therefore, in assessing soil erosion vulnerability, in addition to the nature and erodibility of topsoil, those of weathering profile of underlying rocks should be considered.

7. Concluding Remarks

The present form of Project Design needs heavy revision, in full consideration of the comments and suggestions elaborated in this review report. The present document is complicated in the arrangement of contents, and includes much duplications, lengthy and repetitious descriptions. More readable text written with concise and luminous languages is preferable for achieving rapid, effective consultation, and also for the effective implementation of the project.

Appendix 1: Western Kenya Integrated Ecosystem Management Project Response to STAP Review

Reviewer comments	Response
The title of the project, integrated ecosystem management, is an unsuitable description of the project's activities, which are focused solely on the agro-ecosystem.	The project has included a greater focus on non-agro-ecosystem areas including critical habitats and other non-farm intervention sites.
Should the project choose to focus on agro-ecosystems only, the project should discuss the necessity of broader ecosystem interventions and the linkages or complementarities between the project and other programs and projects addressing such issues.	The project document has been revised to reflect a greater focus on the larger ecosystem. The project will be implemented within a framework of government and non-governmental cooperation and will involve a range of stakeholders. The project will draw on local government and non-government fora for both planning and implementation of project activities. The project should, therefore, be linked to ongoing or future activities dealing with other aspects of the ecosystem (forests, wetlands). The project document has been updated to further describe this process and the and the need for more linkages with other aspects of ecosystem conservation and management, see p. 15 and 21.
The spatial coverage of the target basins seems to be too large to be covered with the limited number of Focal Areas and to realize the projected programs within five years with limited resources.	The spatial coverage of the project is suitable to test a variety of approaches in different agro-ecological zones. The project was never intended to cover the entire target basins and as such, the project team believes that the learning opportunity provided by three basins is likely to outweigh the benefits from increased coverage on just one river basin.
No concrete procedures, how to extend the methodologies and techniques for erosion control and soil fertility management acquired through the forerunning programs in the Nyando River Basin to the Nzoia and Yala River basins, are given. The applicability of the "Nyando model" in erosion control and soil management to other basins with different physical, social, and cultural aspects should be carefully tested during the early appraisal stage.	As suggested, the project will draw on the experience of other programs in the different basins during planning and implementation. The project document relies heavily on Nyando data because baselines were completed prior to project preparation for the Nyando basin only. It is expected that Yala and Nzoia baselines will be provide guidance for project activities in their respective basins. The project will be implemented in stages starting with the Nyando Basin followed by the Yala and the Nzoia basins in the next two years. In addition, the project utilizes a community driven development approach to address the physical, social and cultural differences in the project area. The project document has been updated to emphasize this aspect of the project, see page 20.
No detailed proposals are found for the two most important elements of the project, i.e., agroforestry	As suggested, data and clarification on agroforestry and value added cropping systems will be added to

and value-added cropping systems. For the clarification of these systems, for instance, possible new, alternative tree species (including new variety fruit trees) and cropping systems (types, methods, grafting technologies, etc.), and their effectiveness to increasing the income as well as to local and global environmental services need to be illustrated explicitly, on the basis of ample background data accumulated in the WAC and KARI.	the project implementation manual.
(i) The word "on and off farm biodiversity" used elsewhere in the text is vague and needs annotation what it means in terms of biodiversity conservation for both plants and animals including soil organisms. "Agrobiodiversity" also needs clarification, with its assessment methods and indicators. (ii) For biodiversity in the farming systems, issues related to alien species, particularly invasive alien species should be addressed.	(i) The distinction is made to capture impact of the project, which will have effects on biodiversity off farm in critical habitats and the conservation and increase of biodiversity on farms than in other parts of the ecosystem. The project design has been revised to more precisely define biodiversity and the mechanisms for the project to support conservation or mitigation strategies, see page 6. (ii) The project intends to promote the use of indigenous species and the introduction of alien invasive species is not envisaged. The project document has been changed to reflect this more explicitly, see page 21.
For the contribution of agroforestry and improved land management to the reduction of emission of GHGs and carbon balance, particularly the issues regarding the creation of certificated carbon emission units and the development of carbon credit option, thoughtful examination should be given to these matters, in relation to the progress made in the realization of actions based on the Kyoto Protocol /UNFCCC, particularly "forest CDM".	The carbon monitoring protocol developed by the World Agroforestry Center for the project builds on existing standards and develops new methods for measuring agroforestry based carbon stocks. Because of the lack of global knowledge about agroforestry based carbon sequestration, the project will engage in "learning by doing" to develop an accurate monitoring system.
Biodiversity and climate change are difficult to estimate and may not be overestimated. For these two areas, there is much room for further investigation and improvement.	The project has developed a more elaborated monitoring and evaluation protocol to estimate environmental benefits using PDF-B funds. The M&E protocol has been reviewed by the Carbon Finance team with in the Bank and was found to be of acceptable quality. One outcome of project activities will be improved capacity to monitor environmental benefits. We will be happy to share the M & E plan.
The approach to choosing focal areas is rigid, an alternative, flexible approach need to be considered as suggested. In particular, thoughtful attention should be paid to the diversity in the physical conditions in the target region, in terms of landforms, geology, soils, and vegetation, by river basins and within a basin as well as the diversity and complexity in socioeconomic aspects.	The focal area design was chosen on the basis of extensive field survey which looked at the diversity in soil conditions, vegetation and socio-economic aspects. The result of the survey is well documented and has been used to underpin the project design.

Success stories, influential programs and action plans in the related fields, including small-scale ones, should be listed and lessons learnt be summarized.	This is a pilot project and in a way the first of its kind. In other words, there are not many projects where one can draw lessons from to enhance the impact of the project. The project document, nonetheless, will reflect further lessons learned at appraisal. See p. 17 for other changes
Downstream effects of soil and water management and soil fertility improvement activities need to be critically checked. Environmental effects of use or introduction of exotic plant species in erosion control, agroforestry, and cropping systems also need careful investigation	The project relies on a participatory approach which involves multiple stakeholders. This should help prevent negative downstream effects as should the technical expertise of project implementing agencies. The M & E plan stipulates for periodic monitoring of project activities and taking midstream actions as required.
Reinforce the quantifiable baseline data, both physical conditions and human dimensions. Quantify key performance indicators as much as possible both for the baselines and the goals/targets of the achievements. For the Yala and Nzoia River Basins, even the baseline data are almost completely lacking.	Quantifiable indicators to determine project outcome will be agreed upon during appraisal. Further, baseline data will be gathered for the remaining two basins during the first year of the project. This is also reflected in the M & E plan developed for the project. Some estimates have been, for more detail see Annex 1 of the project document.
Although the tracts of protected areas, wetlands, large-scale commercial agricultural areas, urban areas, etc. will be excluded from the net project area (p. 66), the roles played by these tracts in the basin hydrological cycle and controlling of and affecting on sediment yield and transport should not be ignored. Intimate linkages with other programs and projects which cover the excluded areas within the targeted basins are strongly advisable.	The project monitoring and evaluation plan will reflect the suggestion that water collecting stations should be established so as to estimate the contribution to sediment budget not only from targeted areas, but also non-targeted areas including these tracts, see annex 9.
As a general rule in the humid and sub-humid tropics in equatorial Africa, in the Western Kenya Highlands and Plateaus, underlying rocks have been deeply weathered and have provided thick erodible material. Therefore, in assessing soil erosion vulnerability, in addition to the nature and erodibility of topsoil, those of weathering profile of underlying rocks should be considered.	This suggestion will be incorporated in the monitoring and evaluation section of the project document as well as the plans for baseline monitoring for the Nzoia and Yala river basins, see page 20.
Thoughtful investigation into issues related to the land ownership and other legal aspects in land and water management is strongly recommended.	The Environmental and Social Management Framework currently being developed will addresses how social and environmental impacts from the project will be managed.

Annex 4: Detailed Project Description

KENYA: Western Kenya Integrated Ecosystem Management.

Selection of Project Interventions Sites

The project will operate within three catchments of the Lake Victoria watershed, namely the Nyando, Yala, and Nzoia basins. Three focal areas per river basin, each representing a different geographic or biophysical aspect of the watershed will be selected. The selected focal areas will be approximately 100 square kilometers and represent 8.5 percent of the Nyando basin, 8.9 percent of Yala basin, and 2.3 percent of Nzoia basin. On average, focal areas will cover 10 communities. The criteria for selection of communities will include the following: (i) the degree of food insecurity and land degradation; (ii) presence of critical mass of technical expertise and community interest; (iii) availability of sufficient baseline data to allow assessment of impact; and (iv) the presence of other activities to which the project can be complimentary. Selection of communities will be performed by stakeholders who are members of the district development committees.

Integrated Ecosystem Management Approach

The project will utilize and integrated ecosystem management (IEM) approach. The overall goal for the project is to improve ecosystem performance in terms of biological productivity, integrity, maintenance and sustainability while at the same time ensuring that these improvements can be adopted by farmers and decision-makers at various levels and they actually result in poverty alleviation and farmers empowerment.

The proposed project would support interventions that specifically address the following constraints that impede the adoption of IEM approaches in Kenya:

- Absence of necessary data and information required by resource managers, planners and decision-makers to mainstream an IEM-based approach into production activities;
- Weak policy framework and enabling environment supporting the adoption of IEM approaches;
- Weak institutions at national, regional, and local levels with weak capacity to adopt and implement policies formulated in support of IEM objectives;
- Insufficient technical assistance and financial resources to reduce the perceived risks faced by resource managers in the decisions leading to the adoption of non-traditional land management strategies in support of IEM objectives;
- Difficulty in integrating activities related to sustainable ecosystem management that transcend local boundaries because of lack of co-ordinated planning across these boundaries.

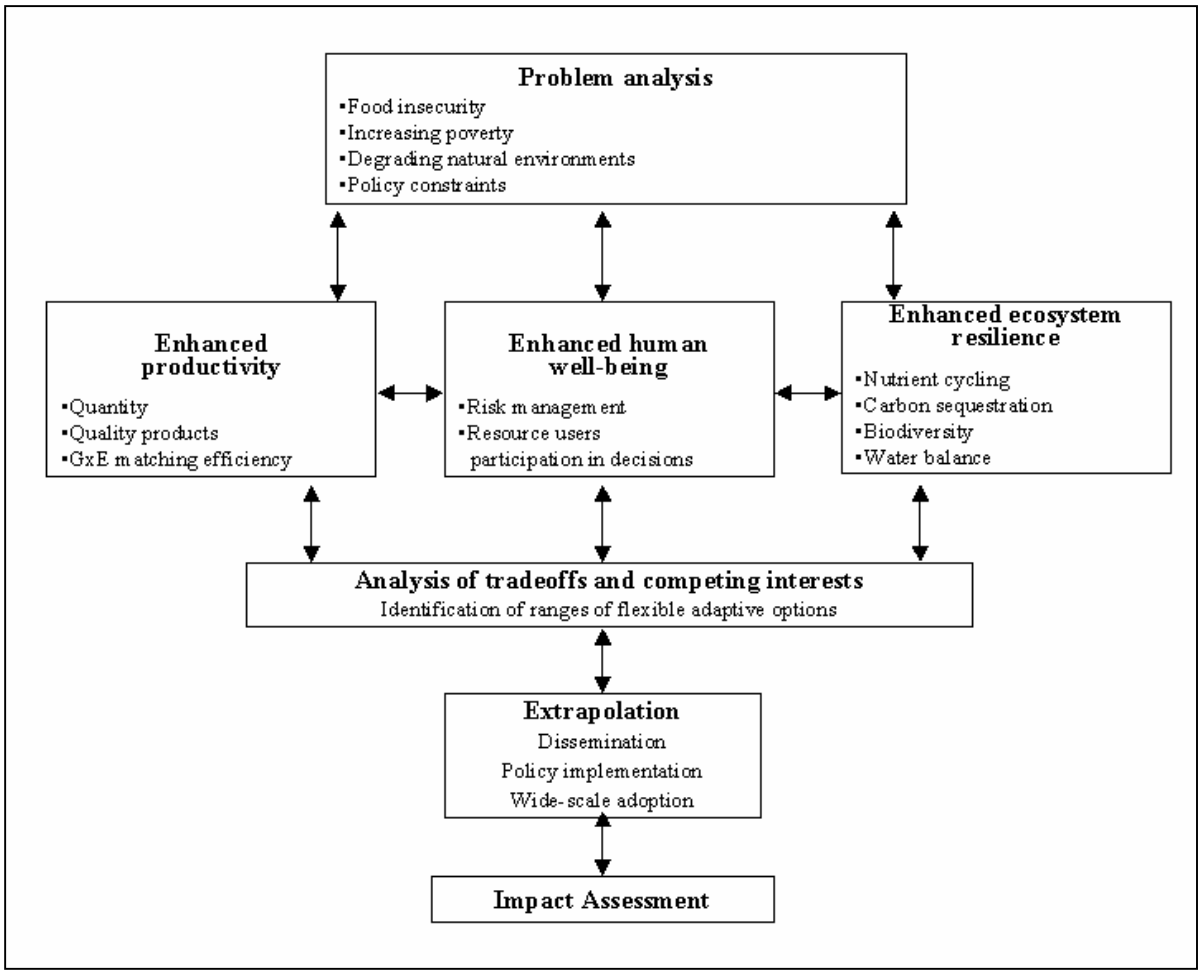


Figure 1 Integrated Natural Resources Management Framework

Project Components

The project will have three main components.

Component 1: Capacity Building for Community Driven Integrated Ecosystem Management

Activities in the first component will focus on two areas of capacity building. The first involve 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. The second area of capacity building aims to enhance the capacity of government and local institutions to develop proposals and establish the financial and administrative process required to enter into carbon sequestration contract arrangements. These applications will utilize a demand-driven approach to mobilize communities and to enable them implement small scale interventions which will progressively improve their livelihoods while conserving natural resources and providing global environmental benefits.

The expected environmental benefits from the first component are: (i) an acknowledgement of key ecosystem management issues within and across communities; (ii) creation of inter and intra-community

land degradation mitigation and biodiversity conservation strategies; and (iii) development of mechanisms for creation and management of carbon assets.

Sub-component 1.1: Strengthening Local Development and IEM Planning

Activities in this sub-component will utilize a community driven approach to identify major constraints to rural poverty mitigation and natural resource conservation, and begin planning small scale interventions with a focus on an ecosystem management. The primary output will be decentralized action plans called Participatory Action Plans (PAPs).

The development of these PAPs is expected to strengthen the integration of stakeholders including smallholders, NGOs, local government, and others, by promoting their participation in decision-making process at the local, district and provincial levels. The project will support farmer associations and community /farmer organizations through institutional learning involving awareness building, training, and community mobilization. Emphasis will be on farmer innovators who are community leaders. Project investments will also support the identification of sites of global environmental importance and the inclusion of these sites in land use planning.

Community mobilization and priority setting: Community priorities will be identified using Participatory Rural Appraisal (PRA) methods based on an ecosystem management approach. Community PRAs will be implemented with technical and institutional backstopping from KARI, World Agroforestry Center, KEFRI, and MoA. PRAs will be inclusive of different community groups, including women and non-farmers. Gender considerations are particularly important, To reflect women's concern, the project will: (i) ensure that women's are represented in the various committees at all levels; (ii) set quota for funds directed at women; and (iii) include gender dimension in all training programs.

Development of work plans. Planning meetings with community members, extension agents, service delivery groups or governing agencies will be held to determine community priorities. Once the priorities are identified, village development committees will develop a detailed work plan for submission and review by location development committees. Development of a work plan will require technical input from service providers and implementing partners.

Integrated ecosystem management interventions will be selected as to their capacity for concurrent productivity improvement and environmental enhancement.

Processing and approval of community proposals. Communities will prepare simple proposals in the format demonstrated to them at the early stage of the project implementation. These proposals are submitted to the development committees at Location level who will appraise the proposals against set criteria. The various proposals will be submitted to the district steering committees and the project coordination office. The district development committee will assess proposals against set criteria including level of community contribution, amount of money requested compared to the number of beneficiaries, gender sensitivity, appropriateness of proposals in terms of environmental, social and economic considerations and availability of service delivery agencies. Funds for the execution of the proposals will be transferred as an advance to communities through the district administration.

