KENYA
Western Kenya Integrated Ecosystem Management

GEF Project Document

Africa Regional Office
AFTS2

Date: January 25, 2005	**Team Leader:** Berhane Manna
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Focal Area: M - Multi-focal area	**Sector(s):** General agriculture, fishing and forestry sector (100%)` **Theme(s):** Environmental policies and institutions (P), Biodiversity (P), Other environment and natural resources management (S)

Project Financing Data

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

For Loans/Credits/Others:
Total Project Cost (US$m): $8.5 **Co-financing (US$m): 4.4**
Total Bank /GEF Financing (US$m): 4.1

Proposed Terms (IDA): GEF

Financing Plan (US$m): Source	Local	Foreign	Total
BORROWER/	1.5	0.00	1.5
PHRD	0.20	0.20	0.40
Other	2.50	0.00	2.50
GLOBAL ENVIRONMENT FACILITY	2.62	1.48	4.1
Total:	6.82	1.68	8.5

Borrower/Recipient: GOVERNMENT OF KENYA

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Project implementation period: FY2006-2010
Expected effectiveness date: June 30, 2005 **Expected closing date:** December 30, 2010

Estimated Disbursements (Bank FY/US$ m)

FY	2006	2007	2008	2009	2010
Annual	0.25	0.6	0.8	1.5	0.95
Cumulative	0.25	0.85	1.65	3.15	4.1

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A. Project Development Objective

1. Background:

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

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

As a result, conversion of woodlands, forests, and wetlands into agricultural production has accelerated in recent years with significant negative impact on the natural resource base. Studies conducted in the context of the Lake Victoria Integrated Land Management Project (LVILMP) uniformly indicate the occurrence of severely accelerated land degradation in the Lake Victoria watershed. Measurements performed on sediment cores collected in the Nyando estuary show that sedimentation rates of the basin have increased fourfold over the last 100 years, resulting in large gullies that advance at rates up to 200 meters per year and deposit large quantities of sediment in the Winam Gulf of Lake Victoria. (Walsh, unpublished data)

Western Kenya's rich stock of biodiversity has suffered as a result of land degradation. By the mid 1980's, some 400 endemic species of cichlid fish were approaching extinction due to encroachment from water hyacinth and increasing eutrophication of Lake Victoria. Deforestation and loss of vegetative cover has also resulted in a shortage of plant and tree resources. Over the last 150 years the most important land cover conversion pathways in the Nyando basin have been characterized by substitutions of vegetation dominated by trees (characterized by a 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.

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

Better farming practices 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 the conversion of degraded crop lands into agroforestry as the land-use practice with the largest potential to sequester carbon.

The Government of Kenya has been actively involved in natural resource management and disseminating new technologies aimed at improving land management and agricultural production. 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 natural resource management. The project is also expected to demonstrate the value of such an 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 integrated 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.

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 by end of project
Participation of local and regional institutions in planning and coordinating ecosystem management activities	90% 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 within three years of technology dissemination
Change in soil fertility and in land quality on land where improved land management technologies are applied	Increase in below ground carbon in plots where the improved SLM technologies have been adopted by end of project
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)
Indigenous on- and off-farm biodiversity in the surrounding project area as measured by ground survey and estimates of eco-system richness	Increasing trend in abundance and diversity of plant species in at least 30% of focal area intervention sites, 50% of communities identifying a conservation strategy for specific threatened or endemic species in community plans by end of project
Reduced erosion rates and sediment delivery in watercourses surrounding project areas as measured by soil spectral analysis	Negative trend in erosion rates from farming plots receiving interventions by end of project

Reduced phosphorous runoff from agricultural land into key waterways.	Negative trend in phosphorous runoff from demonstration plots in at least 50% of focal areas by end of project

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:** June 17, 2004

The Bank's CAS was recently presented to the Board and represents a strategy of re-engagement with Kenya. The CAS is centered around four themes: strengthening public sector management and accountability, reducing the cost of doing business and improving the business climate, reducing vulnerability and strengthening communities, and investing in people. The proposed project is consistent with the 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 in western Kenya to be financed in 2006.

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 regard 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 water bodies'. 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, and the application of a community driven methodology.

The project will build the capacity of community and other local institutions to identify and manage ecosystem issues and implement conservation or mitigation measures. The project will also 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. In particular, integrated ecosystem management interventions such as sustainable land management will increase above and below ground carbon sequestration 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. 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 linked to the 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 of 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 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 fuel wood 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. 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); and Forest fragments around Lugari and Kaimosi.

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 Papondit. 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 based land degradation (see the Biodiversity working paper in the project file for more detail).

In addition to critical habitat protection, the project is also expected to contribute to biodiversity conservation in the general catchment areas through reduced pressure on critical habitats. The project will also increase biodiversity in the agricultural landscape through soil fertility replenishment, which will

enhance biodiversity by increasing heterogeneity in the landscape leading to increased above and below ground biodiversity. Increased heterogeneity on the landscape creates more niches and increases 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. Land degradation interventions may also influence below ground biodiversity (agrobiodiversity) in ways are only beginning to be understood.

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.

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 experienced increasing rates of poverty. Together, Nyanza and 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.

The Government's Economic Recovery Plan 2003-2007 and Strategy for Revitalizing Agriculture (2004), have identified natural resource management and sustainable agricultural production as a priority for development. Agricultural research and extension are seen as key drivers for this process. 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 research centers and have developed strong linkages with government and non-government extension agents. KARI and KEFRI have partnered with the Ministry of Agriculture (MoA) on a number of sustainable land management initiatives in Western Kenya such as the National Agriculture and Livestock Extension Program (NALEP), Soil Management Project (SMP), Legume Research Network

(LRN), Agricultural Technology and Information Response Initiative (ATIRI), and Lake Victoria Improved Land Management Program (LVEMP).

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, and 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:

- The completion of the National Biodiversity Strategy and its corresponding Action Plan;
- The preparation of the first report to the COP in 1998 in accordance with the obligations under the CBD to report on progress made in respect to implementations of articles 6 through 8 of the CBD;
- The implementation by the national government of the GEF-supported Tana River Primate National Reserve Project;
- The implementation by the national government of two regional GEF-supported projects Lake Victoria Environmental Management Project and East African Cross-Border Biodiversity Project; and
- The designation of several areas 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 correspond to NEPAD's priorities on agriculture, the environment and empowerment.

3. Sector Issues to be Addressed by the Project and Strategic Choices:

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 project file.

***(c) 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 a greater development impact by increasing agricultural sustainability and output. Environmental services, particularly those associated with carbon sequestration, also have the potential to generate new types of assets that benefit local communities.

***(d) 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 then implementing plans which addresses these needs.

***(e) Seeking complementarity with other programs*:** The project seeks to build on and complement the success of other natural resource management projects in the area (SMP, ATIRI, LRNP, and the SIDA sponsored Lake Victoria Project). Linkages with the second GEF-financed LVMP II 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.

(f) 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 2006. 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.

B. Project Description Summary

1. Project Components (see Annex 1):

The project will utilize an 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 that they result in poverty alleviation and farmer empowerment.

A key element of IEM in the project will be linking upstream and downstream communities to better manage 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 community based organizations and village levels organizations as well as 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) the creation of inter and intra-community land degradation mitigation and biodiversity conservation strategies; and (iii) the 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 funding. The project will also strengthen the land/IEM planning capacity of local governments by supporting planning and training workshops at the focal area, district, and provincial levels. To support the development of PAPs and capacity building of local service providers, the project will support training for technology dissemination, development of extension messages and the purchase of media services.

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 are currently unprotected. Local critical habitats will be identified and where little is known about endangered or endemic biodiversity, special attention will be given to the identification of species, 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 (ICRAF). 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 Kenya in the global carbon market, the project will sensitize and build the capacity of the government, local institutions, and communities to manage carbon assets. The project will support targeted research to develop a methodology for net-net accounting and explore institutional mechanisms for community management of carbon assets. The project will also build the capacity of the Kenya Agriculture Research Institute through the purchase of equipment and training to measure carbon baselines, end of project carbon stocks and participate in international forums for climate change with the aim of establishing a national carbon monitoring and evaluation and certification capacity within the national research system.

The sub-component will also be co-financed by a Japanese PHRD grant for capacity building. The grant will support development of administrative processes required to enter into carbon sequestration contracts through training and consultancies in departments in charge of global environment conventions negotiations and implementation in the Ministry of Environment, as well as potential local and private sector operators willing to get involved in environmental markets.

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 would require community contributions, usually in the form of in kind contribution. Activities in this component will include:

- Development of village nurseries to support agro-forestry
- Conservation of existing biodiversity resources through adoption of protective measures and support to alternative livelihood strategies or small scale income generating activities that reduce pressure on critical habitats
- Dissemination of improved fallow and cover crop technologies to control land degradation and reduce sediment loss
- Training on improved land management practices
- Activities to increase plant or tree cover on and off farm in order to sequester carbon in agricultural landscapes
- A select number of small scale infrastructure activities such as the protection of river banks, and the construction of water pans

Pilot areas will also 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. Dissemination activities to be supported will include participatory adaptive on-farm research, farmer field schools, and farmer to farmer training. Expected environmental benefits are: (i) increased carbon sequestration through use of cover crops, and tree planting; (ii) decreased sediment load in surrounding water courses 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 the project's 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 being responsible for project implementation, focus on two broad areas of impact: socioeconomic and biophysical. The expected environmental benefits are: (i) the measurement of changes in carbon stocks and biodiversity levels over the project lifetime, including a net-net accounting of GHG accumulation; (ii) the incorporation of environmental monitoring into local monitoring and evaluation exercises; and (iii) improved capacity for monitoring carbon stocks.

The M&E 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 comply 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.
Much effort was made to ensure the cost effectiveness of the scientific element of the M&E system.

Component 4 Project Administration.

The fourth component will fund activities related to the coordination, administration, monitoring and auditing of project activities, including the operation of a project coordination office in Kisumu. This component will also act as a vehicle for collaboration and coordination with relevant programs. In particular, the project will facilitate meetings between project management units for GEF IA coordination and will establish mechanisms to integrate input from the Lake Victoria Environmental Management Project into district level government and stakeholder events or meetings

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	2.54	30	0.00	0.0	0.71	17
2. Scaling up and Financing IEM Interventions	2.76	33	0.00	0.0	1.54	38
3. Establishing a Monitoring and Evaluation System	1.90	22	0.00	0.0	0.90	22
4. Project Coordination	1.30	15	0.00	0.0	0.95	23
Total Project Costs	8.50	100	0.00	0.0	4.10	100
Total Financing Required	4.40	52	0.00	0.0	4.10	48

2. Key policy and institutional reforms to be sought:

The small scale of the project and its relatively narrow scope make 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 the three initially identified basins of Western Kenya, 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 an agro-ecosystem. The total area of the three basins is about 20,000 sq. km (Nyando 3,590 sq. km., Yala 3,250 sq. km., and Nzoia 13,250 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 the Nyando basin, 8.9% of Yala 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. An estimated 8,000-12,000 households will be targeted in the nine focal areas .

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 are among the highest in the country and have left a growing number of rural households widowed or orphaned. Female headed households accounts for 35 percent of households in some project areas.

Benefits:

Benefits from the project would have an 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 agroforestry species, tree crops or indigenous species such as medicinal plants, would bring additional income to households.