Timeline for Initiating and Processing of Proposals

Activity	Time (weeks)
Mobilization	2
Participatory Rural Appraisal	1
Preparation and submission of	2

community proposals	
Screening and approval of proposals	1
Collection of community contribution	2

Contractual arrangements. A contractual agreement for the agreed activities will be in effect between district administration and village development committee (for fund to be directed to the community) or a service provider. Contractual agreements will include the project duration, project component and total indicative budget, a clear statement on what the project can or can not support, how the project should be implemented, the roles and responsibilities of all parties, and the financial management and procedures.

Communities will be required to contribute a share of total costs, either as cash or in kind. It is anticipated that most community groups in the project area will have access to bank accounts and will manage some funds. Where this is not possible, the district administration or a designated body (location office) will disburse the total amount of funds allocated for community sub-projects. The project will support the training of community leaders in book keeping, and development of simplified accounting procedures.

Capacity building for Integrated Ecosystem Management Planning. Although local government and private sector organizations may have been exposed to improved land management interventions, many have little experience with an ecosystem management approach, particularly one that focuses on watershed management. Workshops and trainings will be held to sensitize focal area stakeholders and improve their capacity for ecosystem planning at the district, location, sub location, and community level. These workshops will also focus on developing upstream-downstream linkages especially between improved land management and critical biodiversity.

Capacity Building for Technology Dissemination. Support will be provided to stakeholders (KARI, KEFRI, MoARD, NGOs, local development authorities) to disseminate technologies for community land management interventions. The activities supported will include development of awareness packages, community level documentation centers, training of extension workers and rural development practitioners (NGOs, local development authorities, MoARD extension staff), and development of extension messages. In addition to technical support and backstopping, this level of support will perform key roles of interfacing among farmer organizations, the project coordination office (PCO), and government departments.

Sub-component 1.2: Enhanced Capacity for Developing Carbon Finance:

In order to facilitate the participation of targeted communities in the global carbon market, the project will build the capacity of local institutions, communities, and government. In particular, the project will enhance the ability of target local institutions and communities to investigate carbon finance opportunities, measure baselines, and establish the financial and administrative processes required to enter into carbon sequestration contracts.

Institutional and administrative strengthening. Participation in the carbon market will require a new set of administrative and institutional arrangements at the local and national level. This will require a reliable, and transparent management structure, as well as a community based system for use of the credits for the collective benefits of the community. The project will test and recommend administration arrangements. Project support would be given for studies, workshops and partnership building activities. The project will also provide funds to create the scientific capacity in KARI to monitor and evaluate change in carbon stocks in the project area, with the eventual aim of gaining experience on how to participate and trade carbon credits on the international trading market. KARI will establish research collaboration with World

Agroforestry Center, and proceed in a "learning while doing manner", with the eventual emergence of a strong unit in KARI responsible for research on land resource management and the environment.

Targeted Research. Project resources will be provided to undertake some targeted research to develop procedures by which carbon and other GHGs can be monitored in a cost effective manner. The procedures must be spatially and temporally applicable, with reference to land management change over large landscapes. This requires specialized expertise involving mathematical modeling , remote sensing and spectral analyses, ecosystem stratification, and GIS experience. Some expertise is already available in KARI. This will be further developed under the project through research collaboration with World Agroforestry Center.

Component 2: Scaling up and Financing IEM Interventions

The second component will support implementation of improved land management activities identified in Sub-component 1, as well as financing the investments identified in the PAPs. The financing mechanisms will involve contribution (financial and in kind) by the communities in the form of a "matching grant" to ensure sustainability of the investment. In addition, the community will be required to sign a memorandum of understanding (MoU). Details of the MoU will be finalized in the PIP. The component will fund activities such as technical and extension assistance for farmers and community organizations, farm infrastructures to ensure better production and environmental management, improved seeds/germplasm, fertilizer and other supplies, and other related investments.

Expected environmental benefits are: (i) increased carbon sequestration through use of cover crops, and tree planting; (ii) decreased sediment load in surrounding watercourses due to reduced erosion; and (iii) improved awareness and conservation of biodiversity at community level.

Service delivery and technical backstopping. Implementation support for community identified sub-projects will be provided by a range of stakeholders including government (KARI, KEFRI, MoARD) and Non-Government actors (CBOs, NGOs). District level administration staff will play a key role in coordinating service delivery particularly district agriculture, livestock and social services officers.

Where appropriate, and to optimize project costs and minimize duplication of efforts by the different stakeholders, project activities will draw on the practical lessons from other ongoing projects in the area, currently being managed through KARI offices in Kisii and Kakamega, as well as the World Agroforestry Center office in Kisumu. These include the Soil Management Project (SMP), Agricultural Technology and Information Response Initiative (ATIRI), Legume Research Network Project (LRNP), and the SIDA sponsored Lake Victoria project.

IEM technologies. A sub-set of IEM approaches will draw on a range of sustainable land management technologies and services. These would include participatory adaptive on-farm research with farmers, farmer field schools, farmer-to-farmer exchanges and field days, development of village nurseries to support agro-forestry, development of local and indigenous bio-diversity resources, improved fallow, input delivery, alternatives to control land degradation, construction of catchments and land management interventions to sequester carbon in agricultural landscapes.

Component 3: Establishing a Monitoring and Evaluation System

The integration of development objectives with global environmental objectives requires several monitoring protocols with several objectives and at several scales. Monitoring procedures have been developed for a number of the project activities, but some targeted research will be required for monitoring GHGs. Project resources would be used to support the costs of developing a detailed but cost

effective monitoring and evaluation system, particularly with respect to global environmental services of carbon sequestration, biodiversity and international waters. The monitoring and evaluation system would regularly monitor a set of indicators that would serve as benchmarks against which changes could be measured periodically. To this effect, the project will make full use of the baseline surveys developed under PDF-B as a reference to measure progress. It is also proposed that the M & E system include external review in addition to the MTR.

Results from the targeted research activities will be generic for humid tropical regions, and thus could be applicable to many other regions with similar ecosystems. The expected environmental benefits are: (i) measurement of changes in carbon stocks and biodiversity levels over the project lifetime including a net-net accounting of GHG accumulation; (ii) incorporation of environmental monitoring into local monitoring and evaluation exercises; and (iii) improved capacity for monitoring carbon stocks.

Sub-component 3.1 Socio-economic Impact Monitoring

Community level monitoring of action plans (PAPs), will use the "impact monitoring and assessment" tools. Progress on the social, economic, agricultural and environmental objectives of the action plans will be assessed through farmer interviews at regular intervals. Poverty levels will be assessed at the start of the project based on the 1999 census, but in addition project staff will collect household data, including livestock populations, to assess change in poverty during the term of the project.

Sub-component 3.2. Biodiversity and River Basin Impact Monitoring

Biodiversity will be monitored through on farm surveys using simplified data forms derived from the "Alternatives to Slash and Burn "program (see technical annex).The surveys will be conducted during the monitoring of focal areas. Water quality, erosion, and sediments will be monitored in close collaboration with the SIDA funded project "Improved Land Management in the Lake Victoria Basin".

The change in livestock numbers will be used to estimate change in CH4 and will contribute to estimates on N2O. Erosion and nutrient loss will be also monitored using standard procedures. Finally, the incidence of pests and diseases and the impacts of these on the welfare of farmers in the project area will be monitored.

Sub-component 3.2. Monitoring of GHGs

The monitoring procedures for GHGs will consist of a mix of field surveys and remote sensing as important parts of baseline development (see technical annex). Application of remote sensing data will be tested for spatial and temporal monitoring of carbon, integrated with a structured system of field validation (ground truthing).

***Remote sensing*.** In each of the project focal areas, ground measurements will be carried out using a spatially clustered sampling plan related to pixel size and spatial coverage of images available (QuickBird, ASTER, TM). Fifteen clusters per focal area will be selected at randomly located intersections on a 500 X 500 m grid. All locations will be geo-referenced and entered on a GIS for future follow-up surveys.

***Field Surveys*.** Each cluster will be sampled for above and below ground biomass (carbon). Soil carbon will be analyzed using diffuse reflectance spectrometry (non destructive) calibrated against a standard soil reference library. In addition, surface observations will be made on parameters such as land use, erosion status, hydrology, and ecological condition. PAP intervention plots, identified by farmers, will be paired with closely located control plots in which no project sponsored interventions are being carried out.

Impact assessment will be done using control intervention pairing, in which before-after observations are paired with observations at control sites. Results will be aggregated by types of management interventions.

Data analysis and targeted research. Results from the field will be used to develop new allometric (tree growth) tables representative of western Kenya as well as other humid tropical regions. These tables are required to give reliable estimates of carbon sequestration for agroforestry interventions. In addition, equations will be developed to provide scientifically sound estimates of biomass production and soil carbon sequestration.

Other GHGs, N_2O and CH_4, will be initially assessed using IPCC coefficients and procedures (Tier 1) but data will assembled and studies initiated to systematically move to develop generic coefficients for humid tropical regions (Tier 2). These will be applicable for all countries bordering Lake Victoria, and other similar ecosystems. At the completion of the targeted research, results will be summarized into simplified look up tables and coefficients, so that continued monitoring can proceed in a cost effective manner beyond the term of the project.

The procedures will be applied at the start to establish the baseline and at the end to estimate the project impacts (carbon sequestration is a relatively slow process). Final results will be calculated on a "net-net" accounting basis to establish the change in carbon stocks developed by the project.

Annex 5: Estimated Project Costs

KENYA: Western Kenya Integrated Ecosystem Management

Project Cost by Component	Local US$ million	Foreign US $ million	Total US$ million
Capacity Building for Community Driven Sustainable Land Management	1.5	3.3	4.8
Scaling up IEM interventions	1.5	0.5	2.0
Monitoring and Evaluation	0.75	0.9	1.65
Project Administration	0.75	0.75	1.5
Total Baseline Cost	4.5	5.45	9.95
Physical Contingencies			
Price contingencies			
Total Project Costs	4.5	5.45	9.95
Total Financing Required	2.25	2.25	4.5

Project Costs By Category	Local US$ million	Foreign US $ million	Total US$ million
Goods	0.75	1.5	2.25
Works	0.75	0.25	1.0
Services	0.5	0.9	1.4
Training	0.5	0	0.5
Community sub-projects	2.0	2.8	4.8
Total Project Costs	4.5	5.45	9.95
Total Financing Required	2.25	2.25	4.5

Annex 6: Cost-Benefit Analysis Summary

KENYA: Western Kenya Integrated Ecosystem Management.

The project does not normally lend itself to classic economic and financial analysis because the expected institutional strengthening and capacity building benefits cannot in any reliable way be quantified in monetary terms. Also the demand-driven nature of investments leaves undetermined the specific investments that will be made under the project, thereby making impossible any rigorous ex-ante estimation of costs and benefits for the entire project. It is possible, however, with reasonable assumptions, to assess the profitability of the various types of investment that are likely to be made under the project and to indirectly estimate approximately the break-even economic rate of return (ERR) below which the project would not be economically viable.

Given the difficulty of quantifying certain ecosystem interventions, the analysis has been confined to a sub-set of activities, namely the profitability of various agricultural enterprises in which the communities and farmers groups are likely to invest in through adoption of improved soil fertility practices. In particular the analysis reviewed the ex-post cost and benefits data of soil fertility management technologies tested on farm and on station during the past decade in Western Kenya by World Agroforestry Center and KARI, and whose adoption the project is expected to upscale. Actual and potential adoption data for said technologies in Western Kenya were also reviewed to assess the likelihood of their profitability and economic viability from the point of view of adopters. Available data on the potential biophysical and economic impact of adoption of the technologies on Lake Victoria, primarily fish yields were also reviewed, as well as potential earnings from carbon trading.

4. 1. Financial Costs and Benefits

The profitability of World Agroforestry Center/KARI/KEFRI sustainable land management technologies in western Kenya

Biomass Transfer of *Tithonia Versifolia* with or without phosphorus application. Biomass transfer of tithonia, as a soil fertility management technique, is one of the main technological breakthroughs achieved by World Agroforestry Center/KARI/KEFRI research activities in Western Kenya in the 1990s. Financial returns have been analyzed for maize, kale, and tomatoes. A study (Place et al.) found that for maize in researcher managed trials the application of tithonia biomass at 0.91 or 1.82 tons of dry matter per hectare (during the first season) increased yields and profits substantially. The biggest increases occurred, however, when tithonia was integrated with phosphorus fertilizer. The returns to land and labor were highest when 1.82 tons per hectare of biomass (dried-equivalent) were applied along with 50 kilograms of phosphorus per hectare (e.g. the returns to labor were four times compared with the unfertilized continuous maize treatment). Nevertheless, it was also found that extension farmers in the region tended to adopt the technology more for application in high-value vegetables fields than in maize fields. The study confirmed (Table 1 below) that the biomass transfer system is more profitable on the higher valued crops as compared to maize. Due to high costs of labor and pesticides, vegetable production is not profitable in the absence of soil fertility amendments. The addition of tithonia alone (row 4 under each crop) was not profitable for kale (*Brassica oleracea cv acephala*) production but was profitable for tomatoes. This most likely reflects the fact that phosphorus status of soils varies somewhat in the region. As was the case with maize, the largest impacts occurred when phosphorus was added. For both crops, the most profitable systems appeared to be tithonia combined with a low dose of phosphorus.

Table 4.1 Economic analysis of biomass transfer on kale and tomatoes in Western Kenya (farmer-managed trial)

Tithonia fresh weight	N input from tithonia	P input from rock phosphate	Costs for labor	Costs for capital	Return to Land	Return to labor
Tons/ha	Kg/ha	Kg/ha	$/ha	$/ha	$/ha	$/day
Kales						
0	0	0	571	286	-857	-0.47
0	0	33	571	339	116	1.12
0	0	65	571	393	311	1.44
10	49	0	628	286	-801	-0.26
10	49	33	628	339	985	2.39
10	49	65	628	393	820	2.14
Tomatoes						
0	0	0	929	500	-1012	-0.08
0	0	32.5	929	554	-728	0.20
0	0	65	929	607	752	1.68
10	49	0	985	500	201	1.12
10	49	32.5	985	554	1854	2.68
10	49	65	985	607	1677	2.51

The results of other studies (Jama et al, 2000) indicate that under farmer management conditions tithonia biomass transfer is not profitable or economically attractive for low-valued maize production at relatively high rates of application (Table 4.2), but confirm that it is very profitable with kale – a high-valued green vegetable. Application of tithonia biomass to maize, however, can be profitable, particularly at relatively low rates of tithonia application (Jama et al., 1999).

Table 4.2 Financial analysis for application of tithonia biomass to maize and kale (*Brassica oleracea*) under farmer-management conditions in western Kenya

Crop	Number of farmers	Mean tithonia Application rate (t fresh weight ha-1)	Labor cost for Application (US$/ha)	Mean increase in net revenue (US$/ha)
Maize	62	19	257	-153
Kale	23	14	180	708

Source: Jama et al (2000) adapted from World Agroforestry Center (1997)

There are some constraints and risks to the use of tithonia biomass transfer including: (i) lack of awareness by farmers about proper use; (ii) considerable labor is required for cutting and transporting biomass to fields; (iii) the wide-scale use of tithonia will likely be constrained by its supply as field boundaries and contours, now used for planting tithonia hedges, are likely to be put to more competitive uses in the future as in the central highlands of Kenya with higher-valued crops and trees as the demand for land increases; (iv) nutrient mining by tithonia, the latter is not a legume and therefore does not fix atmospheric nitrogen , it obtains its nitrogen through effective retrieval of nutrients from the soil, biomass transfer is therefore only a cycling of nutrients within the farm and landscape; (v) potential to become a pest, tithonia is a prolific seeder, which can colonize farmlands, become a weed in crop fields and increase labor for weeding (Jama et al., 2000).

Improved fallows. Fallow, improved with *tephrosia, crotalaria , sesbania* and other leguminous shrubs and trees, is another major soil fertility management technology developed and validated in Western Kenya during the 1990s. According to surveys conducted in 1998 and 1999 (Place et al), about 79 % of farmers reported that subsequent crop yields were positively affected by the fallows, through soil fertility improvement and weed reduction (notably striga).

Tephrosia and Crotalaria fallows. Table 4.3 presents an analysis of two farmer-managed trials in western Kenya (Place et al). The first trial was for four seasons and the second trial was for three seasons. The crop following the fallow was maize or maize/bean. In the first trial, the natural fallow system was found to be unproductive and not financially attractive compared to all other systems. The tephrosia fallow without phosphorus inputs was the most financially attractive by both returns to land and returns to labor criteria. The crotalaria system, favored by most farmers, gave poor results in the first season and thus was superior to the continuous cropping practice only in returns to labor. For this system, the addition of phosphorus increased returns substantially. A second trial involving more farmers (about 30) found that the crotalaria fallow system without any additional fertilizer was far superior to that of the continuous cropping system. The returns to land and labor were 45 percent and 33 percent higher respectively.

Table 4.3 Financial analysis of improved fallows on maize and beans for three seasons in Western Kenya (farmer-managed trial)

Land Use System	P rate	Average total yield: maize	Average total yield: beans	Total Costs	Return to land	Return to labor
	Kg	*Kg*	*Kg*	*$*	*$/ha*	*$/day*
Trial 1 (total N = 34)						
Continuous	0	4390	969	585	405	1.74
Cropping	250	5025	1191	1047	108	1.14
Natural	0	2626	519	442	148	1.36
Fallow	250	3573	681	904	-131	0.63
Crotalaria	0	3964	855	484	397	1.87
Fallow	50	5191	1035	588	528	2.13
Tephrosia	0	5122	962	495	588	2.31
Fallow	50	5440	867	588	534	2.14
Trial 2 (total N = 61)						
Continuous	0	4160	0	388	242	1.53
Cropping	50	4505	0	481	189	1.40
Crotalaria	0	4498	0	313	351	2.04
Fallow	50	4414	0	404	249	1.71

Sesbania fallows. Studies on Sesbania tree fallows also indicate that the rotation of Sesbania sesban, a fast growing nitrogen-fixing tree, with maize, complemented with P (phosphorus) application can generate attractive returns to land and labor and be more financially profitable than local practices where sufficient rainfall is available (>= 500 mm rain in each of 3 seasons at Ochinga in Table 4.4 below), but not financially attractive where rainfall is relatively low (< 300mm in each post fallow season, in Muange in Table below).

Table 4.4 Effect of previous land-use system and phosphorus on net benefit, net cash return, and return to labor for seven seasons at two sites in Kenya

Net Benefit	Return to land			Return to labor		
Previous land use system	No P	+ P	Difference	No P	+P	Difference
	$/ha	$/ha	$/ha	$/day	$/day	$/day/ha
Ochinga						
Maize monoculture	-52	-56	-4	0.68	0.67	-0.01
Natural fallow-maize	273	105	-168*	1.10	0.82	-0.28**
Sesbania fallow-maize	170	334	164*	0.92	1.06	0.14
SED	235			0.26		
Muange						

Maize monoculture	109	19	-90	0.82	0.71	- 0.11
Natural fallow-maize	161	46	-115	0.94	0.73	- 0.21*
Sesbania fallow-maize	-81	66	147*	0.50	0.75	0. 25*
SED	124			0.15		

*** = significant at P=.20; ** = significant at P=.10; SED= standard error of the difference**
Source : Jama et al., 1998

Fallows with different sources of Phosphorus

The use of different sources of phosphorus, such as TSP (triple super phosphate) and PR (phosphate rock) does not affect the profitability of the improved fallow systems, as shown by Pommels (2000) in the following table.

Table 4. 5 Enterprise budget analysis for different sources of P (50 kg/ha)

Land use system	P source	P Rate Kg/ha	No. of Observations #	Maize Yield Kg/ha	Total Costs $/ha	Return to Land $/ha	Return to Labor $/day
Continuous Cropping	Control	0	10	4160	388	242	1.53
	RP	50	4	3835	455	114	1.25
	TSP	50	24	4505	481	189	1.40
Crotalaria Fallow	Control	0	7	4498	313	351	2.04
	RP	50	6	5118	388	358	2.06
	TSP	50	20	4414	404	249	1.71
Max SED						98	0.26
Min SED						49	0.13

Source: Romelese, 2000.

Improved fallows appear to be an attractive financial alternative to the traditional cropping systems, regarding both returns to land and labor. The Tephrosia fallow appears to be the most financially attractive. Improved fallows with a small dose of P (50 kg/ha) appear to perform financially superior to large doses of P under continuous cultivation and natural fallows in western Kenya.

Economic Costs and Benefits

The incremental aggregate income (or GDP values added) that the project would generate in western Kenya over the next twenty years as a result of the project was estimated as follows:

Project Beneficiaries and Base Income

It was assumed that the project would cover 10 districts or 60 villages in five years, each village containing about 500 households. A base average income of one dollar ($1) per day and per household was assumed on the basis of statistical reports and discussions with district officers during project preparation. It was also assumed, based on current statistics, that this income would continue to grow at a rate of 5% per annum in absence of the project. The income stream without the project is as shown in Table 4.6 below.

Table 4.6 Aggregate income stream without the project

Year	1	2	3	4	5	6	7	8	9	10 - 20
Districts Joining	2	2	2	2	2	0	0	0	0	0
Districts covered at Year End	2	4	6	8	10	10	10	10	10	10

No of Villages (6/District/year)	12	24	36	48	60	66	73	80	88	97
Base Income Per household per day(US$)	1	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55
Av. Number of households per village	500	500	500	500	500	500	500	500	500	500
number of days per year	365	365	365	365	365	365	365	365	365	365
Base annual Income Per village (US000$)	183	192	201	211	222	233	245	257	270	283
Total base Villages Income, beginning of year (US$m)	2.19	4.60	7.24	10.14	13.31	15.37	17.76	20.51	23.69	27.36
Base annual income growth in absence of project	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total villages Income at year end without project ($m)	2.30	4.83	7.61	10.65	13.98	16.14	18.64	21.53	24.87	28.73

Productivity and income growth rates with the project

The rural economy in western Kenya being mostly a labor intensive economy, it was assumed that as a result of the adoption and implementation of the new technologies, labor productivity on farm and off-farm, and thereby income would grow at the same rate as the returns to labor. The labor productivity growth rates or rates of growth of returns to labor caused by the new technologies , as suggested by the previous financial analysis are in the range of 33 percent to 77 percent as computed in Table 4.7 below.

Table 4.7 Growth rates of the return to labor due to World Agroforestry Center/KARI technologies

Crop and Tecnology	Control Return 1	Control Return 2	Average Control Retun	New Return 1	New Return 2	Average New return	Growth rate of Return
Kales/Tithonia	1.12	1.44	1.28	2.39	2.14	2.26	+ 77 %
Tomatoes/Tithonia		1.68			2.51		+49 %
Maize/Crotalaria fallow	1.53			2.04			+ 33%

Source: Tables 4.1; 4.3 and 4.5

Since the technologies are not likely to be widely adopted by all beneficiaries, the 33 percent to 77 percent higher and lower bounds of the productivity growth rate have been adjusted downward by using the average adoption rates of the technologies as coefficients.

Adoption of the Agro-forestry Technologies in Western Kenya

The results of surveys over the years shown in Tables 4.8 and 4.9 below indicate that 10 to 25 percent of farmers in pilot villages involved in the research process have adopted the technologies and that 5 to 14 percent of farmers in non-pilot villages have also adopted the technologies. Although the adoption rate is relatively low, it provides an indication that there exist in Western Kenya farmers and villages (probably those who suffer most from land degradation, most progressive and most risk takers) who find the technologies financially profitable or economically viable, given their own circumstances, otherwise there would be no reason for adoption. Swinkels (1997) in his potential adoption studies in Western Kenya found that a break-even increase of at least 21 percent in maize yield by the improved fallows would be necessary to induce the adoption of the technology in maize fields.

Table 4.8 Use of Agroforestry in the Pilot Villages Over Time (% of 1,538 households)

Year / Season	Biomass Transfer	Improved Fallow

1997 Long rains	10.8	**
1997 Short rains	10.4	**
1998 Long rains	20.9	20.5
1998 Short rains	20.0	20.8
1999 Long rains	25.9	23.1
1999 Short rains	6.8	21.9
2000 Long rains	12.3	13.5
2000 Short rains	7.4	14.0
2001 Long rains	16.7	15.2
2001 Short rains	11.2	13.1

**data not available

Table 4.9 Use of Agroforestry in Non-Pilot Villages over time (% of 360 households)

Year	Biomass transfer	Improved fallow
1997	6.1	4.1
1998	8.0	7.2
1999	14.7	13.7
2000	19.9	13.0
2001	21.6	12.4

There are other more traditional soil and water conservation technologies that appear to be more adopted by communities in Western Kenya, as demonstrated by the results (Table 4.10) of an adoption survey in the Rongo catchments in Western Kenya.

Table 4.10 SWC Technologies adopted, implemented, and proportion of households advised in Rongo catchments (N= 94 farmers)

Type of technology adopted	Proportion of households (%)	Proportion of Male implementers	Proportion of Female Implementers	Proportion of Farmers advised by extension
Stone wall	69	61	3	3
Sisal strip	45	40	3	3
Roof catchments	43	41	2	0
Woodlot	20	18	2	2
Fanya Juu	17	15	1	3
Unploughed strip	16	14	1	2
Euphorbia strip	13	-	-	0
Hedge strip	3	3	0	0
Grass strip	3	2	1	0
Banana strip	1	0	1	0
Fanya chini	1	0	0	0
Cut off drain	1	3	0	0
Retention ditch	1	-	-	0
Water pond	1	-	-	0

Source : World Agroforestry Center, 2000

Incremental aggregate income estimation based on the conservative adoption rates of 14 to 18 percent of households, and on three levels of productivity growth rate were made and resulted in the following income stream as shown in Table 4.11 below. It is also assumed that after the project ends, the number of villages where the technologies are adopted would grow by 10 percent every year until year 2010.

Table 4.11 Expected aggregate Income stream, with the project

Year	1	2	3	4	5	6	7	8	9	10-20
Minimum productivity growth rate(pgr) with project	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Medium productivity growth rate (pgr) with project	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Maximum productivity growth rate(pgr) with project	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Average technology adoption/impact ratio	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.18
Rate of adoption expansion to non-project villages/yr	0.00	-	-	0	0	0.1	0.1	0.1	0.1	0.1
Min pgr- villages income at year end with project,$m	2.39	5.01	7.91	11.07	15.45	16.83	19.49	22.51	26.06	32.56
Med-pgr villages income at year end with project ,$m	2.44	5.12	8.09	11.33	15.81	17.25	20.00	23.10	26.79	33.39
Max-pgr villages income at year end with project ,$m	2.52	5.29	8.39	11.74	16.38	17.91	20.82	24.04	27.94	34.72

The incremental aggregate income streams, by productivity growth rate assumption, derived from the above tables were as shown in Table 4.12 below. Project cost based on disbursement plan up to year five, and based on beneficiaries maintenance cost contributions post-project period are also shown in the table below.

Table 4.12 Aggregate incremental income streams due to project, project investment cost ($m) and computed economic rates of return (ERR)

Year	1	2	3	4	5	6	7	8	9	10-20	ERR %
Minimum Productivty growth- incremental aggregate income	0.09	0.18	0.30	0.43	1.47	0.60	0.85	0.98	1.19	1.38	**10**
Medium Productivity growth- incremental aggregate income	0.14	0.29	0.49	0.68	0.96	1.11	1.36	1.57	1.92	2.22	**22**
Maximum productivity growth- incremental aggregate income	0.22	0.46	0.78	1.10	1.53	1.77	2.17	2.51	3.07	3.55	**41**
Project Cost ($m)	**0.50**	**1.00**	**1.50**	**2.00**	**1.50**	**0.20**	**0.25**	**0.30**	**0.35**	**0.40**	

Break –even Point											**12**

Break-Even Economic Rate of Returns

The resulting economic rates of returns from the low to high productivity growth rates are 10 percent, 22 percent, and 41 percent respectively. The break even ERR that would justify investment under the project is 12 percent. This means that a productivity growth rate higher than 33 percent would be needed in order to economically justify the project.

4.3 Social Costs and Benefits

The project is also expected to generate additional income from at least two of its externalities: carbon sequestration and reduction of sediment loads into Lake Victoria.

Carbon sequestration

Carbon dioxide emission reduction is estimated to reach about 200,000 tons at the end of the project implementation period (World Agroforestry Center,…) with a value of about one million US dollars ($870,000) at the end of the project, and much more in the tenth year, based on conservative prices between 4 and 6 dollars per ton. The CO2 emission reduction was calculated as shown in Table 4.13 below.

Table 4.13 Carbon sequestration benefits

Year	1	2	3	4	5	6	7	8	9	10
Carbon stock for 2500 ha in 1000 tons					31					32
CO2 emission reduction for 2500 ha in 1000 tons					114					117
Area cultivated per household in hectares					1					1
Area cultivated by all household in hectares					30000					48,315
Area where technologies are adopted in hectares					4,800					8,697
CO2 emission reduction in adoption area, in 1000 tons					218					409
Expected CO2 Emission Reduction 1000tons, all villages					218					409
Expected net CO2ER price $ per ton of CO2					4					6
Expected carbon revenue, all villages ($M)	0.00	-	-	0	0.87	0	0	0	0	2.45

Lake Victoria

Several studies provide estimates of annual sediment load into Lake Victoria. For example, it is estimated that the annual sediment load into the Sondu Miriu river is 150t/km2; while it is 423t/km2 in the Nyando river [World Agroforestry Center, 2000]. Unfortunately, no analysis of the impact of the sediments on the economy of Lake Victoria, in particular on fish production has been found. It was assumed, for the

purpose of this analysis, that the economic impact of the project on sediment load reduction and on fish production in the lake is negligible or nil.

The Project Break-even Social Rate of Return

The results obtained by adding carbon sequestration benefits to the economic benefits suggest that the break-even social rate of return of the project is about 12 percent. The project would have to increase the annual growth rate of income in Western Kenya from an assumed 5 percent income growth rate (without the project) to at least 8.4 percent in order to economically and socially justify the investment planned under the project. The minimum expected productivity growth from available improved technologies rate of 33 percent and low adoption rate of 14 to 18 percent produce a social rate of return of at least 15 percent, while the medium and high productivity growth rates of 50 percent and 77 percent suggest much higher social rates of returns of 28 and 47 percent respectively, even after assuming relatively conservative adoption rates of 14 to 18 percent. The rates of return do not take into account of the potential economic gains from improved technologies for the Lake Victoria's economy. Thus, the project appears economically viable.

Table 4.14 Aggregate incremental income stream, including carbon income, project costs stream ($m), and computed social rates of return (SRR).

Year	1	2	3	4	5	6	7	8	9	10	SRR %
Minimum Productivty growth- incremental aggregate income	0.09	0.18	0.30	0.43	1.47	0.69	0.85	0.98	1.19	3.83	**15**
Medium Productivity growth- incremental aggregate income	0.14	0.29	0.49	0.68	1.83	1.11	1.36	1.57	1.92	4.67	**28**
Maximum productivity growth- incremental aggregate income	0.22	0.46	0.78	1.10	2.41	1.77	2.17	2.51	3.07	6.00	**47**
Project Cost ($m)	**0.50**	**1.00**	**1.50**	**2.00**	**1.50**	**0.20**	**0.25**	**0.30**	**0.35**	**0.40**	
Break –even Point											**12**

Table 4.15 Variation in Social Rate of Return of Project to Real Village Income Growth (%)

Assumed real annual growth in village income without the project	Assumed Productivity Growth rate of SLM technologies 1/	Real annual growth in village income, with the project	Assumed real annual growth in village income resulting from the project	Implied Real Village Income Increase over the project period 2004-2009	Resultant Social Rate of Return (SRR)	Benefit/Cost Ratio at 12 percent Discount Rate
5.0	77	16.5	11.5	72.3	47	2.70
5.0	50	12.2	7.2	41.5	28	1.82
5.0	33	9.1	4.1	22.2	15	1.26
5.0	30	8. 4	3.4	18.2	12	1.00

1/ applied to only 14%-18% of farmers (adoption rate), SLM = sustainable land management

4.4 Sensitivity Analysis

Variation in base income growth rate without the project

As shown in Table 4.16 below the break-even social rate of return (SRR) needed to justify the project remains invariable at 12% no matter what base income growth rate is assumed between 0 and 5 percent per year. The higher the assumed base income growth rate, however, the lower the incremental income growth rate needed to justify the project. The latter declines from 4.7 percent for a base income growth rate of 0 - 3.4 percent for a base income growth rate of 5 percent.