At the national, provincial and district levels 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 the global level 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, community groups will be the main bodies for planning and implementing approved development interventions. Community groups could be formal village organizations such as Village Development Committees (VDCs) or smaller groups of interest group members.

Community groups 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, which will serve as an important resource for project. 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.

Implementation of selected proposals will be carried through close supervision of the project coordination office, the lead implementing agencies – KARI with close technical assistance from World Agroforestry Center, district agents and other NGOs or CBOs. Because capacity varies between the districts, training modules will be developed based on need assessment and analysis.

At the national level, the Technical Advisory Group (TAG) will provide lead coordination, and ensure that results meet the targets set by the project. TAG draws its membership from concerned ministries including agriculture, environment, KEFRI, and NEMA. The main responsibilities of the TAG include: (i) securing inter-agency coordination to ensure implementation of the project; (ii) recommending changes when necessary; (iii) reviewing progress of implementation every quarter and provide direction to the PCO; (iv) ensuring capacity building; and e) promoting the integrated ecosystem approach. The TAG will be chaired by the Director of KARI and will meet quarterly

KARI's specific responsibilities for WKIEMP implementation include: (i) organization of project launch workshop before or immediately after Grant Effectiveness; (ii) organization of an annual workshop to comprehensively review the performance of the outgoing year; (iii) approve workplans for implementation; (iv) monitoring and ensuring full implementation of the program agreed under WKIEMP; (v) IEM related capacity building at district and community levels to enhance efficiencies; (vi) submitting quarterly progress reports to IDA; (viii) developing an Operational Plan to guarantee sustainability after closing date; (viii) conducting a Mid-Term Review of project progress within six month from the close of the second project year; and (ix) preparing an Implementation Completion Report (ICR).

A project coordination office (PCO) will be set up within KARI's administrative structure for the duration of the project and it will operate under the guidance and supervision of KARI. The day-to-day coordination and monitoring of project activities would be handled by the project coordination office (PCO) located in Kisumu. The PCO will be staffed by a Project Coordinator, an accountant and disbursement officer, a monitoring and evaluation officer, three field staff, and an appropriate number of support staff.

The role of the project coordination office will be: (i) to release funds against agreed work plans; (ii) ensure that the institutions utilizing project funds set up proper accounting system and maintain proper accounts, and promptly claim reimbursements from IDA; (iii) coordinate project activities; (iv) monitor and evaluate the project as a whole to ensure effective implementation; and (v) periodically hold meetings at selected places in the project area to review the progress made and problems encountered in the implementation of WKIEMP and to agree with district administration on a work plan. It will also raise awareness, mobilize technical assistance, and assist districts with their procurement where needed.

KARI will ensure that all of the PCO staff are in place before project effectiveness.

Financial Management: KARI will be responsible for the project's financial management system. Under the proposed arrangement, community based organizations and other implementing agencies will produce work programs that include procurement and disbursement plans that will be consolidated at the PCO and

used to monitor and plan cash flow needs. The accountant and disbursement officer will be responsible for the financial management system at the PCO level with the KARI headquarters financial department providing technical oversight, capacity building, monitoring and coordination functions. The accountant and disbursement officer shall also be responsible for consolidating input into quarterly financial monitoring reports (FMR) and project financial statements.

Qualified and experienced independent auditors will be appointed on approved terms of reference..

Disbursement Arrangements and Flow of Funds: Funds will flow from the IDA credit account to the project Special Account, maintained by the Ministry of Finance in accordance with GOK procedures. The Ministry of Finance will transfer funds to a local currency project operating account administered by KARI. The GOK contribution will be transferred directly to the Project Account as well. Payments for centrally procured items will be made directly by the PCO or at KARI Headquarters, in line with existing KARI approval procedures. Community organizations and other implementing agencies will receive and account for funds from KARI using a system of imprest accounting. Under this arrangement, a sum equivalent to 2 months average expenses will be released as an advance. The beneficiary is expected to utilize the funds against the approved expenditure in their work program and budget, and submit accountability reports at the end of each month in respect of amount already spent during the month.

Procurement: Much of the procurement in the project will be split between small transactions taking place at the sub-location, location and district levels and procurement managed centrally at KARI Headquarters. Financing for community projects generated by PAPs will depend on application received from communities, and procurement would be carried out in accordance with the simplified procurement procedures provided in Bank's procurement guidelines. The PCO will be responsible for ensuring compliance with these guidelines. Ex-post reviews of random sub-projects will be conducted periodically by the Bank and through independent technical staff, if necessary. Procurement above the district level will be undertaken by KARI procurement staff in Nairobi according to standard Bank guidelines. Annex 8A contains greater detail on procurement methods and prior review thresholds.

Monitoring and Evaluation: Monitoring and Evaluation activities will be coordinated by the M&E officer in the PCO. 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 the Land and Resources section at KARI. Further information on M &E activities is contained in a working paper in the project file.

C. Project Rationale

1. Project alternatives considered and reasons for rejection:

Several alternatives for the project were considered before the current proposal was presented:

Linking with IDA or a stand alone GEF project. The Government of Kenya has recognized the rapid decline in the natural environment and stagnation in agricultural production of Western Kenya as a priority. 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 focus primarily on improved land use at the community and farm levels through sustainable land management approaches. 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 were considered 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 the implementation of the project. In order to broaden the range of expertise available, however, and to give communities a choice of service providers, other entities, such as, NGO's, COSPFAP, and others, will also be enlisted to provide advice and assistance.

Major projects financed by the Bank and other development agencies (completed/ 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 II (ALP)	S	S
Biodiversity and environment improvement in national reserve	Tana River National Reserve Project	S	S
Agricultural technology generation and dissemination	Kenya Agricultural Productivity Project	NA	NA
(b) 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

There are a number of complementary activities which are not only in the same area as the WKIEM but that are also implementing activities which are indeed similar to or complement WKIEMP (e.g., the prevention of gully erosion, alternative livelihoods, village committees, community capacity building, baselines, surveys and M&E, etc). Furthermore, many of these projects are being carried out in collaboration with KARI (including the KEFRI-KARI-World Agroforestry Center Pilot Project in Vihiga and Siaya Districts). The WKIEMP will use these linkages to enhance outcomes of WKIEMP and, conversely, will also work within the framework of benefiting other projects through coordination and collaboration. Mechanisms to achieve such mutual benefits will be based on active efforts to communicate with, share, and learn from these other activities in the same area (including active information sharing between and amongst project management units).

Examples of some of these complementary initiatives include:

Watershed Management Initiatives
UNEP/GEF is currently implementing a medium size project in the Lake Baringo catchment which is due to close in February 2004. The catchment management processes and technologies piloted in this MSP could potentially be replicated and scaled up within the framework of the WKIEM.

The WKIEMP will also coordinate with the World Bank managed multi-country initiative, Lake Victoria Environmental Management Program (LVEMP) that includes a component for Kenya. This trans-boundary watershed management project is being implemented within Kenya through KARI and, although WKIEMP and LVEMP will have different implementation structures, overall implementation responsibility will reside within the same departments and managers. Ample opportunity, therefore, exists for the two projects to collaborate and share information. Insofar as KARI and other members are stakeholders in the WKIEMP, they do have a "formal" collaborative role. Furthermore, WKIEMP sets up a process for consultation both amongst agencies/projects, and with local stakeholders. Opportunities will be explored for LVEMP to play a role in community consultations through support for some consultative services to districts in the catchments areas for capacity building and IEM planning.

Finally, one of the main achievements often mentioned under LVEMP is "undertaking three multisectoral management pilots (one in each country) of important micro-catchments in the Lake Victoria Basin. These involved the soil conservation, catchment afforestation, wetlands management, microprojects, and water quality components of the project working together to improve river/Lake

water quality". Where the two project areas coincide, the above activities will contribute strongly to the integrated ecosystem management objectives of the WKIEMP.

As a precursor to the second phase Lake Victoria Project, the World Bank is supporting the Transboundary Diagnostic Analysis and Strategic Action Program Development for the Lake Victoria Basin to identify a Strategic Action/Investment Program (SAP). The objective of this intervention is to come up with a strategic investment program for LVEMP II. And although it's implementation period is short (15 months) and on-the-ground investments will not be directly supported, the WKIEMP experience should provide valuable input.

Dryland Management Initiatives
The Desert Margins Program (DMP) (GEF-UNDP) has developed methodologies and technology packages for arid zone management in order to permit agricultural intensification and improved livelihoods. These new technologies paired with those developed through the Management of Indigenous Vegetation for Rehabilitation of Degraded Rangelands in the Arid Zone of Africa project (GEF-UNDP) have the potential to feed into the WKIEMP.

A second, GEF-funded project, (the targeted research project on Land Use Change- LUCID) will also support the generation of baseline information and the formulation of monitoring and evaluation mechanisms. WKIEMP will endeavor to support LUCID efforts through the supply of relevant information collected through project preparation and implementation.

Local Management of Natural Resources
The Developing Incentives for Community Participation in Forest Conservation Through the Use of Commercial Insects in Kenya (GEF-UNDP) project operates in and around Kakamega Forest (which is one of the areas addressed by WKIEMP) to scale up the livelihood support mechanism in forest adjacent villages, so as to protect the neighboring forest, as the source of sustainable income. In particular the project aims at a) forest management framework that facilitates community participation b) engaging forest adjacent communities in forest conservation through buffer-zone management and enterprise, c) increase the capacity of communities and institutions to manage and utilize both wild and mulberry silk-moth and honeybee biodiversity for income generation, and d) support the availability of improved methodologies and insect resources to allow efficient resource use for improved livelihoods and conservation practices.

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. An 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. A 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 the 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 should be continued during the term of the project and thereafter.

(v) A promotional program that enables 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 NALEP, SMP, LRN, ATIRI, and the 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 was 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 World Agroforestry Center supported project preparation by completing baseline surveys, designing project interventions and mapping 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 the 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.

D. Summary of Project Analysis

1. Economic

Evaluation methodology and cost/benefit analysis

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. The demand-driven nature of investments also 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 and social rates of return below which the project would not be economically and socially 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 sustainable soil fertility and land management technologies. Three types of analysis have been carried out:

- A financial cost-benefit analysis to assess the profitability of some of the technologies at the farm level;
- An economic cost and benefit analysis to assess the economic viability of the sustainable land management (SLM) interventions on-farm and off-farm in Western Kenya; and
- A social cost and benefit analysis to assess other externalities such as carbon sequestration, biodiversity, impact on water quality in watersheds and on the lake Victoria economy.

Financial cost-benefit analysis. Surveys taken by World Agroforestry Center on adoption of biomass transfer and improved fallow technologies in western Kenya have yielded a rich data set on adoption patterns and farm level profitability. The results of cash flow analysis indicate that Tephrosia improved

fallow technology is profitable with the net present values of benefits exceeding the NPV of costs by 100% to 200% (cost benefit ratios of 2.2 and 3.6) while the NPVs of benefits exceed the NPVs of costs by less than 70% for the traditional practice of continuous cropping (cost-benefit ratios of 1.5 and 1.6). The greater cost benefit ratio of the improved fallow technology further suggests that it carries less financial risk than the traditional continuous cropping practice in the densely populated areas of western Kenya.