Assumed base real income growth rate without the project	Break even social rate of return needed to justify the project	Benefit/Cost ratio	Resulting real income growth rate with the project	Incremental real income growth rate needed to justify the project
0%	12%	1.0	4.7%	4.7%
1.0%	12%	1.0	5.4%	4.4%
2.0%	12%	1.0	6.1%	4.1%
3.0%	12%	1.0	6.9%	3.9%
4.0%	12%	1.0	7.7%	3.7%
5.0%	12%	1.0	8.4%	3.4%

Variation in base income level and in its growth rate

As shown in table 4.17, the change in the base income per household from $1/day to 50 cents/day or to $1.5/day, combined with changes in its growth rate without the project (0%, 2%. 4%) has very little or no impact on the break-even rate of return needed to justify the project. The lower the base income, however, the greater the growth rate of income needed to justify the project and vice versa.

Table 4.16 Variation in base income level and in its growth rate

Base income per household per day without the project ($/household)	Assumed annual growth rate of the base income without the project	Break-even Social rate of return (SRR) needed to justify the project	Resulting total income growth rate per year with the project	Incremental real income growth rate needed per year to justify the project
0.50	0%	12%	9.2%	9.2%
0.50	2%	12%	10.2%	8.2%
0.50	4%	11%	11.0%	7.0%
1.00	0%	12%	4.7%	4.7%
1.50	2%	12%	4.7%	2.7%

Overall, the model appears to provide a robust estimate of the break-even social rate of return (12 percent) needed to justify the project.

References

World Agroforestry Center, 2000: Improved land management in the Lake Victoria basin: linking land and lake, research and extension, catchments and lake basin, final technical report-startup phase-July 1999 to June 2000, World Agroforestry Center working paper 2000-2, Nairobi.

Annex 7: Financial Summary

KENYA: Western Kenya Integrated Ecosystem Management

	Implementation Period					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Total financing required						
Total Project						
Investment Costs	0.6	1.1	1.4	0.8	0.75	4.65
Recurrent Costs	0.4	0.4	0.2	0.2	0.2	1.6
Total Project Costs	1	1.5	1.6	1.0	0.95	6.25
Total Financing	0.6	1.0	1.4	0.75	0.75	4.5

Financing						
IDA						
Government	0.6	1.0	0.7	0.25	0.2	2.75
Other	2.2	.35	.15	0	0	2.7
GEF	0.6	1.0	1.4	0.75	0.75	4.5
Total Project Financing	1.0	1.5	1.6	1.0	0.95	9.95

Annex 8A: Procurement Arrangements

KENYA: Western Kenya Integrated Ecosystem Management.

Procurement of goods and works for all IDA financed components will be carried out in accordance with the Bank's Guidelines for Procurement under IBRD Loans and IDA Credits (January 1995 and revised in January and August 1996, September 1997 and January 1999). Consulting services by firm or individuals financed by IDA will be awarded in accordance with the Bank's Guidelines: Selection and Employment of Consultants by World Bank Borrowers (January 1997, revised in September 1977 and January 1999, and May 2002). The appropriate World Bank standard bidding documents will be used for all International Competitive Bidding (ICB), and the World Bank's standard Request for Proposals (RFP) for the selection of consultants.

In recent years, Kenya has increased its national procurement capacity and there is currently no conflict between the Government's Procurement Regulations and the Bank Guidelines. Following the findings and recommendations of a Country Procurement Assessment Review (CPAR) conducted in 1997, the Government of Kenya received Bank assistance to implement CPAR recommendations. Using the proceeds of the grant, Government initiated a procurement reform program resulting in National Public Procurement Regulations in March 2001. The Regulations govern all public procuring entities and include the production of standard bidding documents for works and goods, and allow the Bank procedures to take precedence over other procurement provisions in the national regulations.

Community Procurement. Most of the procurement in the project will be in the form of small transactions taking place locally at the Sub-location, Location and District levels. Each participating district will receive funds in tranches before applying for a second fund tranche.

Procurement arrangements will take into consideration the "learning by doing" nature of the project, as well as the central focus on community funds. The arrangements will aim at efficient procurement for a quick disbursement and delivery of goods. Simplified procurement, disbursement, accounting, and auditing would be used in line with the Africa Region's Guidelines for Simplified Procurement and Disbursement, March 1998, and Bank Procurement Guidelines, January 1999, section 3.15 Community Participation in Procurement. Local shopping, single-source selection, obtaining quotations, and direct contracting would be allowed under specified procedures.

Accessing resources does not guarantee access to required materials, therefore, each districts may have to devise its own solution within the agreed procurement manual that will be prepared by the Government. The procurement elements by disbursement category and procumbent methods are summarized in the tables below, as are consultant selection methods and thresholds for procurement methods. The selection methods and thresholds will be determined after the types of required consultancies and their cost estimates have been identified by the implementing institutions.

The project provides funds for beneficiary executed projects at community levels. Financing will depend on application received from communities and their procurement details will depend on the needs identifies by the communities. Procurement of these would be carried out in accordance with simplified procurement procedures referred herein above. The project coordination office will be responsible for ensuring compliance of these guidelines. Ex-post reviews of random sub-projects will be conducted periodically by the Bank and through independent technical audits carried out by independent consultants. The Bank's standard procurement bid documents will be used for procurement of works and goods, except for those sub-projects executed at village levels.

Goods. The project will finance the procurement of vehicles, motorcycles, office equipment and field equipment. Goods to be procured will be lumped into lots estimated to cost US$ 100,000 or more and will be procured under ICB procedures. Goods that can not be lumped together into lots of US$100,000 and cost no less than US$100,000 more than US$50,000 per contract and are available locally can be procured using NCB procedures. Procurement for the off-the-shelf goods or standard commodities costing US$50,000 equivalent or less per contract will be procured through prudent local shopping on the basis of quotation from at least three suppliers. In case goods are not available in the country, international shopping procedures will be followed. Goods may also be procured from UN agencies provided each contract does not exceed US$50,000.

Consultant Services. Consulting service financed by the project will be for studies, technical audits, monitoring and evaluation, technical assistance to communities, training of staff and local communities.

Consultants services will normally be procured through the selection of short-listed firms on the basis of Quality and Cost-based selection (QCBS), except for technical matters where direct procurement will apply due to the specialized nature of the technical assistance. Consulting services for preparation of training will be based on consultant qualification (QBS) based on work experience and competence relevant to the assignment. Services for tasks such as organizing seminars and workshops shall be procured under contracts awarded to individual consultants. Short-lists of consultants for contracts for community sub-projects estimated to cost less than US$20,000 each may consist entirely local nationals selected from at least three qualified firms or NGOs.

Single Source Selection. This will be used only under exceptional circumstances for the selection of services of specialized nature provided the aggregate amount of such service do not exceed US$ 250,000 over the life of the project.

Prior Review. All goods and works contracts estimated to cost US$50,000 or more will be subject to IDA's prior review of bidding documents, including draft contracts and technical specifications prior to inviting bids and bid evaluation prior to contract award. In addition, the evaluation of technical proposals must be cleared with IDA before the financial proposals are opened.

Post Review. All contracts not subject to prior review will be subject to post-review.
Once a year, a procurement accredited Bank staff will conduct a post review of a sample of contract not subjected to prior review. The Borrower will maintain a procurement register related to procurement to assist in such ex-post review and for a review by the project staff. The overall procurement risk assessment is expected to be high.

Capacity Building. The main role of the project coordination office located in the project area will be to assist communities to execute procurement done at their level. The project office will be strengthened with additional training as required. The annual procurement plan will include a procurement plan by procurement method. The annual report will also contain an overview of all procurement to date and an evaluation of procurement problems encountered during the year under review.

Procurement Manual. A project implementation manual will be prepared by the client in form satisfactory to the Association. The manual will consist reference to specific procedures. The manual will be finalized as a condition of negotiations. The manual will include illegibility criteria, procedure for calling bids, selection of contractors, service providers and contract award, supervision and financial management and disbursement procedures.

Assurances obtained at negotiations. The following assurances were obtained during negotiations: (a) the use of IDA's standard bid documents and standard evaluation reports; (b) annual review of the

procurement plan and arrangements as part of the annual reports; (c) the procurement plan will be updated bi-annually and submitted to IDA; and (d) the establishment of a procurement register recording contract information, updated procurement plan, and compliance with aggregate limits on specified methods of procurement.

Procurement Phase	**Time (weeks)**
Preparation of bidding documents	
Preparation of bids by bidders	
Bid evaluation	
Signature of contracts	
Payments	

Table A. Project Costs by Procurement Arrangement
(US$ million equivalent)

Expenditure Category	Procurement Methods				Total Cost
	ICB	NCB	SSS	Others	
Works					
Goods					
Services					
Funds for Sub-Projects					
Operating Costs					
Total					

Table 2 Threshold for Procurement Methods and Prior Review

Expenditure Category	Contract Value Threshold (US$ thousands)	Procurement Methods	Contracts Subject to Prior Review
1.Works			
2. Goods		ICB NCB NS	Prior Review Post Review Post Review
3. Services 3.1. Individuals 3.2. Firms		 Individual Consultants QCBS QBC LCS	All TORs or sole source contracts are subject to IDA Prior Review Prior Review Post Review Prior review Post Review
4. Funds for Sub-Projects		Conform to procedures detailed in the Implementation Manual	Subject to Post reviews based on random sampling

Procurement Arrangements by Institution. The following institutions and groups will play distinct roles in the implementation of the project: (1) KARI is the overall project implementing agency; (2) Project Coordination Office in Kisumu will be responsible for overseeing and facilitation of sub-projects

implemented by district interest groups (DIGs), and community development committees (CDs); (3) DIGs and CDCs will be implementing priority sub-projects identified by their respective constituencies; and (4) research institutions will be carrying out research activities in their respective fields. The roles of these four institutions and community groups in the implementation of the project as well as their responsibilities in the procurement function with respect to their activities in the project and appropriate procurement methods to each level are summarized in the Table below.

Institution/ Group	**Role in project implementation**	**Role in procurement**	**Appropriate procurement method[1]**
1. KARI	Overall management of the project including	Development of procurement procedures that are suitable to each group of project beneficiaries	• ICB • NCB
	a. management of project account;	a. Organizing appropriate training courses to all project implementing institutions	
	b. Transfer of funds into the accounts of other implementing institutions/groups on arrangements to be agreed and defined in a Project Operational Manual	b. Procurement of relatively large contracts of goods and works where centralized procurement is more suitable economically, consultancy services of national nature and procurement of requirements that can be supplied from outside Kenya	• International Shopping • Procurement of consultancy services through QCBS, QBS and Single sourcing
	c. Supervision of project implementation;.	c. Carrying out periodical reviews of the physical project outputs and procurement documentation to ascertain that governing procurement procedures are adhered to	
	d. Assisting project beneficiaries in the following areas:		
	(i) Carrying out need assessments of project beneficiaries and implementers		
	(ii) Carrying out capacity assessment of the beneficiaries in implementing sub-projects		
	(iii) Assisting interest groups at district and community levels in establishing DDIGs and CDCs to be responsible for the		

[1] Appropriate thresholds for the different procurement methods will be set determined at appraisal, i.e. after requirements of the implementing institutions of project components have been defined. Procurement under community sub-projects will be carried out in accordance with the Africa Region's Guidelines for Simplified Procurement and Disbursement. The provisions of the Bank's Procurement Guidelines and Consultants' Guidelines will apply to procurement under project components implemented by public institutions

Institution/ Group	Role in project implementation	Role in procurement	Appropriate procurement method[1]
	implementation of their respective sub-projects		
	(iv) Development of an Operational Manual		
	(v) Training all project implementing institutions/groups in the areas of financial and procurement management of the project		
2. Project Coordination Office (PCO)	a. Receiving sub-project proposals from District Interest Groups (DIG) such as farmers' groups and Community Development Committees (CDCs), and presentation of such proposals to a District Technical Group (DTG)[2] for evaluation and approval of sub-project proposals.	Assisting DIGs and CDCs in contracting out qualified local institutions for carrying out any services that DIGs and CDCs may not be able to undertake without external assistance	• Local Competitive Bidding • Local Shopping • Direct Purchase • Direct selection of service providers to assist District Interest Groups (DIGs) and Community Development Committees (CDCs)
	b. Submission of lists and brief details including budget estimates of approved sub-projects to KARI and advising KARI on amounts of approved budget to be transferred to each sub-project in tranches	Carrying out periodical reviews on the records of DIGs and CDCs to ensure compliance to the laid down procedures	
	c. Receiving periodical implementation progress reports including utilization of each tranche from DIGs and CDCs	Creating and updating databank of prices of commonly used inputs in the sub-projects to be used as a guide by the DTG in evaluating proposed sub-project costs	
	d. Preparation and submission of its own annual work plans and budgets to KARI	From its annual work plans, preparation of annual procurement plans specifying inputs that are locally available and be procured by PCO and procurements that will be appropriate to be undertaken by KARI on its behalf	
	e. Accounting for its budget	Procurement of goods and services that are available from local market	
	f. Supervision of sub-projects and, with assistance of DTG, provision of technical advice to DIGs and CDCs as needed		
3. DIGs and CDCs	a. Based on the priorities of their needs, preparation and submission of sub-project proposals including cost estimates to PCO	Procuring required inputs to approved sub-projects in accordance with the procedures of the Operations Manual	• Local Competitive Bidding

[2] DTG will be constituted from representatives from relevant Government departments, locally based private institutions, and development partners

Institution/ Group	Role in project implementation	Role in procurement	Appropriate procurement method[1]
	b. Preparation and submission of periodical implementation progress reports including utilization of funds received	Seeking assistance of PCO in contracting local institutions for services that they feel they are beyond their capacity	• Local Shopping
	c. Compliance to the Operations Manual in the management of sub-project funds		• Direct Purchase • Direct Contracting • Force Account
	d. Establishing and maintenance of simplified good record keeping system that is compliant to the procedures to be spelt out in the Operations Manual		
4. Research Institutions	a. Preparation and submission of annual work plans including budget estimates to KARI	From their annual work plans, preparing annual procurement plans indicating which requirements that can be procured locally by themselves and those that only be supplied from outside the country, and hence KARI would be more suitable to be procure on their behalf	• Local Competitive Bidding • Local Shopping, • Direct Purchase, • Direct Contracting
	b. Submission of periodical implementation progress and expenditure reports to KARI	Establishing and maintaining a good record keeping system	
The Bank's role will be (1) provision of technical advice in setting up appropriate institutional arrangements, and in the development of an Operational Manual to ensure its consistency with the Bank procurement guidelines; (2) assessing the procurement capacities of the institutions and assisting in the capacity building of the institutions; and (3) carrying out its fiduciary responsibilities through continuous prior reviews as needed and periodical post reviews of procurement documentation at all levels.			

Annex 8B: Financial Management and Disbursement Arrangements

KENYA: Western Kenya Integrated Ecosystem Management

External Audit. The Government will appoint a qualified, experienced independent auditor on approved terms of reference. The external audit will cover both the Grant as well as counterpart funds. The Grant Agreement will require the submission of audited financial statements to the Bank within six months after the year-end. The format to be adopted will be documented in the Financial Procedures Manual.

The auditor will be required to express an opinion on the audited financial statements in compliance with International Auditing Standards (IFAC/INTOSAI pronouncements).

In addition to the audit report, the auditor will be required to prepare a separate management letter giving observations and comments, and providing recommendations for improvements of accounting records, systems, controls and compliance with financial covenants in the IDA Agreement

Internal Audit. Taking into account that the CDD setup of the Project, there is need for strong supervision and quality assurance at all levels. In addition to the day-to-day supervision of accounting functions, the PCO finance officer will be responsible for internal audit functions at DSG,, VDC and community group levels.