Economic cost-benefit analysis. Using a land productivity model for the sustainable land management technology adoption data gathered by World Agroforestry Center, the economic rate of return (ERR) over twenty years is estimated to be 23.4%. Using a labor productivity model, which is more dynamic than the first and allows for changes in the productivity of labor and the allocation of land to various crops and farm enterprises, the economic rate of return ranges from 14% for relatively low rates of labor productivity increase to a high of 38% for high productivity increases.

Sensitivity analysis resulted in lower, and at times negative, ERRs. Lowering adoption rates, base income growth and yields from adoption of the technologies all lowered ERRs, but not beyond the point of project viability. Lowering the number of villages did, in some cases, render the ERR negative.

Conclusions. The SLM technology adoption patterns observed in Western Kenya in the past, and the estimated financial, economic and social rates of return suggest that the project is likely to be financially and economically viable, provided that some conditions are met. These include: (i) the need for the project to emphasize the dissemination of the tithonia biomass transfer technology in vegetables fields as much as possible, or more than the improved fallow technology in maize fields; (ii) the need to directly or indirectly have an impact on the almost 450 villages within the nine blocks of the project area through direct or indirect adoption of the SLM technologies by at least 18 percent of the households on average and on small plots (400 square meters, or about 10% of land holding) by the end of the project period (in 5 years); and (iii) availability of market outlets to absorb the increased outputs, especially vegetables output, without any drastic fall in product prices; otherwise the project might not be economically viable.

Adding environmental externality benefits such as benefits arising from carbon sequestration, biodiversity and reduction in sediment loading into water catchments within the watersheds and into Lake Victoria increases the economic rate of return of the project. For the land productivity model, the ERR increases to 25.4% and for the labor productivity model, the ERR increases its range from to 16% - 39%.

The socio-economic viability of the project will be much more enhanced if the project succeeds in creating the expected 2500 hectares of carbon sink, for CO2 emission reduction marketing within the next twenty years. The expected economic and social rates of returns of the project are generally in the range of 14-38% depending on assumptions made, and might be higher because several potential environmental (biodiversity) and institutional benefits have not been quantified. An incremental income growth rate of 0.6 –0.7 % per year in the project villages would be sufficient to have a 12% rate of return to justify the investment being made under the project.

With respect to the potential impact that the project might have on poverty, the available empirical data fails to establish a significant direct link between poverty and the SLM technology adoption in Western Kenya because of uncontrolled and distorting factors such as diseases (HIV-AIDS) during the research period.

2. 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.

3. Technical

Biophysical Measurements. The primary technical issues arising from biophysical measurements concern the 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 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 the refinement of remote sensing techniques for carbon monitoring.

Appropriate Land Rehabilitation Technologies. There are two technical issues related to the technologies to be disseminated in the project: (i) the availability of appropriate technologies; and (ii) the lack of technical capacity in communities, NGOs, and Government agencies to utilize these technologies. 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 the 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 the Yala and Nzoia basins and the results of the data analysis 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 shows 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 an increase in the a number of plant species on farms, it will also 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 the implementation of project activities. It 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 and CBOs to implement project activities. Because of weak capacity at the district level, most funds for community activities will be channeled directly to CBOs. Some funds may be allocated to districts to undertake intra-community activities but this will be on a pilot basis. District agencies will provide services to CBOs such as assistance with registration requirements for CBOs and technical services from district or divisional agricultural and livestock agents. 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. Support from the PCO field staff will also provide a mechanism to accelerate 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 are 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 provide most of the primary service providers.

4.1 Executing agencies:

The overall responsibility of project implementation will rest with KARI. KARI will be IDA's counterpart agency for ensuring implementation of WKIEMP. Community-based organizations at the grass roots level, district agencies, and the consortium of non-governmental institutions based in Western Kenya (acting through an already constituted and functioning coordination committee at the project level) would be the main implementing agencies.

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's headquarters are in Nairobi and has substantially decentralized research and dissemination activities to its regional centers. There are three such centers in Western Kenya, in Kakamega, Kibos 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 have specific responsibilities in project execution through the provision of technical backstopping for community sub-projects, monitoring and quantifying environmental benefits, and targeted research. Already, it is involved in technology dissemination and natural resource management and has an office in Western Kenya. It is a member of the Consultative Group for International Agricultural Research (CGIAR) and is currently an implementing partner in the Lake Victoria Improved Land Management Project. It also works with the Ministry of Agriculture in implementing the National Agriculture and Livestock Extension Program (NALEP).

The project will sponsor World Agroforestry Center for such activities under an established agreement to be entered into between World Agroforestry Center and KARI. Accordingly, a portion of the proceeds of the grant provided under the Development Grant Agreement will be used to procure the service of World Agroforestry Center on terms and conditions set forth in the agreement in respect of the kind of services to be provided, resource required, time table for completing the activities, and payment.

The role of the MoA will also be central to the successful implementation of the project. MoA's responsibilities would include, supporting rapid rural appraisal, as needed, to define and formulate programs; forging of links between research, extension and the farmer; and creating awareness as to the benefits of the use of integrated ecosystem management approach.

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 TAG provides a means to coordinate across the project's geographical area, an important element of the integrated ecosystem approach.

The location of the PCO in Kisumu is designed to accelerate implementation of the project and ensure adequate technical assistance from PCO staff to implementing agencies at the district level. The PCO will be headed by a full time staff based in Kisumu which will include one Project Accountant-cum-Disbursement Officer, one M&E Officer, three field staff (one field staff for three focal areas) and assisted two environmental and social specialists seconded from the National Environmental Management Authority. 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.

4.3 Procurement:

Procurement using funds made available by GEF would be made in compliance with the rules adhered by the Government and the implementing agency, which are consistent with IDA guidelines. A draft project procurement plan was submitted to IDA and found satisfactory. A first year work program and procurement plan are a condition of effectiveness. Because of its focus on communities, the project would follow simplified procedures that are designed for community based development projects and which are applicable to grass root level agency procurement under IDA guidelines.

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. Owing to the significance of community grants and associated risks, the financial management procedures will be further reviewed as part of the final Project Implementation Plan prior to credit effectiveness. In addition, appointment of a qualified accountant and disbursement officer will be a condition effectiveness. Overall, the project's financial management arrangements as documented in the draft financial management manual 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.

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 (November 6, 1992), the Convention to Combat Desertification (October 14, 1994) and the UN Framework Convention on Climate Change (June 12, 1992(Note: these are dates of signature). It has developed and adopted a Conservation Strategy, and an Environmental Policy. Although the Project is in an international watershed of the Lake Victoria Basin, there will be no new works that will affect the quality or quantity of water flows into Lake Victoria. Project will not finance irrigation or other water use activities. However, there may be rehabilitation works (where any springs exist in the project area) which would qualify from the exemption for the notification requirement as per OP 7.50, para 7 (a). An exemption was received by the regional Vice President on August 11, 2004 (see Documents in the Project File).

Environmental and social sustainability are fundamental to sustainable rural development strategies, natural resource conservation, and poverty alleviation. Community involvement is key to the proposed project, which seeks to bring lasting improvements in the livelihoods of people, that in turn could lead to better use and protection of natural resource base. With environmental rehabilitation as a key component, 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 and Social Management Framework was finalized in August 2004. The report identifies few potential environmental issues relating to the project and recommends measures for integration into the planning, design and implementation early in the implementation stage.

The general findings of the ESMF 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; and
(iii) The benefit from the project outweighs any adverse impacts that the project may have had.

Since subprojects will be identified by the communities during project implementation, an Environmental and Social Management Framework (ESMF) was prepared by the Borrower, which includes a mechanism for screening potential environmental and social impacts. The Framework will be used to avoid, manage or mitigate all potential environmental and social impacts associated with the sub-projects.

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, such as pollution of water bodies as a result of increased use of fertilizers and agrochemicals. The ESMF has assessed the potential environmental and social impacts whether positive or negative, and propose mitigation measures which will effectively address these impacts. The ESMF also establishes clear directives and methodologies for the environmental and social screening of subprojects to be financed under the WKIEMP. It includes methods to promote an Integrated Pest Management (IPM) approach that will minimize the need for chemical pesticides. The ESMF outlines the process applicable to this project, was submitted in draft to the Bank and Borrower for review prior to project negotiations. The ESMF replaced the draft ESA which was disclosed (both in-country and in Washington) prior to appraisal mission departure.

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:	September 14, 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?

No EMPs are required at this stage as the subprojects which will be demand driven, have not been identified and categorized. Instead, an Environmental and Social Management Framework (ESMF) details a format for an Environmental Impact Assessment , if deemed necessary during project implementation. The ESMF fully complies with Kenyan environmental codes and legislative requirements and with the relevant World Bank environmental and social safeguard policies. The ESMF will specifies explicit and appropriate roles and responsibilities of all parties (individuals and institutions) responsible for managing and monitoring environmental and social concerns related to the subprojects. Relevant institutions (NEMA, KARI, World Agroforestry Center, Stakeholders, Community Representatives, Farmer Groups, NGOs, etc.) will be given appropriate training during the Project Launch Workshop. They in turn will train the groups and/or individuals responsible for screening the subprojects for environmental and social safeguard concerns. The objective of the training will be to raise the level of environmental and social awareness in the communities and promote adoption of the screening checklist. The ESMF (especially the screening process) is also a part of the Project Implementation Plan (PIP).

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 took 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 World Forestry Center, farmers, NGOs, and other community organizations. The entire process of planning and subproject preparation would be participatory, and 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 communal institutions, incomes and poverty reduction, and agricultural sustainability.

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 interventions (both positive and negative) on the environment. Where negative impacts from the project are anticipated, the mitigation measures as outlined in the ESMF will be implemented and monitored. Component III of the project which is dedicated to Monitoring and Evaluation (M&E), will have environmental indicators included as well. KARI shall prepare, under terms of reference satisfactory to the Bank, and furnish to the Recipient and Bank, on or about January 31 of each year until the completion of the Project, a report integrating the status of compliance with the social and environmental safeguard measures under the Project in accordance with the criteria set forth in the ESMF, the measures taken in furtherance of the ESMF, any conditions which interfere or threaten to interfere with the smooth implementation of the ESMF, and the remedial measures taken or required to be taken to address such conditions.

Further, as part of the mid-term review, KARI shall appoint not later than January 15, 2007, independent consultants acceptable to the Bank to carry out an environmental and social performance audit of the Project, on terms of reference satisfactory to the Bank. The audit report will be shared with the Recipient and the Bank.

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 communal 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 by the reduction of poverty and migration.

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

The ESMF report identified the creation of a 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 the 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 the impact on demand for labor. In addition to carefully selecting the participating communities on account of wealth, 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 the project in developing watershed IEM plans. 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, community based organizations will be the main bodies for planning and implementing approved development interventions. To ensure safeguards, community participation and transparency will be targeted during development of community sub-projects and intra-village activities.

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 in identifying the major natural resource management constraints faced by the community. Focus groups will be asked to rank problems and propose possible interventions 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 and the choice of tree stocks for the farmer selected stocking plots.

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 will 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 livelihoods and economic performance of local, small scale farming systems, gender, and implications for demand for labor.

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)	No
	Forestry (OP 4.36, GP 4.36)	No
	Pest Management (OP 4.09)	No
	Cultural Property (OPN 11.03)	No
	Indigenous Peoples (OD 4.20)	No
	Involuntary Resettlement (OP/BP 4.12)	No
	Safety of Dams (OP 4.37, BP 4.37)	No
	Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	Yes
	Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	No

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 was developed to address environmental and social issues in project implementation. The Framework includes a screening process (screening checklist) which will be used to screen subproject proposals, and given an environmental rating. The ESMF also includes a suggested format for EIA, in case the need arises where a subproject is of environmental category A in nature.

Safeguard Policy on Projects in International Waters (OP 7.50). Even though this Policy is triggered by the project, based on the information below, the project qualifies for an exception to the Notification requirement. The project will be implemented in the Nyando, Yala and Nzoia River Basins, which are part of the Lake Victoria watershed. These three rivers are part of the Lake Victoria Basin which is shared by Kenya, Uganda and Tanzania, and as such is an international waterway under OP/BP 7.50. The OP requires, as a general rule, notification of all the riparians of the international waterway of certain types of projects specified in the OP, but also includes some exceptions to the notification requirement. The

project will not finance irrigation and other water use or pollution activities or any major works. It will only finance small works as part of the community-driven IEM sub-projects, which will involve scaling up current land rehabilitation interventions such as protection of river banks and construction of water pans, improvement of soil fertility, agro forestry, and introduction of value-added cropping systems. Any rehabilitation works for spring protection will be small in size and will not adversely affect the quality or quantity of water flows into Lake Victoria. Based on the above, the project received an exception to the Notification requirement under OP 7.50.

8. Business Policies

8.1 Check applicable items:

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 the concerned NGOs. NGOs, independently or together 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 the costs of NGO participation and support as above.

D. 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 determined based on the community's demonstrated ability to maintain the assets over the longterm. 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 regard to financial sustainability is the maintenance of investments resulting in effective gains in income 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 the provision of technical assistance through the 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 among 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, farmers' 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 other purposes	M	Generation of funds would be strongly tied to measurable indicators.
Community members are not able to work together to manage resources	N	Project design to maximize community participation and provide capacity building support.
Non-adoption of technologies intended to promote IEM.	N	Use of already tested technologies and high levels of participation would minimize this risk.
From Components to Outputs		
Difficulty in identifying changes which will have the desired effects	M	Develop M&E system to monitor progress and to adjust interventions based on observed outputs.
Implementing agencies already overtaxed with work loads resulting poor program coordination.	M	Project funds will enable hiring additional staff who will be based in the field.
The large number of transactions involved makes ex-ante controls across individual sub-projects difficult	H	A project financial management system would be put in place to ensure self regulation by communities
Community groups may lack the necessary capacity.		Incorporation of capacity building component in project design.
Elite capture of institutions and political	M	Involvement of communities in decision making

interference		processes
Risks associated with theft and fraud	M	Regulation through active community involvement
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.

E. Main Loan Conditions

Effectiveness conditions:

(a) The Subsidiary Grant Agreement has been executed on behalf of the Recipient and KARI.

(b) KARI will have appointed a Project Coordinator, an Accounting/Disbursement Officer, a Monitoring and Evaluation Officer, and three field staff with experience and qualification satisfactory to IDA.

(c) The Project Account shall have been opened and credited with the initial deposit.
(d) KARI will have completed a final PIP, including the work program, budget and procurement plan for the first year of project implementation, satisfactory in form and substance to IDA.

Disbursement conditions:

Disbursement of community grants will be governed by a simple contractual agreement entered into between a beneficiary community and the Project Coordination Office, in accordance with the procedures referred to in the Project Implementation Plan and the ESMF. The Bank and the Project Coordination Office will carry out ex-ante review to ensure community grants are in compliance with these procedures.

F. Readiness for Implementation

Drafts of the Project Implementation Plan, and the procurement plan for the Project Year 1 were prepared prior to Negotiations.

G. 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 • 20% of households in pilot villages, 10% in surrounding villages within three years of technology dissemination	• 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.	• Negative trend in erosion rates from farming plots receiving interventions by end of project • Negative trend in phosphorous runoff from demonstration plots in at least 50% of focal areas by end of project • Increasing trend in abundance and diversity of plant species in at least 30% of focal area intervention sites by end of project • Sequestration of 3.3 tons of	• Project sponsored biophysical evaluations and field inventories • Local level surveys	• Number of beneficiaries are sufficient to produce significant impact

	carbon per hectare in focal areas		
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. • 90% of ecosystem management planning activities inclusive of local and/or regional institutions • 50% community participation in village land management planning exercises by end of project • 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. • 50% 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 intra-community and community conservation activities funded.	• Project reports • Supervision mission reports • Evaluation reports (midterm and final)	• Extension services, research activities and farmer field schools have large impact on farm management activities. • National capacity

	• Increase in below ground carbon in plots where the improved SLM technologies have been adopted by end of project		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 • Biodiversity baseline survey completed • 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) USD**	**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 b) Capacity building for service providers and district and focal development committees for integrated ecosystem management	Component 1: $710,000 GEF *Sub-component1.1: $210,000 GEF*	• 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

c) Establishment of local learning centers and farmer to farmer linkages *sub-component 1.2* d) Capacity building for carbon finance administration and market development	*Sub-component 1.2:$ 500,000 GEF*		
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	Component 2: $1,540,000 GEF	• 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	Component 3: $900,000 GEF	• Progress reports (annual and quarterly) • Bank supervision report (semi-annual)	
Project Coordination	$950,000 GEF	• 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

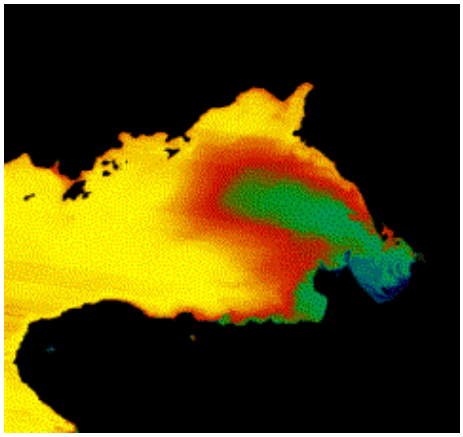
3. Baseline

Western Kenya's natural resource base is under severe threat from population pressure and agricultural production. Traditional land management 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 2. Nyando sediment plume (~40 km^2) in Winam Gulf, Lake Victoria

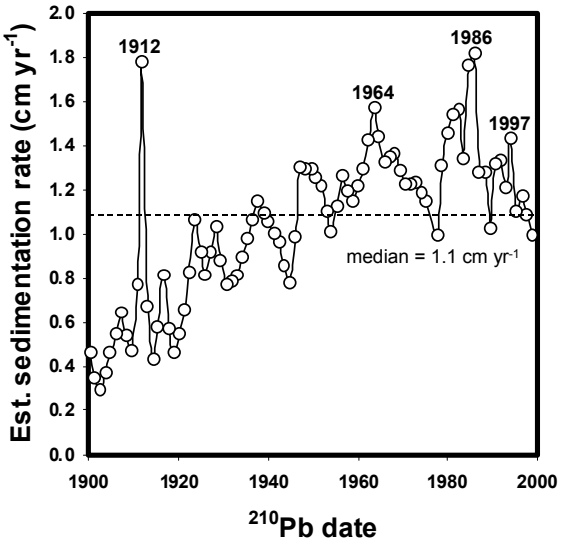
Source: based on Landsat ETM data Feb. 2000



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 2 Estimated 100-year sedimentation rates in the Nyando River Basin



Source: 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 2.1. 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 working paper in the project file)

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 or environmental conservation with little focus on integrated 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.

Government and donor financing of land rehabilitation activities in western Kenya include:

- 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. The 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.

Government of Kenya agricultural extension and research services: Government financing currently supports localized interventions for community based land management activities through the public extension service. Specific relevant activities include small-scale local investments in improved soil management. The Kenya Agricultural Research Institute also disseminates technology through its two research centers in Kakamega and Kisii.

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$ 2,540,000, GEF financing US$ 710,000)

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. World Agroforestry Center has received funding from various sources to implement land management activities in the project areas, an estimated USD 2.5 million will be available to finance activities in western Kenya in the next five years of which $0.75 million will be allocated to capacity building activities. Government of Kenya funding for this component totals USD 0.16 million and 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.

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$ 2,760,000; GEF financing US$ 1,540,000)

GEF funding will complement GOK funds of USD 0.54 million and World Agroforestry Center co-financing of USD 1.0 million that supports provision of inputs to communities undertaking land rehabilitation activities.

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$ 1,900,000; GEF financing US$ 900,000)

GEF funding will build on GOK co-financing of USD 0.25 million which will support Kenya Soil Survey activities and cash contributions for project activities. GEF funds will also be complemented by ICRAF co-financing in the amount of USD 0.75 million, which will fund some of the collection and analysis of biophysical data throughout the project life.

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$ 1,300,000; GEF financing US$ 950,000)

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. GOK funding of USD 0.55 million will provide in kind staff and payment of certain operating expenses.

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	**1,830,000** • Institutional costs (government extension and research staff) associated with	**2,540,000** • Institutional costs (training, staff costs, services) of integrated ecosystem management	**710,000** • Community PRA activities • Identifying IEM

	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)**
	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.	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.	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 Financing IEM Interventions	**1,220,000** • Provision of inputs for localized interventions in community based land management	**2,760,000** • On farm, community, and intra-community interventions focused on ecosystem management and environmental services	**1,540,000** • Inputs (seedlings, small scale infrastructure, tools, etc.) associated with community PAPs and intra-community ecosystem management activities
3. Establishing a Monitoring and Evaluation System	**1,000,000** • 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.	**1,900,000** • Monitoring and evaluating the impact resulting from IEM interventions. • Establishing the capacity for local communities to measure carbon sequestration.	**900,000** • Monitoring of biodiversity, GHG accumulation, and socio-economic changes resulting from project activities
Project Administration	**350,000** • Operating costs associated with government research and extension services	**1,300,000** • Operating costs associated with IEM approach	**950,000** • Operating costs associated with IEM plans, community PRA, monitoring and evaluation and IEM services delivered by project partners
Total	**4,400,000**	**8,500,000**	**4,100,000**

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Annex 3: STAP Technical Review and IA Response

KENYA: Western Kenya Integrated Ecosystem Management.

Yokohama, 3 January 2004

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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/World Agroforestry Center, 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-World Agroforestry Center/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 STAP 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/World Agroforestry Center" and "Design Principles for Land and Watershed Management in Western Kenya, Discussion Paper 2001/World Agroforestry Center". (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. The definition of ecosystem is understood to include the full range of ecosystems, both large and small. Furthermore, the purpose of the GEF integrated ecosystem management OP is to ensure that projects result in multiple environmental benefits. In this regard the OP does not define integrated ecosystem management as the management of an entire ecosystem.
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 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 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.	As suggested, data and clarification on agroforestry and value added cropping systems will be added to 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 [redacted]odiversity 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	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.

and complexity in socioeconomic aspects.	
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 15-20 communities. The criteria for selection of communities includes 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 complementary.

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.