Supervision. Financial management supervision will be carried out regularly by a World Bank accredited FMS at least once a year. In addition, the Project will be required to submit quarterly FMRs to IDA. The FMS will also review quarterly FMRs, and annual audit reports and management letters from the external auditors.

Accounting System, Accounting Policies and Procedures. Community organizations will maintain simplified manual accounting systems comprising a SOE analysis and cash book. Accountability vouchers will also be retained by community organizations which will be required to prepare and submit monthly returns to the DSG though the VDC. At the DSG, established government accounting systems will be used in accounting for project funds. The PCO will invest in an accounting and financial management system. The PCO project management system will be used to control funds and produce periodic FMRs.

The format of accounting records and reporting to the PCO for consolidation by implementing agencies will be defined in the Project Financial Procedures Manual.

Budgeting. For the purposes of the Bank credit financing, community implementing agencies will produce annual procurement and disbursement plans that will be consolidated at the PCU and used to monitor and plan cash flow needs. Community organization financing plans will be contained in their project proposals. To facilitate standardization, the Project Financial Procedures Manual will include templates of budget proposals. The DSG will be responsible for authorizing expenditures for their respective components in accordance with the agreed budgets.

Financial Monitoring and Reports. The following quarterly FMR inputs will be produced by each implementing agency, summarized at respective reporting levels and consolidated by the PCO:

- Sources and Uses of Funds by Project Category
- Uses of Funds by Project Component
- Physical Output Monitoring Report

- Procurement Monitoring Reports

Simplified formats of FMR inputs by implementing agencies will be included in the Project Financial Procedures Manual. The formats will be developed in consultation with each implementing agency of the Project.

Project Financial Statements. In addition to the monthly bank reconciliation and quarterly monitoring reports, the Project will produce annual Project Financial Statements for analytical and audit purposes. These Financial Statements will comprise:

- A Consolidated Statement of Sources and Uses of Funds (showing IDA and counterpart funds as well as funds provided by community organizations as provided in funding agreements);
- A Statement reconciling the balances on all Bank Accounts to the bank balances on the Statement of Sources and Uses of Funds;
- SOE Withdrawal Schedule, listing individual withdrawal applications relating to disbursements by the SOE Method, by reference number, date and amount;
- A Cash Forecast for the next two quarters;
- Notes on significant accounting policies and accounting standards adopted by management when preparing the financial statements; and on any supplementary information or explanations that may be deemed appropriate by management to enhance the presentation of a "true and fair view."

Monitoring. Project monitoring will take the following forms:

- Community organizations self monitoring mechanisms established in line with CDD funded project requirements;
- PCU finance officer's oversight and internal audit of other implementing agencies;
- Annual external audit of the Project finances.

Disbursement Arrangements. IDA credits in Kenya are generally controlled through Special Accounts managed by PCOs. The Government, through the Ministry of Finance opens a separate Project Account where counterpart funds are deposited in agreed amounts and managed by the PCO to fulfill counterpart financing requirements. The Project will adopt similar structure. Funds will be released by the PCO to DSGs on quarterly basis on evidence of approved community proposals. The PCO will directly meet own administrative expenses. The DSG will channel funds directly to community bank accounts upon acknowledgement of evidence of opening of project bank accounts and depositing of required counterpart contributions. The chart in Appendix 1 illustrates the flow of funds arrangements for general project management. Specific funds flow procedures will be included in the Project Financial Procedures Manual.

Training Plan. The PCO finance officer will undergo training in Bank Financial Management and Disbursements procedures. Implementing agencies' accountants, administrative and procurement staff will be trained in Financial Management, including internal controls, information systems and computer applications; and procedures relating to IDA procurement, accounting and reporting. Training must be substantially completed before Project effectiveness. Ongoing training for implementing agencies' personnel, mainly based on Financial Procedures Manuals, will be arranged and conducted throughout the life of the Project by the PCU finance officer.

Risk Assessment

Country Risk Assessment. The results of the latest Kenya Country Financial Accountability Assessment (CFAA) dated April, 2001 indicated that "fiduciary risk in public spending is assessed as high. While a

lack of compliance with established financial and procurement regulations have completely rendered many initiatives aimed at strengthening the control environment ineffective, issues of limited execution, inadequate monitoring, insufficient capacity and lack of enforcement also need to be resolved."

Government accounts are regularly late and incomplete. Inter-agency reporting is slow and sometimes difficult to achieve, where hierarchical lines are blurred or are foreign to the day-to-day structures and management of the institution. Accountability chains are weak, and penalties are extremely light or nonexistent. A new Government is now in place with a commitment to ensuring compliance with legislation, strengthening regulatory institutions and fighting corruption.

Project Risks. Specific Project risks here include:

(i) The large number of parties and transactions involved, the small value and multiplicity of contracts, and the scattered locations of the subprojects that render problematical ex-ante controls across all individual sub-projects;
(ii) Accounting difficulties arising from disbursement to the beneficiaries' bank accounts or to regional/sub regional accounts is based on progress reports while the supporting documents are best kept at the level where the expenses are incurred;
(iii) Community groups may lack the necessary capacity;
(iv) Community representatives may not be truly representative of the community (i.e. elite capture of institutions and political interference);
(v) Risks associated with the handling of substantial cash transactions including theft and fraud.
(vi) Liquidity at the central treasury delaying project implementation through lack of counterpart funds and/or inability to access counterpart funds because the project is not "inscribed" in the national budget; and
(vii) Weak financial management and procurement capacity at the PCU delaying implementation;

Summary of country and project risks

	Risk Assessment				
	High	***Substantial***	***Moderate***	***Negligible***	***Comments***
Inherent Risk					
1. Corruption	X				*
2. Poor governance	X				*
3. Weak Judiciary	X				*
4. Weak Management capacity		X			*
Overall Inherent Risk	X				*
Control Risk					
1. Implementing Entities			X		**
2. Funds Flow			X		**
3. Staffing			X		**
4. Accounting Policies and Procedures			X		**
5. Internal Audit			X		**
6. External Audit			X		**
7. Reporting and Monitoring		X			
8. Information Systems		X			
Overall Control Risk			X		

* These will be mitigated by adoption of a comprehensive Financial Procedures Manual, supervision by the PCO finance officer, community ownership and direct implementation of planned activities, and inclusion of capacity building components in the Project.

** Considered non significant as long as mitigating factors, as described in the FM Action Plan, are put in place.

The project financial management risk is assessed as being moderate provided that the proposed financial management arrangements are implemented and the following financial management action plan are satisfactorily addressed.

Financial Management Action Plan

	Action	**Due Date**	**Conditionality**
1	Financial Monitoring Report formats and input by implementing agencies agreed.	Negotiations	Condition of Negotiations
2	Recruitment of appropriately qualified and experienced financial officer at PCU.	Negotiations	Condition of Negotiations
3	Training for PCU and implementing agencies' financial managers and accountants on World Bank FM and Procurement procedures.	Effectiveness	Condition of Effectiveness
4	Financial management system installed at the PCU. This includes: ▪ Procedures Manuals ▪ Information System ▪ Training	Effectiveness	Condition of Effectiveness
7	Project accounts opened and initial deposits of counterpart funds made.	Effectiveness	Condition of Effectiveness
8	Relevantly qualified external auditor for the entire project appointed on approved terms of reference.	Effectiveness	Condition of Effectiveness
9	Ability of PCU to prepare FMRs and of implementing agencies to prepare FMR input.	Effectiveness	Condition of Effectiveness

APPENDIX 1

FUNDS FLOW AND REPORTING ARRANGEMENTS

World Bank

*Ministry of Finance**

Project Account

*Kenya Agricultural Research Institute (KARI)**

Special Account

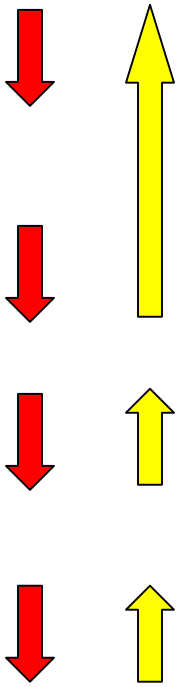
*Project Coordination Unit (PCU)**

District Development Committee

*Location Development Committee**

*Village Development Committee**

Community Organizations



*Oversight entities

Legend

- Direction of funds flow

1. - Direction of fund accountability reporting

Annex 9: Monitoring and Evaluation Plan

KENYA: Western Kenya Integrated Ecosystem Management

Gross project area. The gross project area will include the Nyando, Yala, and Nzoia basins of the Lake Victoria watershed. This large area, consisting of 19,898 km^2, will include specific monitoring focal areas (FA), for monitoring and evaluation of project and environmental objectives, as well as the remainder of the area which will not receive the same degree of treatment but in which farmer/community associations may want to participate.

Net project area. The net project area will consist of nine 10X10 km focal areas (FAs) specifically designed for monitoring and evaluation. The location of FAs within basins will be stratified by elevation zones including: *Lowlands*, 1134-1440 m, *Midlands*, 1440-1890 m and *Highlands* 1890 m a.s.l. Considering the size of each FA in each elevation zone, the FAs will represent 8.5% of the land area of Nyando, 8.9% of Yala a and 2.3 % of Nzoia. There is strong associations between this zonation and variables related to population density, land use, soil condition and production ecology (Table 1).

Table 1. Indicative differences between elevation zones in western Kenya. Table reports 95% CI's of mean zonal values.

Variable	*Lowlands*	*Midlands*	*Highlands*
Housing units (no. km^{-2})[1]	111 – 142	62.3 – 85.1	23.3 – 33.5
Ave. tree cover (ha km^{-2})[1]	8.47 – 10.0	18.7 – 22.6	23.0 – 30.6
Tree cover on farms (ha km^{-2})[1]	2.58 – 3.39	2.30 – 3.52	0.72 – 1.13
Cropland (ha km^{-2})[1]	14.6 – 17.9	11.1 – 15.3	8.95 – 12.6
Commercial crops (ha km^{-2})[1]	1.12 – 1.66	1.43 – 2.04	1.51 – 2.25
Ave. annual NDVI[2]	0.29 – 0.33	0.38 – 0.43	0.52 – 0.61
pH (water)[3]	6.44 – 6.68	5.81 – 6.30	–
Clay (%)[3]	37.1 – 42.8	29.2 – 36.4	–
CEC[3]	17.3 – 21.6	11.5 – 16.8	–
SOC (g kg^{-1})[3]	12.6 – 15.1	17.8 – 23.0	*24.8 – 27.3*[5]
Steady-state infiltration (cm hr^{-1})[4]	1.67 – 3.05	5.28 – 13.0	–

[1] Data from Ecosystems Ltd (1986) regional low-altitude aerial survey interpretation.
[2] Normalized Difference Vegetation Index data from Africa Data Dissemination Service, GAC decadal time-series (1985 – 2002).
[3] Shepherd & Walsh (2002).
[4] Thine et al. (in press).
[5] Spectral library estimate.

The net project area (NPA) will be the area in which improved land management treatments will be implemented, as selected by farmers, and in which the impacts of these treatments will be monitored. It is the area over which baseline predictions will be made and monitored, consistent with current international rules for eligible greenhouse gas sinks

Focal area locations will be selected randomly, nested within basins and elevation zones, but subject to the following criteria: no part of any FA will impinge on 1990 baseline "*forested lands*"; FAs will not impinge on large-scale commercial agricultural areas (e.g. rice irrigation schemes, tea estates, and sugar cane plantations); FAs will not impinge on government lands such as protected areas and game parks; FAs will not impinge on large wetlands or urban areas.

Field Sampling Design within Focal Areas and Reference plots

Ground measurements within each focal area will be carried out using a spatially clustered sampling plan. Fifteen plot clusters, based on QuickBird images (0.7 m resolution), will be selected at spatially stratified, randomly located grid intersections in each image. Within each cluster, there will be 13 systematically circular sampling plots, located along 3 radial line transects. All reference locations and plots will be documented with digital photographs that will contain the precise geographic coordinates of each plot, and these will be registered on a GIS compatible database to facilitate validation of field observations, and assist in navigation during revisits.

Data collected at each cluster will include biophysical, site characterization data, above and below ground biomass, erosion observations, etc. A 5-person team consisting of 1 person for data recording, GPS data collection, and infiltration measurement, and 2 persons for soil auguring and vegetation sampling, can comfortably complete 1 cluster in ~1 day depending on accessibility and local terrain conditions.

Farmer-selected stocking plots. Five additional plots per cluster will be stocked with a variety of farmer-selected tree species, as well as with a project-selected, indigenous reference trees. These "stocking plots" will provide information about tree survival, growth performance, and carbon sequestration traits across differing site conditions, and they will be used as demonstration plots and as seed orchards for locally operated nurseries. Within each stocking plot, rectangular livestock-proof enclosures will be established to assess the effects of tree performance vis-à-vis livestock browsing. This is necessary for monitoring net primary production and net ecosystem production.

Stocking plots will be matched with an equal number of "control plots" located immediately adjacent and under essentially identical pre-project site conditions[3], and on which no project facilitated interventions will be carried out. Both stocking and control plots will be monitored over the course of the project. This will provide information on shifts in non-project related baseline measurements.

Table 2. Summary of proposed focal areas (FAs), stocking and control plots that will be established over the course of the project[4].

Focal areas	FA's	Clusters	Control	Stocking
No. per basin	3	15	5	5
Project total	9	135	675	675

The FAs will serve as the primary data collection sites for the project. The location of the FAs and all data collected there from will be georeferenced and entered into a project GIS data base.

Remote sensing. Fifteen QuickBird satellite images[5] will be acquired each FA, and georegistered. Complete inventories of woody vegetation cover will be completed, using standard image interpretation and supervised classification techniques. Additionally, the images will be used to identify FAO Land Cover Classification System (LCCS) classes, housing units (thatch & modern roofs), the presence of soil conservation structures, roads, water sources including stock tanks, springs, boreholes, lakes and rivers,

[3] Note that this assumption will be quantified prior to initiating plantings
[4] To ensure that stocking plots are managed in accordance to project guidelines, we anticipate the necessity of compensating farmers for incurred production losses and labor inputs. Compensation
[5] http://www.digitalglobe.com

roads, tracks and physically degraded or barren areas such as rock outcrops, gullies, landslides and hardset areas.

In addition, ASTER images will be acquired, and new digital elevation models will be constructed. These will be used to derive watershed boundaries at different levels of stream order, and secondary terrain information such as slope, specific catchments area and plan and profile curvatures.

Monitoring rural livelihood and poverty. Participatory rural appraisal techniques will be used to capture socio-economic indicators in each FA. Attention will first be given to villages within the FAs, although additional villages may be included later. Initially, focus group discussions with local leaders and community members will be used to introduce the project to the area and to identify the major natural resource management constraints faced by the community. Focus groups will be asked to rank problems and possible interventions for these by consensus. Results will be synthesized as reference documents for each community.

The information collected will include household surveys, agricultural labor profiles, farm size, food sufficiency, proportion of land for subsistence food crops, number and type of animals, improvements to farm dwellings, distance to potable water, and willingness to participate in new technologies.

Ecosystem richness and (agro)-biodiversity. Two complimentary approaches for measuring biodiversity will be used. The first, , called "ecosystem richness", calculated on the basis of the type and number of farming systems in each FA (FAO LCCS Level 2). The second approach, called agrobiodiversity, is a rapid field approach to biodiversity assessment, based on using pair-wise plant checklists of useful, common exotic and indigenous plants. Agrobiodiversity will be assessed in terms of abundance, density, and relative frequencies of plant species, and the importance of traditional, indigenous plants.

Measuring impacts of land degradation on Lake Victoria. Monitoring of deforestation, sediment and nutrient loads to lake Victoria will be achieved by integration of the project with the SIDA funded project "Improved Land Management in the Lake Victoria Basin". Large scale diagnostics of land degradation will be done using spectral analyses of soil samples, based on a reference soil spectral library. Areas will be identified and mapped as erosion sources, sediment deposition basins, and reasonably stable areas. Results are used to target land management interventions.

Deforestation will be monitored along forest margins using remote sensing. Land degradation and sediment loads will be monitored in the FAs. Observations will be matched with field data and socio-economic surveys collected at the monitoring sites. Interpretation will be done for deforestation hot spots, sources of sediment, and impacts on soil fertility.

Sediment and nutrient loads will be monitored by collecting water samples at 14 day intervals during the rainy season (less frequently during the dry season) at the headwaters, midway, and the mouth of each river. Normalized turbidity units (NTU). Will be calculated, and results interpreted for human consumption, recreation use, and impacts on aquatic life. Water collecting stations will be established to estimate the contribution to sediment budget not only from project areas, but also non-targeted areas such as protected areas, wetlands, large-scale commercial agricultural areas and urban areas.

Measuring and monitoring biomass

Above ground biomass. Sampling on each plot will include standing wood, under story, woody debris, surface litter, and coarse roots. Samples of representative strata, collected from line intersect sampling, will be harvested, weighed, and analyzed for carbon by dry combustion. Surface biomass from annual

crops will not be included as these are assumed to have minimal impacts on carbon sequestration. Allometric equations will be used to calculate above ground biomass and carbon. Available allometry equations from FAO will be tested for accuracy, and as necessary, new, generic and regionally specific allometric relationships will be developed. These will be specific to west Kenya, and also for other similar humid, tropical regions in Africa.

Below ground carbon. Carbon sequestration from annual crops (agricultural areas) will be assessed as change in soil organic matter. Soil organic matter and organic carbon will be analyzed by sampling four top soils (0-30 cm) and 4 sub soils (30-50 cm) at the center and terminal end of each plot on the radial line transects. Randomly selected subsets will be analyzed for total carbon, soil organic carbon, nitrogen, and δ^{13} carbon, using element analysis and isotope mass spectrometry. All soil carbon stocks will be expressed on a soil mass equivalent basis.

Soil condition and erosion classification. Soil carbon, other soil organic constituents, and selected other soil properties will be measured using Diffuse Reflectance Spectra. This is a rapid. Filed method for soil analyses, based on correlations against a reference spectral library. These measures are necessary to estimate the rates of soil organic carbon sequestration, calculate carbon credits on a net-net basis, and to predict estimates for the various soil management interventions. An index of soil erosion, EDI (Erosion/Deposition Index), will be used to define and map areas subject to erosion, deposition, and stable. This index has been found to be strongly related to soil management technologies. Because underlying rocks have been deeply weathered and have provided thick erodible material, the weathering profile of underlying rocks will also be considered.

A simple, bio-assey procedure for assessing the fertility status of the soil will be used to assess soil fertility. Maize seedlings will be grown under controlled greenhouse conditions for 14 days. Root to shoot ratios will be calculated from harvested biomass. Results will be correlated with land cover conversion, EDI, as well as soil infiltration capacity.

Determination of soil infiltration capacity will be obtained using two single-ring infiltration cylinders per plot, as well as tension adsorptions using pressure plates. Soil texture-structure indices will be determined related to resistance to soil erosion.

Non-CO_2 greenhouse gases

Tier 1 Level assessment of green house gasses. The current emissions of non-CO_2 greenhouse gases from the project focal areas will be estimated using the methods described in the IPCC "Revised 1966 Guidelines for National Greenhouse Gas Inventories" and "Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories". In general, the decisions made at each node of the IPPC decision trees in the Good Practices Guidance will be presented. Equations for the Tier 1 estimate, a table that summarizes the calculations, the source of the data to be used for the calculation and a description of the sources of uncertainty in the estimate will be prepared. Procedures include estimating CH_4 from livestock, manures, and flooded rice, N_2O emissions from manures, and direct and indirect N_2O emissions from soils, emissions from filed burning and agricultural residues, and CH_4 uptake by soils will be developed.

Targeted research to refine the IPCC coefficients. Some targeted research will be conducted to develop coefficients suitable for Tier 2 assessment. Tier 2 accounting will also be used in the monitoring and evaluation of the project.

Measurement of N_2O and NO fluxes. Surface fluxes of N_2O and NO will be done using chamber techniques to capture gaseous emissions in reference plots stratified by erosion phase and infiltration rates. Samples will be analyzed by gas chromatograph.

A mechanistic model will be developed to explain rates of N cycling, specifically to rates of NH_4^+ oxidation by nitrifying bacteria and NO_3^- reduction by denitrifying bacteria, as well as the amount of N that "leaks" out as gaseous N-oxides. It will be used to assess seasonal and inter-annual variability, N_2O, NO, and CH_4. This will help to predict variability of nitrogen oxide emissions, including the effects of deforestation, land-use change, animal populations, and manure management. This model can easily be incorporated in ecosystem models such as CENTURY or NASA-CASA.

CH_4 consumption by soils. Surface fluxes of CH_4 will be measured using chambers techniques similar to NO and N_2O. A conceptual model, based upon the linkage between CO_2 in the soil atmosphere and CH_4 fluxes, and determined by soil water content and soil texture and by biological processes of O_2 consumption, will be used to estimate consumption by soils under improved and traditional land use practices.

Calculating baselines. Regional baselines will be assessed using mixed-effects models, intended specifically for analyses of grouped data. Data from the multiple spatial scales, e.g. plot-level measurements grouped within clusters grouped within FAs will be analyzed to assess baseline conditions for carbon, other GHGs and carbon balance. Generalizations to higher levels of grouping (e.g. plots / clusters / FA's / Elevation zones) are straight-forward. Concurrently, a carbon baseline will be calculated using the CENTURY model. Net-net accounting to estimate the amount of potential carbon credits, will be applied by estimating the total carbon status minus the atmospheric forcing functions of N_2O and CH_4.

Annex 10: Root Causes of Ecosystem Degradation

KENYA: Western Kenya Integrated Ecosystem Management

8.1 Context

The highlands of western Kenya are home to 12 million people, or 40% of the country's population, but occupy only 15 percent of the land area. These lands have high agricultural potential, yet recent soil degradation has led to incidences of abject poverty on the order of 30 to 50 percent of rural households (Central Bureau of Statistics, 1998). Low yields and increasing population levels in western Kenya have caused more marginal lands to be brought into production and have led to the degradation of remaining natural forests, resulting in still greater rates of land degradation, habitat destruction, and biodiversity losses. Current smallholder practices are no longer adequate to meet food needs or maintain the resource base, a situation that must be reversed if social and environmental disasters are to be averted. Poverty reduction, environmental quality, and sustainable agriculture are intricately linked in the area. Reversing the downward trend will require a sustained annual growth rate in agricultural production of 4 percent (Cleaver and Schreiber, 1994). This target can only be achieved through agricultural intensification. The intensification must be achieved, however, in a manner which enhances soil fertility. It is only through integrated ecosystem management (integrating management of production and environmental service functions) that the dual issues of reversing/preventing ecosystem degradation and reducing rural poverty will be addressed, and local, national, and global environmental benefits will be achieved.

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[6] coupled with stagnating urban job growth has accelerated the search for new agricultural land, resulting in a high rate of woodland, forest, and wetland conversion for agricultural use. Locally, there has been little restriction on encroachment onto steep slopes, wetlands, and forests, despite the existence in some cases of laws and regulations against such practices.

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. The government has introduced reforms to enable markets to function better, but the agricultural sector is still plagued by poor management of key commodity sectors, and inadequate maintenance and expansion of infrastructure. Credit is a serious problem for the small farmer. Access to inputs is hampered by lack of preferred inputs, late delivery, and high costs of inputs. Marketing constraints are g are visible on the landscape through the absence of higher value crops.

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

[6] Rural population birth and growth rates have eased of late, in part due to better education and increased burdens on civilians to pay for health and education services.

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. Especially since current poor management practices are threatening biodiversity, increasing sediment loads in key waterways and reducing GHG storage in above and below ground biomass.

Improved agricultural practices must also increase farm profitability, which is essential if they are to be adopted by farmers. Recognition of the social and economic needs and expectations of rural populations must be an integral part of any proposed changes in agricultural practices. On the policy side, the focus has been on the larger farmer and the assurance of adequate food supplies to urban areas (e.g. packages centered around expensive seed and fertilizers). Similarly, flows of information are generally poor in smallholder rural communities. Flows from research and extension to communities are inadequate, as are flows between households and within households.

8.2 Current Problems at Household Level

At the farm household level, trends of declining agricultural productivity and declining environmental quality have led to the emergence of poverty and pessimism towards agriculture resulting in reduced number of feasible options for improving livelihoods. Many households have since disintegrated socially through individual migration and diversification of livelihood strategies. Consequently, agriculture tends to become more marginalized leading to the need for intensified efforts to invigorate productivity and reverse degradation. The government of Kenya has a draft poverty eradication plan, but relies on external funds to finance much of the plan.

Even if the economic climate for agriculture is improved, certain types of degradation may still occur because they take place or originate on land that is not farmed (e.g. abandoned land, roadsides, river banks). Such situations require collective action to solve, whether that be among households within a village or among different villages. The hilly and sloping topography of Western Kenya contributes to trans-farm degradation. Moves toward greater decentralization have begun but the legacy of a centrally controlled style of governance in Kenya generally hinders communities from taking their own initiatives as authority for initiative is vested in few office holders. Recent efforts (e.g. Lake Victoria project) offer new platforms for bringing communities together, but these are still nascent.

KARI and the World Agroforestry Center have been working on ecosystem management problems in western Kenya for the past 10 years. Several agroforestry practices exist that have been proven to be helpful with overcoming soil fertility, weed, and erosion problems, particularly when these practices are combined with other conservation measures (e.g. minimum tillage, integrated pest management, soil fertility recapitalization). Agroforestry provides reasonable options for small-scale farmers to re-establish the productivity of their land, diversify production, and reverse the downward spiral of poverty and environmental degradation. The “Pilot Project on Soil Fertility Replenishment and Recapitalization” initiated in 1997, has begun the work of scaling up the results of research through community-led activities in partnership with the Ministry of Agriculture and Rural Development (MoARD), local and international NGO’s, and community-based farmer organizations.

The Government has funded this project since its inception. Under this project, 17 pilot villages with 2035 households in two administrative districts (Siaya and Vihiga) are participating. Adoption rates of agroforestry technologies for soil fertility improvement, including improved fallows and biomass transfer of *Tithonia diversifolia* (a green manure system) are on the order of 60-70 percent. Through a collaborative network of partners, another 10,000 farmers scattered in 16 other districts in western Kenya, have been reached and impacted. Farmers are now adding value to improved soil fertility by growing high

value crops (vegetables, fruit trees), and those who can afford it are beginning to raise dairy animals. These technologies have certainly had profound impacts on rural food security, incomes, and their general welfare, and this is currently being monitored to quantify the nature and magnitude of these impacts. Constraints to adoption have been lack of information and awareness about technology, adequate supply of seeds and planting materials, training and follow-up. These are problems that will be addressed over the course of this project.

In addition to solving these local problems of poverty and natural resource degradation, better farming practices including agroforestry also provide global environmental benefits. The recent *Land-Use, Land-Use Change, and Forestry* Report (2000) of the Intergovernmental Panel on Climate Change (IPCC) has identified conversion of degraded croplands into agroforestry as the land-use practice in the tropics with the largest potential to sequester carbon. Estimates of carbon accumulation rates range from 2 to 9 tones per hectare per year, depending on the climate and the nature of the agroforestry practice. Agroforestry can also generate important global benefits in the area of international waters by decreasing the impacts of poor land management practices on water quality in Lake Victoria. The area that is proposed for this project is part of the Lake Victoria basin, whose products and services support some 25 million people in Kenya, Tanzania and Uganda. Environmental degradation in the uplands inevitably affects the lake, resulting in declining fisheries and increased infestation by the exotic aquatic weed, water hyacinth (*Eichhornia crasipes*). For example, upland erosion in the Nyando River watershed causes a sediment plume in the lake that is visible from space. The other rivers (e.g., Yala, Sondu) discharging into the lake show similar effects of inappropriate land management practices in the watersheds. KARI, World Agroforestry Center, and partners have been involved in the *"Improved Land Management in the Lake Victoria Basin Project*", which concentrates on the Nyando and Sondu-Miriu river basins that empty into Winam Gulf of Lake Victoria. This project seeks to decrease the significant sediment loads delivered to Winam Gulf through improved land management practices, restoration of vegetation, and restoration of the filter function of wetlands.

Furthermore, agroforestry can enhance biodiversity and agrobiodiversity in the agricultural landscape. Studies conducted by the "Alternatives to Slash and Burn Programme" in the humid tropical areas of Africa, Southeast Asia and Latin America show increased diversity of flora and fauna with the adoption of agroforestry practices. Increased heterogeneity on the landscape creates more niches and increases habitat for different species. Agroforestry also has the potential to contribute to biodiversity in protected areas by providing wood to rural households and thus decreasing pressure on resources inside preserves. Finally, agroforestry affects belowground biodiversity (agrobiodiversity). For example shifts in nematode populations in improved fallow systems and communities appear to be more diverse and more even (Desaeger et al., 1999). This increased evenness appears to decrease the pathogenicity of nematodes on subsequent crops.

Annex 11: Biodiversity in Western Kenya

KENYA: Western Kenya Integrated Ecosystem Management

Kenya is home to 25,000 species of animal and 7,000 species of plants. Western Kenya has a variety of forest, grassland and wetland habitats that include both common and endangered species. Several ecologically sensitive sites are under threat from agricultural induced encroachment. Although Kenya has a number of national parks or reserves, including large forest habitats in western Kenya, many smaller forest fragments, grasslands and wetlands that are home to threatened or endangered species are not formally protected. Forest fragments, grasslands, wetlands and riparian areas are critical natural habitats that serve as important refugia for a variety of endemic and threatened species. Wetland areas around Lake Victoria play an important role as water filters, fish nurseries and migratory and endemic bird habitats. Traditional groves and other forest fragments are among the last remaining areas outside of protected forest reserves where a high density of endemic plant species can be found. Western Kenya also has a number of small riparian zones around the major rivers and their tributaries. Riparian areas often form unique ecosystems that do not extend beyond the narrow boundaries of the river and are home to species not found in the general catchment zone. Grass or shrublands are easy targets for conversion to agricultural lands but are also important ecosystems for small mammal and bird species.

Agriculture related threats to critical biodiversity habitats in western Kenya include clearing or drainage of land for cultivation, overgrazing, tree removal for local fuelwood use, sedimentation of wetlands, and destruction of riverbanks through cultivation or removal of tree and plant vegetation. Many of the critical habitats are in densely populated areas and are under threat from agricultural induced encroachment.

Western Kenya Integrated Ecosystem Management Project

The project will be implemented in three river basins at upstream, mid and downstream intervention areas. The project will impact biodiversity in three ways: (i) through protection of small but important critical habitats in the primary project intervention area; (iii) through reduced pressure on secondary project area; and (iii) through increased biodiversity in the on-farm environment. The primary project area (nine100 km^2 blocks in Nyando, Yala and Nzoia basin) does not include any protected areas and but the larger catschment area, which can be characterized as the secondary project area, does include important protected areas where the project is expected to have an indirect effect on biodiversity. Maps of the project intervention area are found in Annex 12.

The project is expected to impact non farm biodiversity through decreased pressure on natural habitats and reduction in sedimentation in wetlands. The globally significant biodiversity are determined to be those species classified as threatened by the World Conservation Union (IUCN). The Table 2 below presents a list of IUCN red list species[7] found in western Kenya. Although a number of threatened species are found in Kenya (over 75), relatively few have native habitats in the project area. The following matrix presents western Kenya species categorized as endangered, vulnerable or at low risk for extinction from agriculturally induced habitat loss or land degradation (including water pollution). Other types of habitat endangerment such as natural changes in native species dynamics, hunting, or natural disasters are not considered as they will not be affected by project interventions.

[7] "The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on taxa that have been evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those taxa that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable)." Http://www.redlist.org

The following birds are commonly found in the Kenya's Lake Victoria Basin: Blue-breasted Bee-easter, Blue Swallow, Swamp Flycatcher, Greater Swamp-warbler, White-winged Warbler, Papyrus Yellow Warbler, Carruthers' Cisticola, Papyrus Gonolek, Red-chested Sunbird, Red-headed Quelea, Slender-billed Weaver, Yellow-backed Weaver, Northern Brown-throated Weaver, Black-throated Seedeater and the Papyrus Canary.