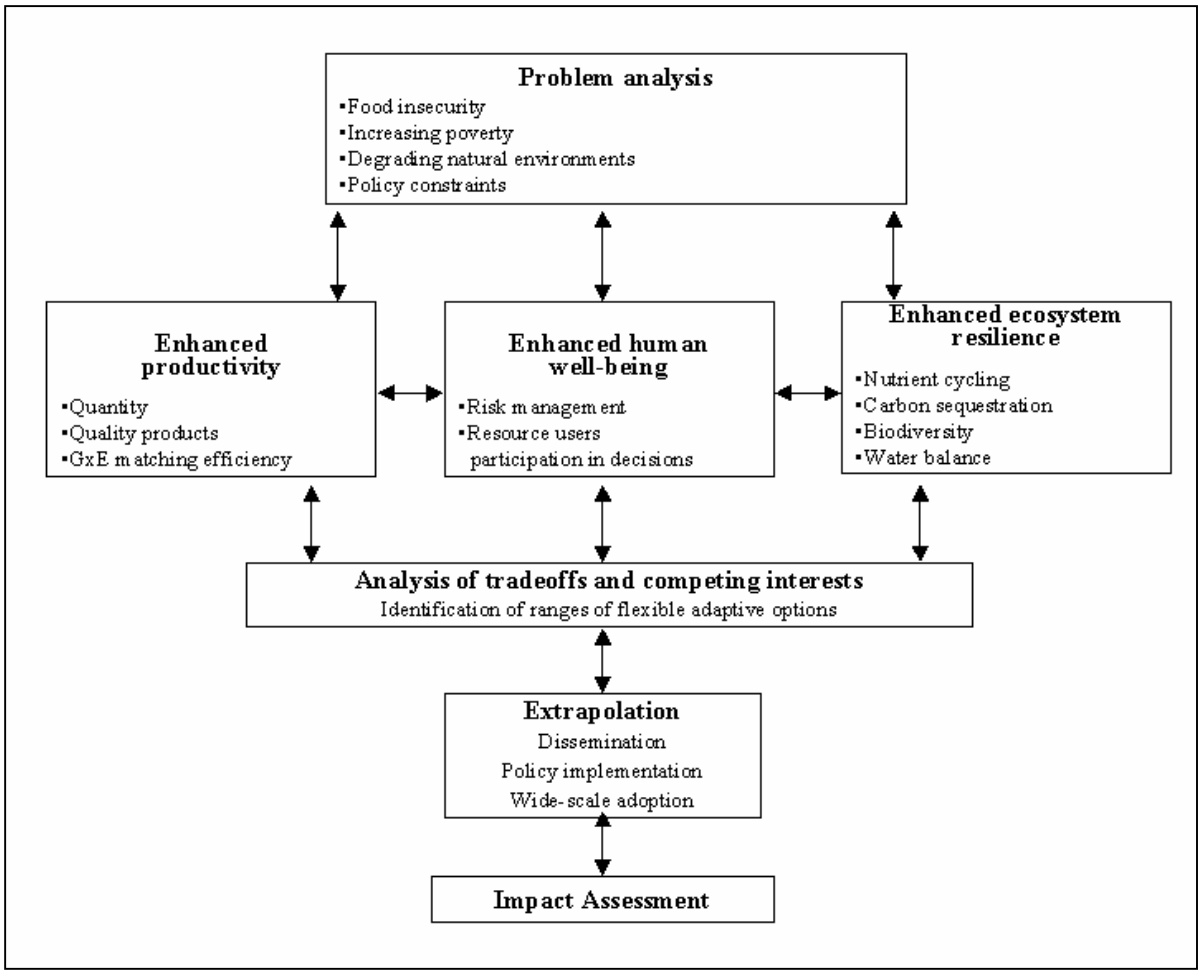

Figure 1 Integrated Natural Resources Management Framework

Project Components

The project will have three main components.

Component 1: Capacity Building for Community Driven Integrated Ecosystem Management ($710,000 GEF)

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 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, interested community groups will develop a proposal with a detailed work plan and budget for submission to the project coordinating office.

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.

Eligibility for financing. PAPs will be developed by groups within a community. Community groups can be comprised of members living in one or more villages or those living within only one village. For the purposes of this project, a community group is defined as the following:

- A registered community based organization
- A group of individuals organized around a common interest, comprising at least 6 separate households

Community groups that are not legally registered will be encouraged to be registered otherwise they will not be able to receive or manage funds directly.

Processing and approval of community proposals. Community groups will prepare simple proposals in the format demonstrated to them at the early stage of the project implementation. These proposals are submitted to the Project Coordination Office who 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.

Timeline for Initiating and Processing of Proposals

Activity	Time (weeks)
Mobilization	2
Participatory Rural Appraisal	1
Preparation and submission of community proposals	2
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 project coordination office and the community group 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.

Community groups 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. Funds for the execution of the proposals will be transferred as an advance to communities through their bank accounts. If community groups are not registered as CBOs, they will not be allowed to receive funds directly, even if they have their own bank account. In such cases, the project coordination office will determine if a qualified intermediary is able to receive funds, such as another CBO, or will assist the community group to procure necessary inputs or services. All efforts will be made to enable community groups to register as CBO so they are able to receive and manage funds themselves. 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, 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

To facilitate the participation of Kenya in the global carbon market, the project will sensitize and build the capacity of the government, local institutions, and communities to manage carbon assets. The project will support targeted research to develop a methodology for net-net accounting and explore institutional mechanisms for community management of carbon assets. The project will also build the capacity of the Kenya Agriculture Research Institute through the purchase of equipment and training to measure carbon

baselines, end of project carbon stocks and participate in international forums for climate change with the aim of establishing a national carbon monitoring and evaluation and certification capacity within the national research system.

Financing for this sub-component will also be co-financed by a Japanese PHRD grant for capacity building. The grant will support development of administrative processes required to enter into carbon sequestration contracts through training and consultancies in departments in charge of global environment conventions negotiations and implementation in the Ministry of Environment, as well as potential local and private sector operators willing to get involved in environmental markets.

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. The PHRD grant would support 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 ($1,540,000 GEF)

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 community groups to ensure sustainability of the investment. In addition, the community group will be required to sign a simple contract detailing their role and responsibility in implementation of the funded activity. Details of the contract will be finalized in the PIP. The component will fund activities such as:

- Development of village nurseries to support agro-forestry
- Conservation of existing biodiversity resources through adoption of protective measures and support to alternative livelihood strategies or small scale income generating activities that reduce pressure on critical habitats
- Dissemination of improved fallow and cover crop technologies to control land degradation and reduce sediment loss
- Training on improved land management practices
- Activities to increase plant or tree cover on and off farm in order to sequester carbon in agricultural landscapes
- A select number of small scale infrastructure activities such as the protection of river banks, and the construction of water pans
- Technical and extension assistance for farmers and community organizations
- Farm infrastructure to ensure better production and environmental management

- Improved seeds/germplasm, fertilizer and other supplies.

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 research centers 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.

Critical habitat conservation. The project will also assist communities to identify critical habitats in their area and develop conservation strategies to maintain or improve them. Critical habitats are areas under pressure due to encroachment or degradation that are unique sites of biodiversity or perform key ecosystem functions. In the project area this includes local refugia, which house indigenous or unique biodiversity, and riparian areas, which perform an important function in maintaining water quality by acting as filtration systems or sediment traps. The project will support a select number of conservation strategies developed by communities as part of the participatory planning process.

Component 3: Establishing a Monitoring and Evaluation System ($900,000 GEF)

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.

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.

Biodiversity and River Basin Impact Monitoring. Biodiversity will be monitored through on farm surveys using simplified data forms.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.

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.

Project Administration ($950,000 GEF)

A project coordination office will be staffed in Kisumu with a project coordinator, abd three field staff in addition to the appropriate number of support staff (driver, secretary, administrative clerk). This component will pay for the operating costs associated with running the PCO and the normal operating costs associated with implementation of project activities.

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	0.46	0.37	0.83
Scaling up IEM interventions	1.34	0.32	1.66
Monitoring and Evaluation	0.45	0.64	1.09
Project Administration	1.04	0.07	1.11
Total Baseline Cost	3.29	1.40	4.69
Physical Contingencies	0.00	0.00	0.00
Price contingencies	0.18	0.08	0.26
Total Project Costs	3.47	1.48	4.95
Total Financing Required	3.47	1.48	4.95

Project Costs By Category	Local US$ million	Foreign US $ million	Total US$ million
Goods	0.67	0.22	0.89
Consultant Services	0.49	0.0	0.49
Trainings and Workshops	0.19	0.04	0.23
Technical Assistance	0	1.22	1.22
Community sub-projects	0.61	0.0	0.61
KARI Salaries	0.72	0.0	0.72
Operating Costs	0.79	0.0	0.79
Total Project Costs	3.47	1.48	4.95
Total Financing Required	3.47	1.48	4.95

These tables include project costs for the GEF/GOK project only. Detailed cost data on categories of expenditure for other co-financing is unavailable. See Annex 2 for a cost estimate of other co-financiers.

Annex 6: Cost-Benefit Analysis Summary

KENYA: Western Kenya Integrated Ecosystem Management.

A. Introduction

The project does not normally lend itself to classic economic and financial analysis. In addition, 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 various types of investment that are likely to be made under the project, to indirectly estimate approximately the economic and social rates of return of the project, and thereby assess its economic and social viability.

Given the difficulty of quantifying certain ecosystem interventions, the analysis has been confined to a sub-set of activities by focusing on the profitability of selected agricultural enterprises in which the communities and farmers groups are likely to invest in through adoption of sustainable soil fertility and land management technologies. Three types of analysis have been carried out:

- A financial cost-benefit analysis to assess the profitability of some of the technologies at the farm level;
- An economic cost and benefit analysis to assess the economic viability of the sustainable land management (SLM) interventions on-farm and off-farm in Western Kenya; and
- A social cost and benefit analysis to assess other externalities such as carbon sequestration, biodiversity, impact on water quality in watersheds and on the lake Victoria economy.

The analysis presented here is a summary of a more detailed working paper that can be found in the project file.

B. Methodology

The following analytical instruments were used:

Technology adoption analysis. Under the economic rationality assumption that adoption implies financial or socio-economic profitability at the farm level, the adoption data for SLM technologies in Western Kenya were reviewed to assess the likelihood of profitability and economic viability of the technologies from the point of view of adopters.

Measures of land and labor productivity. The financial and economic analysis is based on an analysis of rates of returns to the main factors of production, land and labor. This method provides an advantage in that it directly assess rates of return and is based on available studies of farm level profitability undertaken in Western Kenya.

Return to land is calculated as total revenue net of labor cost and of cash inputs costs (seeds, fertilizers, etc.; no rental cost of land included) per hectare. Returns to land represent the net income per hectare to a farmer or landlord who would use hired labor to exploit the land. It is assumed to be the prime economic decision making indicator for the land investor. The return to land is satisfactory if it exceeds the opportunity cost of land, which in this case is equal to the return to land under the traditional practice (or experimental control). The incremental return is considered to be the net benefit or the profit per hectare.

Return to labor is calculated as total revenue net of cash inputs costs (could include the rental cost of land if it exists) divided by the number of days of work. Return to labor is assumed to be the prime economic decision making indicator for labor investors, or ordinary poor farmers. The return to labor is satisfactory when it exceeds the opportunity cost of labor, which in this case is the return to labor under the traditional practice.

Net Present Values and Benefit-Cost Ratios. Net Present Values of costs and benefits as well as their ratios are also computed to rationalize the observed adoption of SLM technologies

Adoption incentive analysis. Given the fact that improved fallow benefits are lagged benefits that occur in the future while fallow installation costs, including labor cost and forgone crop, are short-term costs that occur in the present, would it be necessary to provide farmers with some incentive to speed up adoption of the improved fallow technologies under the project? Especially if farmers are poor and thus heavily discount the future? Would it for instance make sense to compensate farmers for short-term loss incurred by putting scarce land under fallow? A cash flow analysis by season was undertaken to answer these questions.

Poverty analysis. Soil fertility technologies can be expected to have a poverty reducing effect through increased income and food security at the household level. The resulting poverty impact could also occur through various channels, such as increases in the household asset base, better nutrition, higher caloric intake, or increasing availability of cash income for health or education expenditures. The poverty impacts of improved land management technologies are considered briefly in the conclusions to the analysis.

Economic cost-benefit models. Labor and land productivity are also used as the basis for the economic analysis. Two models are tested. A land productivity model *(Model 1)* is applied to the data on returns to land for a representative group of crops in the project area and estimates the effect on an increasing number of hectares area under new technology. The model assumes no fundamental change in land resource allocation to crops and other farm enterprises following the SLM technology adoption. A labor productivity model *(Model 2)* is then used (that is relatively more dynamic than the previous model) and allows for changes in the allocation of land to various crops and farm enterprises, following the adoption of the SLM technologies.

Social cost benefit model. A separate "social" cost benefit analysis is undertaken to account in models 1 and 2 for positive environmental externalities such as benefits arising from carbon sequestration, biodiversity and reduction in sediment loading into water catchments within the watersheds and into Lake Victoria. These benefits are estimated by estimating carbon emission reduction prices and wildlife extraction costs. Benefits to Lake Victoria are not quantified due to low impact and lack of data.

C. Basic Assumptions

Technology adoption profile. Low soil fertility represents one of the major impediments to increased agricultural productivity in Western Kenya and, as a result, the region has supported several pilot projects promoting soil fertility replenishment technologies. Impact assessments conducted on these projects indicate sustained adoption of technologies both in and outside project pilot areas, however the pattern is often variable over time. The technologies reviewed include:

1. Biomass Transfer of Tithonia Versifolia with or without phosphorus application which was one of the main technological breakthroughs achieved by World Agroforestry Center/KARI/KEFRI research activities in Western Kenya in the 1990s;

2. 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; and
3. Traditional soil and water conservation technologies.

Surveys taken by World Agroforestry Center on adoption of biomass transfer and improved fallow technologies in 1600 households in Western Kenya show between 10 to 25 percent of farmers in pilot villages have adopted the technologies and that 5 to 14 percent of farmers in non-pilot villages have also adopted the technologies.[1] In general, adoption seemed to peak shortly after introduction of the new technology and subside as technical and input back-stopping was withdrawn. Over time, residual adoption (without external support) resumed in pilot sites after a short decline.

In the economic and financial analysis a conservative adoption rate of 14% is used.

Project cost. Project cost is distributed over the five years of implementation in accordance with an assumed disbursement plan of the project. A total of six millions dollars (including GEF grant and other contributions, including beneficiaries' contributions) are assumed to have been disbursed progressively over the life of the project ($1 million in years 1, 4 and5; $1.5 million in years 2 and 3). Recurrent maintenance costs of $150,000 per year are assumed to occur at the end of the project, from year 6 and beyond, paid for by the beneficiaries and/or the government.

Project coverage. It is assumed that the project would cover nine blocks of 100 square kilometers each by the fifth year. The project will intervene in three blocks during the first year and expand to three new blocks each year by the third year. Each block comprises of about 50 village communities on average, each community having on average 150 households, with an average land holding of 0.5 hectare per household (0.25 to 5 ha).

D. Financial Analysis

Using rates of returns to land and labor compiled from several studies in Western Kenya, the net present values of all costs and benefits, and benefits-costs ratios were assessed in order to rationalize the adoption. The following table presents a summary of returns to land and labor for various soil and water conservation activities.

Table 6.1 Returns to Land and Labor from adoption of Soil and Land Management technologies

Farm Model	Crop	Technology		Returns to Land $/ha			Returns to Labor $/day			
		Type of cropping	P from rock phosphate (Kg/ha)	Control (a)	Treated Land (b)	Incre-mental (b-a)	Control (c)	Treated Land (d)	Incre-mental return (d - c)	% change (d-c)/c
1. Tithonia Biomass (1-year averages, type of cropping = t/ha of biomass transfer, control = no tithonia application)										
1.1	Maize	19t/ha	0	Na	Na	-153				
1.2	Kales	19t/ha	0	Na	Na	708				
1.3	Kales	10t/ha	0	-857	-801	56	-0.47	-0.26	0.21	45%
1.4	Kales	10t/ha	33	116	985	869	1.12	2.39	1.27	113%
1.5	Kales	10t/ha	65	311	820	509	1.44	2.14	0.7	49%
1.6	tomato	10t/ha	0	-1012	201	1213	-0.08	1.12	1.2	1500
1.7	tomato	10t/ha	32.5	-725	1854	2579	0.2	2.68	2.48	1240%

[1] Adoption by non-pilot villages are often those adjacent to pilot villages. In general, adoption also varied between long and short rains with the long rains often showing the highest rates of adoption. (SPIA/IFPRI, 2003)

Table 6.1 Returns to Land and Labor from adoption of Soil and Land Management technologies

Farm Model	Crop	Technology		Returns to Land $/ha			Returns to Labor $/day			
		Type of cropping	P from rock phosphate (Kg/ha)	Control (a)	Treated Land (b)	Incre-mental (b-a)	Control (c)	Treated Land (d)	Incre-mental return (d - c)	% change (d-c)/c
1.8	tomato	10t/ha	65	752	1677	925	1.68	2.51	0.83	49%
2. Natural Fallow (4 season averages, control = continuous cropping or natural fallow)										
2.1	maize/beans	NF	0	405	148	-257	1.74	1.36	-0.38	-22%
2.2	maize/beans	NF	250	108	-131	-239	1.14	0.63	-0.51	-45%
3. Crotalaria Fallow (3 to 4 season averages, control = continuous cropping or natural fallow)										
3.1	maize/beans	NF	0	148	397	249	1.36	1.87	0.41	38%
	maize/beans	CC	0	242	351	109	1.53	2.04	0.51	33%
	maize/beans	CC	0	405	397	-0.08	1.74	1.87	0.13	8%
3.2	maize/beans	CC	50	189	249	**60**	1.4	1.71	0.31	
4. Tephrosia Fallow (4 season averages, control = continuous cropping or natural fallow)										
4.1	maize/ beans	CC	0	405	588	183	1.74	2.31	0.57	33%
4.2	maize/beans	CC	50	405	534	129	1.74	2.14	0.4	23%
	maize/beans	NF	50	148	534	386	1.36	2.14	0.78	57%
5. Sesbania Fallow (7 season averages, control = continuous cropping or natural fallow)										
5.1 (High rainfall)	Maize	CC (ochinga)	0	-52	170	-222	0.68, cc	0.92	0.24	35%
(High rainfall)	Maize	NF(ochinga)		273	170	-103	1.10, nf	0.92	-0.18	-16%
(Low rainfall)	Maize	(muange)	0	109	-81	-190	0.82	0.5	-0.32	-39%
(Low rainfall)	Maize	(muange)		161	-81	-242	0.94	0.5	-0.44	-47%
5.2 (High rainfall)	Maize	Sesbania	+P	-56	334	390	0.67	1.06	0.39	58%
(High rainfall)	Maize			105	334	229	0.82	1.06	0.24	30%
(Low rainfall)	Maize	Sesbania	+P	19	66	47	0.71	0.75	0.04	6%
(Low rainfall)	Maize	Sesbania		46	66	20	0.73	0.75	0.01	1.40%
6. Crotalaria Fallow										
6.1	Maize	CC	0	242	351	109	1.53	2.04	0.51	33%
6.2	Maize	CC + rp	50 Kg/ha (rock phosphate	114	358	244	1.25	2.06	0.81	65%
6.3	Maize	CC + tsp	50 Kg/ha (TSP)	189	249	60	1.4	1.71	0.31	22%

Data source: ICRAF reports, see References

CC = continuous cropping as the control; NF = natural fallow in previous season as the control

RP = rock phosphate on control plots; TSP = triple super phosphate on control plots

Returns to land and labor. The Tithonia biomass transfer technology appears to be more profitable than the improved fallow technologies, especially when applied to high-value crops, such as vegetables (kales, tomatoes). Apart from Sesbania fallow, all other improved fallow technologies have, for the most part, positive incremental returns and thus appear to be financially viable options. Sesbania fallow is the least attractive for adoption because it requires more labor for transplanting of seedlings, contrary to the other if technologies which are more labor-saving, because they do not require transplanting and are applied through direct seeding.

The rental cost of land in rural areas of Western Kenya, where they exist, is about $45 per year, far below the returns to land under the traditional practices (controls). The higher returns to treated land (from $ 249

to $1670 per hectare, natural fallow and Sesbania fallow excluded) and the positive and greater incremental returns to land, compared to traditional practices, clearly indicate that in general the SLM technologies result in positive net benefits or returns above the rental value of land and above the on-farm opportunity cost of land. The SLM technologies would thus appear to be financially viable, from the point of view of land investors in Western Kenya. [2]

The results further suggest that Tithonia biomass transfer alone would generate about one million US dollars of net benefits ($869,000 and $1,213,000) in one year if applied to 1,000 hectares of kales or tomatoes) which already implies that adoption of the technology in 1,000 hectares of tomato and/or kales fields for the next five to six years might be sufficient to compensate for the project cost of about $5 million.

The labor productivity growth, expressed in percentage change in returns to labor, ranges for the most part from 22% to 65% and above (mid-distribution/modal figures, distribution tails excluded).

Net present values and benefit-cost ratios. The results of cash flow analysis for one researcher-managed trial and one farmer-managed trial to test improved Tephrosia fallow/carbon sequestration in western Kenya are presented in Tables 6.2 and 6.3 below

The results of the cash flow analysis clearly indicate that Tephrosia improved fallow technology is profitable with the net present values (NPV) of benefits exceeding the NPV of costs by 100% to 200% (cost benefit ratios of 2.2 and 3.6) while the NPVs of benefits exceed the NPVs of costs by less than 70% for the traditional practice of continuous cropping (cost-benefit ratios of 1.5 and 1.6), The greater cost benefit ratio (B/C>2) of the improved fallow technology further suggests that it carries less financial risk than the traditional continuous cropping practice in the densely populated areas of western Kenya.