In addition, a number of species that are native to or have a migratory presence in Western Kenya are on the IUCN red list as threatened by agricultural based land degradation : Blue Swallow (Vulnerable); Imperial Eagle (Endangered), Corn Crake (Vulnerable), Turner's Eremomela (Endangered), Lesser Kestrel (Vulnerable), Chapin's Flycatcher (Vulnerable); Speckle Throated Otter (Vulnerable). Chapin's Flycatcher and Turner's Eremomela have a particularly small range, and are found primarily in forested areas . However, forest fragments exist throughout the basin and Turner's Eremomela was initially identified around the Yala river, one of the project's three river basins. The Blue Swallow is more likely to be affected by project activities because its habitat is in grassland/shrubland areas that are often used as agricultural areas. Snake species such as the African python are also common in the river basins.

Plant diversity on farm has also been reduced by low soil fertility, erosion and mono-cropping. Western Kenya has over two hundred endemic plant species . The project activities will contribute to biodiversity conservation through increased agro-biodiversity (on farm) as well as biodiversity enhancement in the agricultural landscape (off farm). Soil fertility replenishment will enhance biodiversity by increasing heterogeneity in the landscape leading to increased above and below ground biodiversity. Project activities such as tree fallows and other agroforestry systems will also contribute to satisfying the demand for fuel wood, leading to less encroachment on forests and woodlands. Studies conducted by ICRAF's Alternatives to Slash and Burn Programme in the humid tropical areas of Africa, Southeast Asia and Latin America show increased diversity of flora and fauna with the adoption of agroforestry practices. Increased heterogeneity on the landscape creates more niches and increases habitat for different species. Agroforestry also has the potential to contribute to biodiversity in protected areas by providing wood to rural households and thus decreasing pressure on resources inside preserves. It is recognized that this benefit is context specific, but there are situations in the proposed project area where this may apply. Finally, agroforestry affects below ground biodiversity (agrobiodiversity) in ways are only beginning to be understood. For example shifts in nematode populations in improved fallow systems and communities appear to be more diverse and more even (Desaeger et al., 1999). This increased evenness appears to decrease the pathogenicity of nematodes on subsequent crops. Other areas of below ground biodiversity still need to be explored.

Project Intervention Area

The project will be implemented in three river basins at upstream, mid and downstream intervention areas. Each of the nine project intervention areas are adjacent to or include a number of critical habitats. Some are formally recognized as important bird areas and wetlands, others are informal sites that are local forests fragments or grasslands. Primary project intervention sites have been tentatively identified and include the following ecologically sensitive sites:

Nzoia Catchment

- Highland area: Forested areas, project intervention site includes with tributary to Nzoia river
- Midland area around town of Lugari: Former site of Lugari Forest Preserve (de-gazetted), forest fragments still present around area. Project intervention site includes two tributaries to Nzoia river.
- Downstream area: Site is east of Port Victoria, 30 km from Yala swamp and small lakes such as Lake Kanyaboli and Lake Sare

Nyando Catchment

- Highland area: Site is near Nandi Hills. Forest fragments still in existence, site also includes Ainabngetuny tributary
- Midland/lowland area: Site includes Nyando river and associated riparian zone
- Lowland area: East of Paponditi town, east of Kusa swamp. Site includes Awach tributary

Yala Catchment
- Highland areas: Site is east of Kapsabet town, includes tributaries to Yala river,
- Midland area: Forest fragments, west of former Kaimosi forest preserve (de-gazetted), project intervention sites include tributaries to Yala river
- Lowland areas: South of town of Siaya, no formal wetland areas, but is adjacent to isolated wetland remnants and seasonally flooded areas

Lack of data on smaller critical habitats prevents a full listing of biodiversity in the area but an overview of biodiversity in the project area is included in Table 1 below. Community biodiversity surveys will be conducted as part of the project's community NRM planning activities and baselines data collected on species in the project intervention areas.

Table 1: Important areas of biodiversity in Primary Project Intervention Area

Area	Size (ha)	Location (district)	River Catchments	Ecosystem type	Important Species	Major Threats
West Kano Bird Sanctuary	<10	Kisumu	Nyando	Mid altitude forest fragment	To be determined	Agricultural induced encroachment
Yala swamp and Lake Kanyaboli	8,000	Siaya/Busia	Yala	Wetlands	Papyrus Yellow Warbler, Great Egret, Baillon's Crane, Lake Victoria ciclids, endemic Haplochromine species, refuge for Protopterus aethiopicus, Clarias mossambicus	Sedimentation, agricultural encroachment, drainage for agricultural purposes, overgrazing in the dry season
Lugari forest fragments	2,160	Lugari	Nzoia	Mid altitude forest fragment	To be determined	Local tree logging, agricultural encroachment
Kaimosi forest fragments	19		Yala	Mid altitude forest fragment	To be determined	Local tree logging, agricultural encroachment
Ainabngetuny, Mbogo, Nyando and Awach tributaries		Several	Nyando	Riparian zone	Migratory bird species, full species inventory to be determined	Riverbank degradation due to agricultural encroachment,
Dunga Swamp	500	Kisumu	Nyando	Wetlands	Papyrus Gonolek, Papyrus Canary, Swamp Flycatcher, Greater Swamp-warbler,	Sedimentation, agricultural encroachment, drainage for agricultural purposes, papyrus harvesting
Kusa Swamp	1,000	Kisumu	Nyando	Wetlands	Plants: Cyperus papyrus; Birds: Papyrus Gonolek, Papyrus Canary, Swamp Flycatcher, Greater Swamp-warbler; Reptile and fish: African python, endmic Haplochromine species	Sedimentation, agricultural encroachment, drainage for agricultural purposes, papyrus harvesting
Local refugia			Nzoia, Yala, Nyando	Forest fragments, grass and srublands	Grassland: Blue Swallow, migratory species Forests: migratory birds, full species inventory to be determined	Agriculturally induced encroachment

Table 2: Important Biodiversity sites in the Secondary Project Area

Area	Size (ha)	Location (district)	River Catchments	Ecosystem type	Important Species	Major Threats
Koguta Swamp	1,800	Kisumu	Nyando	Wetlands	Papyrus Gonolek, Papyrus Canary, Swamp Flycatcher,	Sedimentation, agricultural encroachment, drainage for

					Greater Swamp-warbler, fish species to be determined	agricultural purposes
Ruma National Park	12,000	Suba	Gucha	Grassland, open woodland and thickets	Roan antelope, Leopard, Buffalo	Agricultural degradation
South Nandi Forest	18,000	Nandi	Nzoia	Mid-altitude tropical forest, transitional to montane forest	Turner's Eremomela, Chapin's Flycatcher	Encroachment, Illegal logging
North Nandi Forest	10,500	Nandi	Nzoia	Mid-altitude tropical forest, transitional to montane forest	Turner's Eremomela, Chapin's Flycatcher	
Sio Port Swamp	400	Busia	Nzoia	Wetlands	Papyrus Gonolek, Papyrus Canary, Swamp Flycatcher, Greater Swamp-warbler, fish species to be determined	Sedimentation, agricultural encroachment, drainage for agricultural purposes
Kakamega Forest	18,300	Kakamega	Nzoia	Mid-altitude tropical rainforest, grassy and bushy glades	Turner's Eremomela, Chapin's Flycatcher, Duikers, Blind Snake,	Encroachment, poaching and livestock grazing
Busia Grasslands	250	Busia	Nzoia	Seasonally flooded grasslands and riverine scrub	Blue Swallow,	Agriculturally induced encroachment

Table 3: IUCN Red list species found in western Kenya under threat from agricultural activity

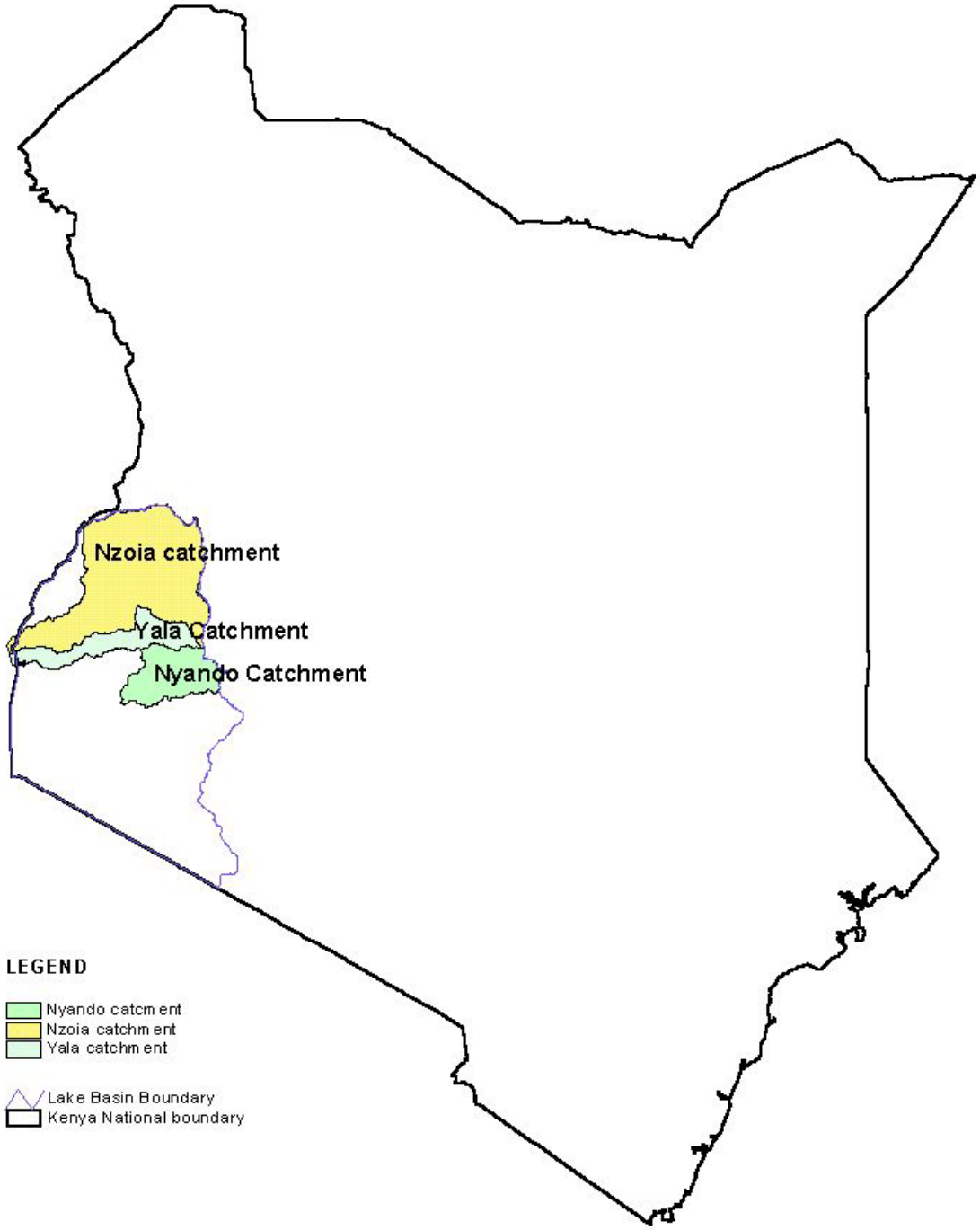
Scientific Name	Common Name	Range	IUCN category	Red list justification
Birds				
Aquila heliaca	Imperial Eagle	Europe, Asia, Africa	Endangered	It is estimated that this species' small population has declined by more than 10% in three generations, primarily as a result of the loss of mature native forest and persecution in parts of Europe and probably in Asia.
Crex crex	Corn Crake	Europe, Asia, Africa	Vulnerable	Recent surveys in eastern Europe and new population estimates for Asiatic Russia and have shown this species to be considerably more numerous than was thought in the early 1990s. Population trends in these regions are unclear but across the species' range evidence of a continuing decline is limited. Historical declines in western Europe occurred rapidly as a result of changes in agricultural practices. Following land privatisation, there is potential for similar widespread land-use change in the species' eastern European strongholds which would result in a rapid population reduction in the near future. For this reason the species is considered Vulnerable.
Eremomela turneri	Turner's Eremomela	Kenya (Yala river), Congo	Endangered	The range of this species is very small and severely fragmented, and it no longer occurs at some of its few known locations. Since its forest habitat continues to be destroyed and degraded, it is treated as Endangered.
Falco naumanni	Lesser Kestrel	Europe, Middle East, Africa	Vulnerable	This species has undergone rapid declines in western Europe, equivalent to c.46% in each ten years since 1950, on its wintering grounds in South Africa, equivalent to c.25% in each ten years since 1971, and possibly in parts of its Asian range. If these declines are

				representative of populations in all regions, the total population is likely to have declined by more than 20% in ten years, which qualifies the species as Vulnerable. It is predicted that similar declines will continue over the next 10 years.
Hirundo Astrocaerulea	Blue Swallow	Eastern, Southern Africa	Vulnerable	This migratory species is threatened by destruction and degradation of its grassland habitat on both its breeding grounds and its wintering sites. This is inferred to have led to a rapid reduction of its already small population, which is projected to continue in the future unless conservation action is taken.
Muscicapa lendu	Chapin's Flycatcher	Kenya, Rwanda, Uganda, Congo	Vulnerable	Although little is known about the current status of this species, it appears to be rare throughout its fragmented range, and the intense pressures on its habitat imply that its probably small population is declining. It is therefore considered Vulnerable.
Mammals				
Lutra maculicollis	Speckle throated otter	Africa	Vulnerable	There has been an observed decline in the distributional range of L. maculicollis, especially in South Africa, as this species is susceptible to the increased silt loads (turbidity) in many African Rivers resulting from increased agricultural activities. As they are 'sight' feeders, this affects their hunting success. This species is sometimes treated under the monotypic genus Hydrictis.
Neotragus moschatus	Suni antelope	Kenya, South Eastern Africa	Low Risk	
Cephalophus nigrifrons	Black Fronted Duiker	Central Africa	Low Risk	

Annex 12: Maps[8]

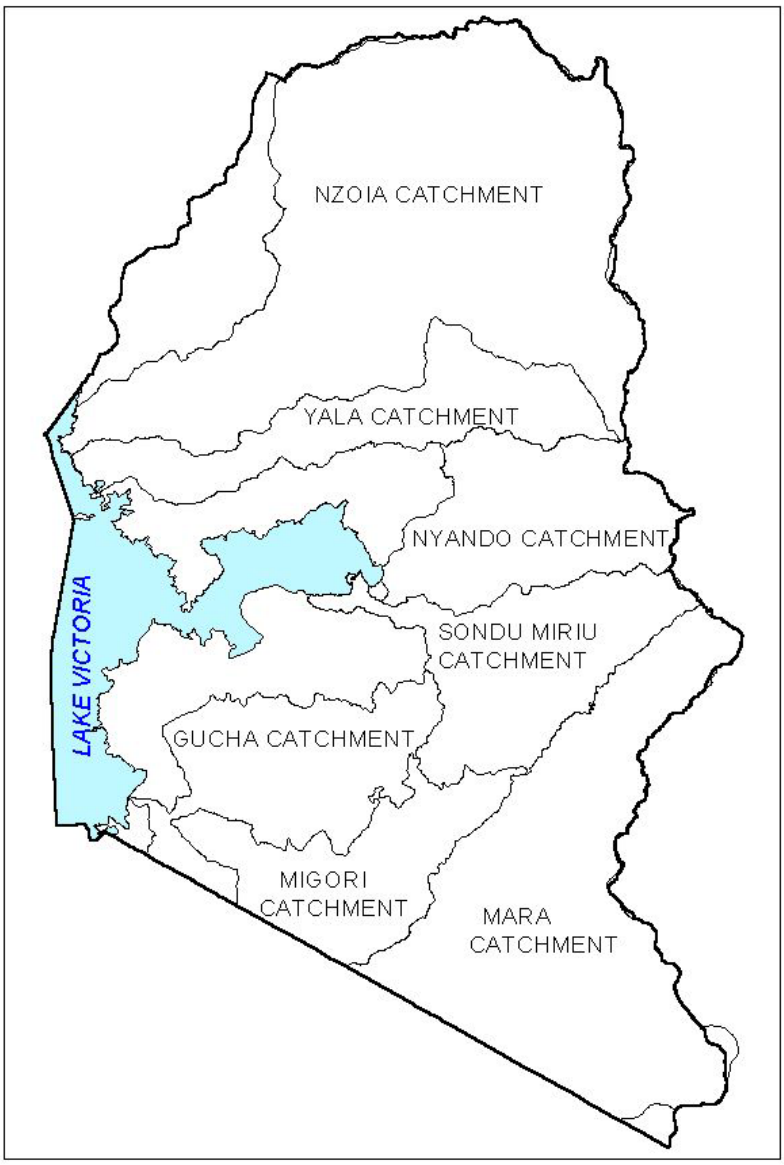
KENYA: Western Kenya Integrated Ecosystem Management