Table 6.2 NPVs and Benefit-Cost Ratios of Tephrosia Fallow (US dollars per hectare) – Researcher-managed trial (Luero, Western Kenya)

Discount rate	12%		20%	
Farming system	Continuous maize & bean	Improved fallow	Continuous maize & bean	Improved fallow
NPV Cost (4 years); (a)	1182	688	1007	586
NPV Benefits - 4 yrs ; (b)	1977	2494	1698	2,120
Net Benefits [4-year NPV/ha] (b-a)	795	2806	691	1,534
Average net benefit NPV per year /ha (b-a)/4	199	702	173	384
Benefits- Costs Ratio (b/a)	1.67	3.63	1.69	3.62
Incremental Benefit- Cost ratio [(b)IF –(b)cc]/[(a)IF – (a)cc]	-1.04		-1.00	
Internal Rate of Return (IRR)*	NA	NA	NA	NA

Table 6.3 NPVs and Benefit-Cost Ratios of Tephrosia fallow (US dollars per hectare) – Farmer Managed Trial

Discount rate	12%		20%	
Farming system	Continuous maize – bean	Improved fallow	Continuous maize - bean	Improved fallow
NPV Cost (4 years); (a)	809	600	709	519
NPV Benefits - 3 years; (b)	1,222	1,329	1,074	1,149
Net Benefits [3-year NPV/ha] (b-a)	414	729	365	630
Average net benefit NPV per year	138	243	122	210

[2] *Return to Land = (Total Revenue – Cost of Labor - Cash Costs)/ (Land area)*

/ha; (b-a)/3				
Benefits- Costs Ratio; (b/a)	1.51	2.21	1.52	2.21
Incremental Benefit- Cost ratio [(b)IF –(b)cc]/[(a)IF – (a)cc]	-0.51		-0.39	
IRR*	NA	NA	NA	NA

***** Internal rates of return (IRR) are not available (NA) as they could not be computed because of lack of negative cash flows

The NPV of net benefits per hectare and per year under the improved fallow technology, which are over $200, exceeds the net benefits under the traditional practice by at least $100. This further suggests that the improved fallow technology remains profitable, even if carbon credits of about $35 /ha (see working document appendix tables 1 and 2) are excluded, assuming that the short-rain carbon sequestration (above and below ground) does not qualify for carbon credit according to the Kyoto Protocol. Internal rates of returns could not be calculated due to lack of negative annual cash flow values.

E. Economic Analysis

Model 1: Land Productivity Model

On-farm income effects of Tithonia Biomass Transfer Adoption. The adoption rate of biomass transfer is assumed to gradually increase as is the average area of biomass transfer application by each household, evolving from 200 square meters in year 1 to 400 square meters by year 5 and beyond. The net incremental return to land is assumed to be $869 per hectare. The current price of output (vegetables) is also assumed to decline as production increases with a price index erosion of 3% per year (based on price elasticity of 0.3 and 10% average increase in output per year). The results suggest that incremental on-farm income in Western Kenya would increase from $55,000 in year 1 to $771,000 in year 10 and beyond.

Off-farm income effects of Tithonia Biomass Transfer Adoption. Biomass transfer is applied jointly with phosphate application, particularly Minjugu rock phosphate. Increased adoption of the technology will create more income or added values in the input market. The model assumes a basic application of 33kg of P per hectare; a Tanzania border price of $1.11 per kg of P from rock phosphate (13% P composition) and a farm-gate price of $1.73 per kg of P. The results suggest that increased consumption of P would generate additional incomes ranging from $1,000 in year 1 to $25,000 in year 10 and beyond in the agricultural input market.

The processing and marketing of increased output resulting from adoption of the technology would also create incomes or added values in the Kenyan economy. Kales was used as the typical vegetable, with an average yield of 864,000 leaves per hectare or 6.2 tons per hectare. 50 percent of output is assumed to be marketed, with producer farm-gate price and border market prices of $1 and $1.3 per 1000 leaves respectively (Mombassa & Nairobi average price used as border price). Price erosion as a result of increased output is also assumed. The results suggest an output-market income effect that ranges from $8,000 in the first year to $117,000 per year in the tenth year and beyond, until year 20.

Total income effect of Tithonia biomass transfer. Given the above stated assumptions and results, the NPV of the total income effect of Tithonia biomass transfer on vegetables is estimated to be about $3.2 million at 12% discount rate for the first ten years of adoption.

Income Effects of Improved Fallow. The same approach used above for Tithonia biomass transfer was used for estimating the on-farm and off-farm income effects of adoption of the improved fallow technologies in maize fields. The NPV of all income effects resulting from improved fallows in maize fields is estimated to be about $1.1 million dollars in the first ten years of adoption, at 12% discount rate.

Project Cost. The NPV of the project cost is about $4.6 million during the first ten years, at 12% discount rate, and is thus barely covered by the previously estimated income effects within the first ten years, but largely covered beyond the tenth year.

Economic Rate of Return. The economic rate of return (ERR) over twenty years is estimated to be 23.4%. Given the large difference in contributions from the two types of technologies, the project is unlikely to be economically viable, without a major emphasis on the Tithonia biomass transfer technology, and without the latter being applied mainly on high-value crops such as vegetables.

Model 2: Labor Productivity Model

The results of ***Model 2*** suggest that the economic rate of return (ERR) would be 14% for a low labor productivity growth rate of 23%. The ERR would increase to 21% for a labor productivity growth rate of 33% from SLM technology adoption, and to 38% for a productivity growth rate of 60%. A productivity growth rate of 21% would be sufficient for the project to be economically viable with a 12% economic rate of return on investment (assumed market price or opportunity cost of capital). The break-even 21% productivity growth rate corresponds to a 0.7% incremental annual rural income growth rate within the project area (9 blocks) that would be needed to justify the investment being made under the project.[3]

Table 6.3 - Summary of costs, benefits and economic indicators for the two models

Year	Project Costs US$000	Land Productivity Model (Model 1)					Labor Productivity Model (Model 2)		
		Biomass Transfer Benefits (US$000)		Improved Fallow Benefits (US$000)		Total Benefits (US$000)	Min. growth rate (23%)	Median growth rate (33%)	Max. growth rate (60%)
		On-farm	Off-farm	On-farm	Off-farm		Net Benefits (US$ million))		
1	1,000	55	9	12.60	4.15	81	-.0.95	-0.93	-0.86
2	1,500	167	25	38.81	13.01	248	-1.39	-1.34	-1.21
3	1,500	375	56	89.86	30.70	561	-1.15	-0.99	-.0.55
4	1,000	528	79	141.92	49.41	812	-0.62	-0.45	0.02
5	1,000	635	95	183.20	65.04	995	-0.39	-0.11	0.63
6	150	738	110	224.17	81.19	1,174	0.5	0.79	1.59
7	150	750	112	242.95	89.81	1,216	0.77	1.19	2.32
8	150	760	113	261.23	98.61	1,256	0.83	1.27	2.47
9	150	767	114	278.96	107.59	1,291	1.14	1.73	3.31
10-20	150*	771*	115*	285.61*	112.61*	1,309*	1.21*	1.83*	3.51*
Value									
NPV @12%	**4,940**	**3,166 (10 yrs) 4,821 (20 yrs)**		**1,123(10 yrs) 1,847 (20 yrs)**		**4,290 6,668**	**5.50 (20 yrs)**	**7.99 (20 ys)**	**14.74 (20 yrs**
ERR	**23.45% (20 yrs)**						**14%**	**21%**	**38%**
B/C Ratio @ 12%							**1.11**	**1.62**	**2.98**

***** Costs and benefits per year from year 10 to year 20.

Most economic benefits accrue from the application of the Tithonia biomass transfer on vegetables, such as kales and tomatoes, therefore the project will need to pay a particular attention to the dissemination of

[3] incremental income per household per day = current income ($1) x productivity growth rate (0.2) x average adoption ratio (.36) x application ratio by adopters (0.1) = $0.0072

the Tithonia biomass transfer technology on vegetables in order to be economically viable. Widespread adoption of the biomass transfer technology may require that more land be used for Tithonia production in addition to the hedges where Tithonia is currently grown. This may be constrained by competitive uses of land, such as a more profitable use of the land for production of forage (e.g.; napier grass). Furthermore, market outlets, especially those for vegetables, will need to be readily available to absorb the increase in output with no drastic fall in prices. Contract farming with the private sector for vegetables production as observed for French beans in the region may need to be developed and expanded to generate the benefits needed to justify investments under the project.

F. Social/Environmental Analysis

This analysis takes into account, in addition to the economic benefits, the environmental externality benefits such as benefits arising from carbon sequestration, biodiversity and reduction in sediment loading into water catchments within the watersheds and into Lake Victoria, subject to data availability.

Carbon. Carbon sequestration area under the project is estimated by World Agroforestry Center to accrue from 2500 hectares of forest or trees-land, that would be established by the end of the project period (in 5 years) and would accumulate carbon for up to twenty years. The C and CO2 Emission reduction (CER) projections of World Agroforestry Center (Woomer, 2003) were used, along with a CER price of $4 per ton. For instance, it is estimated that 5-year old forest lands (density of 400 trees/ha) would sequester in the projected 2500 hectares about 30,000 tons of carbon, corresponding to about 107,000 tons of CO2 emission reduction (transformation ratio = 3.67), that would result, for a CER price of $4/ton, in about $428,000 of carbon revenue. Although total proceeds expected from the carbon market over twenty years would be about $4.8 millions, the NPV of the carbon revenue at 12% discount rate is only $820,000.00 for 20 years.

Biodiversity. Potential biodiversity benefits from the project can be measured through: (i) additional wildlife (plants and animals) extraction benefits that would accrue to households in the project area, as a result of the project; (ii) wildlife stock accumulation benefits in natural habitats, that would accrue as a result of the project, with estimation based on the stock value of endangered or threatened wildlife species; and (iii) the change in long-term livelihood sustainability or disaster mitigation benefits of biodiversity for food, fiber and human health.

Extraction benefits from wildlife is estimated to be about $160 per household for households around Kakamega forest. It was assumed that such benefits would increase by 10 percent as a result of the project for households in adjacent villages of natural habitats. This was used as a base to assess potential biodiversity benefits. Other information were not available.

Lake Victoria. The intervention of the project in the nine blocks covering about 2% of the total watersheds area in Western Kenya, is unlikely to generate any significant decline in sediment loading that would have a perceptible impact on the economy of the Lake. At best the SLM technologies and the planting of trees on degraded lands would improve water quality in the catchments where the blocks are located, but no significant impact beyond such catchments.

Rates of Return. Given the above assumptions, the social rates of returns for the project was estimated, via each model, by adding the economic benefits to the environmental benefits mentioned above. ***Model 1*** suggests a social rate of returns (SRR) of 25.4%, while ***Model 2*** suggests SRRs of 16%, 23%, and 39% for labor productivity growth rates of 23%, 33% and 60% respectively. A labor productivity growth rate of 18%, or 0.64% annual income growth in the project area would be sufficient to achieve a 12% SRR on investment (12% assumed capital market rate/ opportunity cost).

Given that the assumed productivity growth rates are quite feasible under the project, and given the fact that several other potential benefits of the projects are not quantified (capacity building, water quality improvement, biodiversity, etc.;) the project is likely to be economically and socially viable.

G. Sensitivity Analysis

Sensitivity analysis was done to test assumptions about project scope, adoption rates and income growth. The following variables were tested:

Lowering the number of villages affected by the project in the nine blocks. The change from a total of 450 villages (50 per block) to 135 villages (15 per block) led to ***Model 1***: ERR = 14%; SRR = 16% and Model 2 suggests ERRs = negative, 1% and 10% , and SRR = 3%, 6% and 13% for productivity growth rates of 23%, 33% and 60% respectively, given previous assumptions about adoption rates. Thus, if a relatively high labor productivity growth rate (60%) is assured, the project will be socio-economically viable. If not, the ERR may be negative if impact is limited to only 135 villages.