Project area:

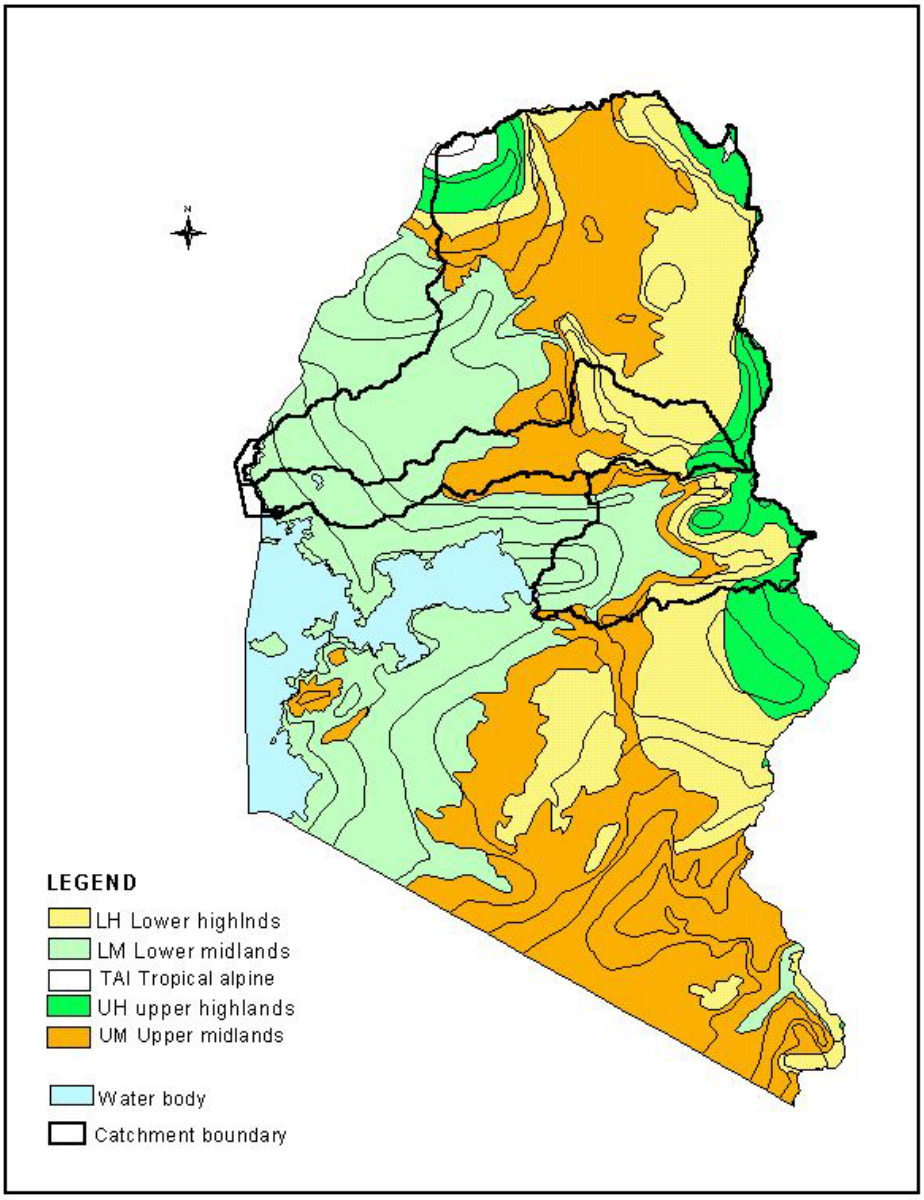


[8] All maps in this section were created by Kenya Agricultural Research Institute unless otherwise noted

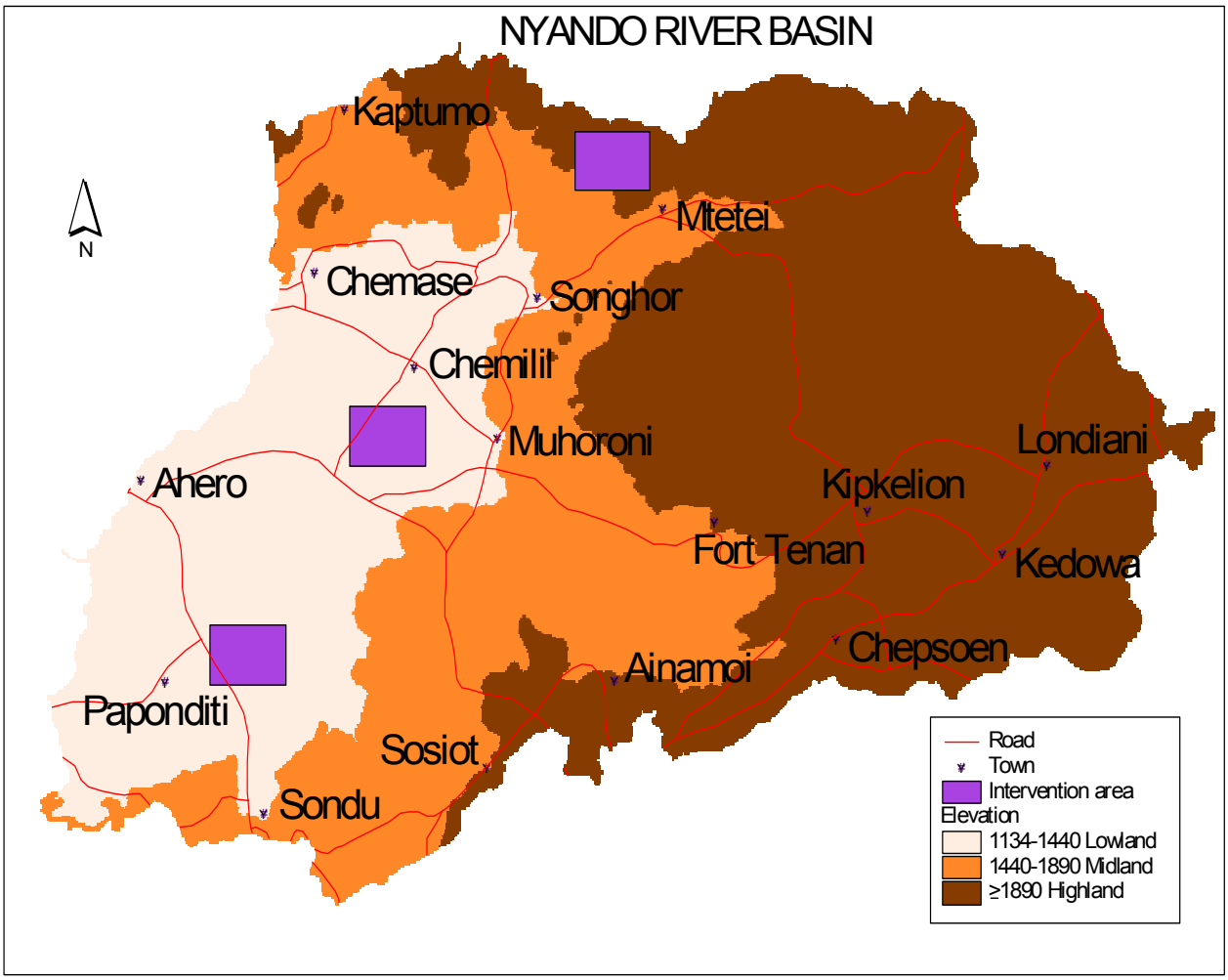
Kenya's Lake Victoria Catchments



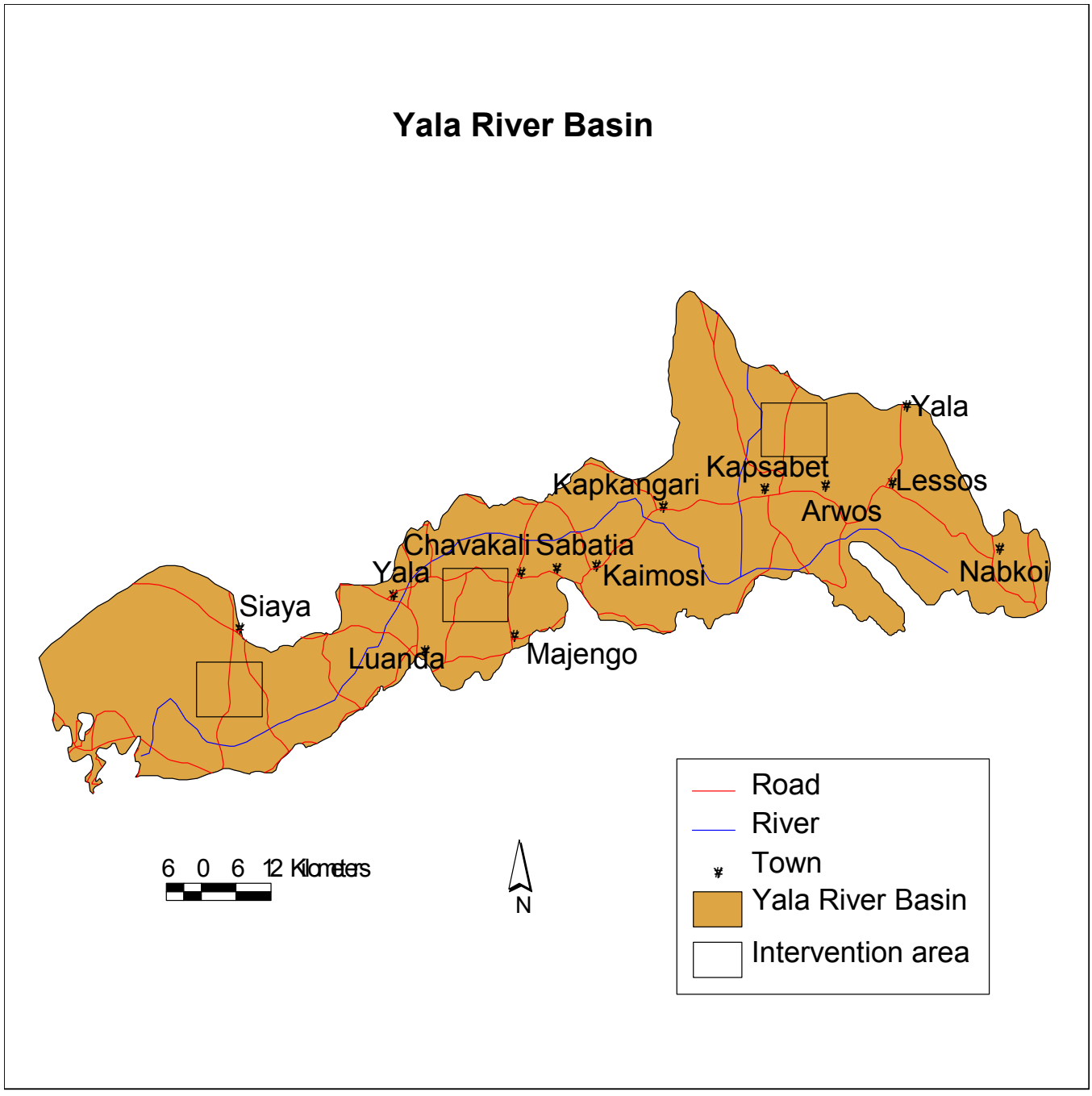
Lake Victoria Basin Ecological Zones with Project Area Highlighted



Nyando Basin with Project Intervention Sites Highlighted

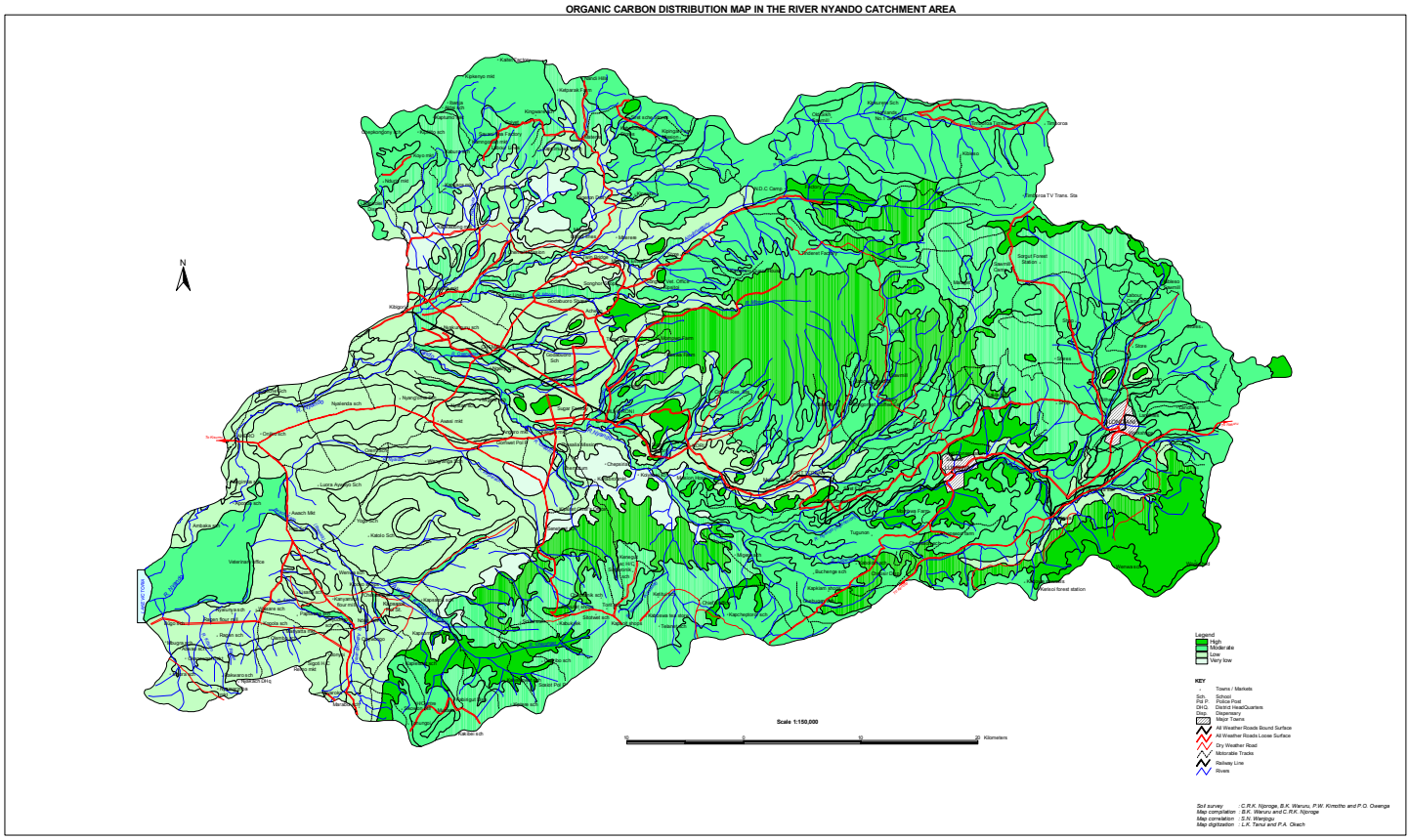


Yala Catchment with Intervention Sites Highlighted



Nzoia River Basin with project intervention areas highlighted

Nyando Catchment Carbon Use[9]



[9] Data on soil, vegetation, erosion rates, and carbon stocks were collected under the PDF B and will serve as the baseline for the Nyando catchment. Similar baseline data will be compiled for Yala and Nzoia catchments.

Nyando Catchment Erosion