Lowering the productivity growth of land. When the productivity growth of vegetables fields under Tithonia biomass transfer were reduced from $869/ha to $500/ha, Model 1 indicates an ERR of 13.5% and an SRR of 15.3% for 135 villages and an ERR of 14.2% and a SRR of 16.1% for 450 villages. Thus, the project remains socio-economically viable with a relatively modest increase in the productivity of land under vegetables and biomass transfer (with still a relatively high corresponding labor productivity growth of about 50%).

Halving the adoption ratio. Reducing the adoption rate from 14% to 23% for both biomass transfer and improved fallow combined from year 1 to year 10 and beyond suggests ERR = 3%, 9% and 19% in Model 2; and a SRR = 7%, 12% and 21% for low (23%), medium (33%) and high (60%) labor productivity rates respectively. A medium labor productivity growth rate (33%) would be sufficient for the project to be socio-economically viable if expected adoption ratios for both types of technologies are halved.

Assuming a base income growth rate of zero percent (0%). Assuming a zero percent growth rate of income in Model 2 results in little or no change to rates of return. ERR is 13%, 21% and 37% and SRR is 16%, 22% and 38% for low (23%), medium (33%) and high (60%) productivity growth rates.

H. Conclusion

The SLM technology adoption patterns observed in Western Kenya in the past, and the estimated financial, economic and social rates of return suggest that the project is likely to be financially and economically viable, provided that some conditions are met. These include: (a) the need for the project to emphasize the dissemination of the tithonia biomass transfer technology in vegetables fields as much as possible, or more than the improved fallow technology in maize fields; (b) the need to directly or indirectly have an impact on the almost 450 villages within the nine blocks of the project area through direct or indirect adoption of the SLM technologies by at least 18 percent of the households on average and on small plots (400 square meters, or about 10% of land holding) by the end of the project period (in 5 years); and (c) availability of market outlets to absorb the increased outputs, especially vegetables output, without any drastic fall in product prices; otherwise the project might not be economically viable.

The socio-economic viability of the project will be much more enhanced if the project succeeds in creating the expected 2500 hectares of carbon sink, for CO2 emission reduction marketing within the next twenty years. The expected economic and social rates of returns of the project are generally in the range of 14-38% depending on assumptions made, and might be higher because several potential environmental

(biodiversity) and institutional benefits have not been quantified. An incremental income growth rate of 0.6 –0.7 % per year in the project villages would be sufficient to have a 12% rate of return to justify the investment being made under the project.

With respect to the potential impact that the project might have on poverty, the available empirical data fails to establish a significant direct link between poverty and the SLM technology adoption in Western Kenya because of uncontrolled and distorting factors such as diseases (HIV-AIDS) during the research period.

Regarding the issue of incentive for speeding up SLM technology adoption, the results suggest that there is sufficient room and motivation for adopting the SLM technologies in the current farming systems of Western Kenya and that an incentive system may be delayed until adoption begins to slow down or become a major constraint for project implementation. The issue may be re-assessed at mid-term review if necessary.

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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	0.92	0.69	0.61	0.66	0.56	3.44
Recurrent Costs	0.38	0.29	0.27	0.28	0.29	1.51
Total Project Costs	1.30	0.98	0.88	0.94	0.85	4.95
Total Financing	1.30	0.98	0.88	0.94	0.85	4.95

Financing						
IDA	0	0	0	0	0	0
Government	0.18	0.17	0.17	0.17	0.16	0.85
GEF	1.12	0.81	0.71	0.77	0.69	4.10
Total Project Financing	1.30	0.98	0.88	0.94	0.85	4.95

These tables include project costs for the GEF/GOK project only. Detailed disbursement schedules for other co-financing is unavailable. See Annex 2 for a cost estimate of other co-financiers.

Annex 8A: Procurement Arrangements

KENYA: Western Kenya Integrated Ecosystem Management.

A. General

Procurement for the proposed project would be carried out in accordance with the World Bank's "Guidelines: Procurement Under IBRD Loans and IDA Credits" dated May 2004; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, and the provisions stipulated in the Legal Agreement. The general description of various items under different expenditure category are described below. For each contract to be financed by the Loan/Credit, the different procurement methods or consultant selection methods, the need for prequalification, estimated costs, prior review requirements, and time frame are agreed between the Borrower and the Bank project team in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

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.

Procurement of Works: The project will not finance any major works contracts but will support community-based small scale infrastructure activities such as protection of river banks, and construction of water pans as well as works related to the development of village nurseries. The scope and budgets of these activities will be determined by the proposals to be prepared by the beneficiaries. The procedures for the implementation of the community-based activities will be detailed in the Project Implementation Manual.

Shopping: Contracts for small works estimated to cost the equivalent of less than $50,000 per contract may procured under lump-sum, fixed price contracts awarded on the basis of quotations obtaining in writing from at least three local contractors. The request for quotations will include description of the works, including plans and technical specifications as appropriate, required completion time, and a standard form of contract acceptable to IDA.

Force Account: Communities may implement sub-projects using its own resources (skilled/unskilled labour, materials, equipment), or hiring labour and purchasing materials themselves and sub-contracting the rest of the work to petty contractors by obtaining three quotations.

Direct Contracting: Direct contracting of one contractor without getting other quotations may be allowed, upon prior clearance of the community project committee, when there is one qualified contractor and/or the amount is small as prescribed in the Project Implementation Manual.

Procurement of Goods: Goods to be procured under this project would include: motor vehicles, office equipment, laboratory equipment and some specialized equipment. The procurement will be done using Bank's Standard Bidding Documents (SBD) for all ICB and National SBD agreed with (or satisfactory to) the Bank.

To the extent practicable, goods and equipment would be combined in packages worth at least US$150,000 and be procured using International Competitive Bidding (ICB) procedures, using IDA Standard Bidding Documents (SBD). Contracts for goods estimated to cost between US$50,000 and US$150,000 equivalent per contract will be procured through National Competitive Bidding (NCB) using National procedures acceptable to IDA.

Contracts for goods, equipment and services estimated to cost less than US$50,000 equivalent per contract will be procured using the Shopping Procedures in accordance with paragraphs 3.5 and 3.6 of the Procurement Guidelines, and in accordance with the notes on Guidance on Shopping[4].

The procurement methods that will be appropriate for goods required for community-based activities will either be shopping or direct purchase as prescribed in the Project Implementation Manual. Procuring directly from the supplier without getting other quotations may be allowed, upon prior clearance with the Bank, when there is only one supplier and/or the amount is small as prescribed in the Project Implementation Manual.

Procurement of non-consulting services: Other services such as meetings, workshops and trainings will be procured throughout the project. Procurement of these services will be governed by the Bank's General Guidelines.

Selection of Consultants: Consulting services financed by the project will include studies, technical audits, monitoring and evaluation, technical assistance to communities, training of staff and local communities. Consulting services from individual consultants, consulting firms, or non-profit organization may be required for the implementation of certain activities of all components of the project.

Except as detailed below, consulting services will be selected through competition among qualified short-listed firms based on Quality- and Cost-Based Selection (QCBS). Short lists of consultants for services estimated to cost less than the equivalent of US$ 200,000 may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines. Consultants for financial audits and other repetitive services will be selected through Least Cost Selection (LCS) method.

Consultancy services for estimated to cost less than US$ 100,000 may be procured on the basis of the Selection Based on Consultants' Qualifications (CQ) method.

In exceptional cases when selection of consultants through competitive process is not practicable consultants may, upon prior clearance with the Bank, be hired through the single-source selection method stipulated in Paragraphs 3.9-3.13 of the Guidelines.

Consultants for services meeting the requirements of Section V of the Consultant Guidelines will be selected under the provisions for the Selection of Individual Consultants (SIC) method. Individual Consultants will be selected through comparison of job description requirements against the qualifications of those expressing interest in the assignment or those approached directly.

Operational Costs: Procurement under the Operational Costs category, which would be financed by the project would be procured using the implementing agency's administrative procedures which were reviewed and found acceptable to the Bank.

[4] The Guidance Notes are available in the following internet address: http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/PROCUREMENT/0,,contentMDK:20105663~menuPK:93977~pagePK:84269~piPK:60001558~theSitePK:84266,00.html

Bank Reviews. Each contract for goods, works and services (other than consultants' services) procured on the basis of International Competitive Bidding or Direct Contracting will be subject to IDA prior review. All consulting contracts costing US$100,000 equivalent or more for firms and US$50,000 and more for individuals will be subject to IDA prior review. All single-source selection of consultants and terms of reference for consulting services will be subject to IDA prior review. Any exceptional extensions to non-prior review contracts raising their values to levels equivalent or above the prior review thresholds will be subject to IDA clearance. All other contracts will be subject to post review in accordance with paragraph 4 of Appendix I of the Guidelines.

B. Assessment of the agency's capacity to implement procurement

Procurement activities will be carried out by KARI. The Finance & Administration Division of KARI has a procurement unit which is staffed by 11 procurement officers. The Project Implementation Manual will include, in addition to the procurement procedures, the SBDs to be used for each procurement method, as well as model contracts for goods procured and consultants to be selected.

An assessment of the capacity of the Implementing Agency to implement procurement actions for the project has been carried out by Country Office Procurement Specialist during appraisal of the project. The assessment reviewed the organizational structure for implementing the project and the interaction between the project's staff responsible for procurement Officer and the Ministry's relevant central unit for administration and finance.

Most of the issues/ risks concerning the procurement component for implementation of the project have been identified. KARI, as an institution, has a long experience in Bank procurement procedures as it has completed implementation of two Bank-funded projects (i.e. NARP I and NARP II), is currently implementing the Lake Victoria Environmental Management project (LVEMP) and the recently signed Kenya Agricultural Productivity Project (KAPP). KARI has a Chief Supplies Officer who is trained and well conversant with the Bank procurement procedures. The overall project risk for procurement is low.

C. Procurement Plan

The Borrower, at appraisal, developed a Procurement Plan for the first 18 months of the project implementation which provides the basis for the procurement methods. This plan will be discussed and agreed with the Bank during negotiation of the project. The Procurement Plan will be available in the Project's database and in the Bank's external website. The Procurement Plan will be updated in agreement with the Project Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

D. Frequency of Procurement Supervision

In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of the Implementing Agency has recommended quarterly supervision missions to visit the field to carry out post review of procurement actions.

Attachment 1

Details of the Procurement Arrangement involving international competition.

1. Goods and Works and non consulting services.

(a) List of contract Packages which will be procured following ICB and Direct contracting:

1	2	3	4	5	6	7	8
Ref No.	**Contract (Description)**	**Est. Cost (US$ 000)**	**Procurement Method**	**P-Q**	**Domestic Preference (yes/no)**	**Review by Bank (Prior / Post)**	**Expected Bid-Opening Date**
Package 1	Lab Equipment	111.80	ICB	N/A	N/A	Post	Sept19, 2004
Package 2	Survey Equip.	107.80	ICB	N/A	N/A	Post	Sept 19, 2004
Package 3	Vehicles	87.80	NCB	N/A	N/A	Post	Sep 5, 2004
No of small contracts	Office equipment and services	0.75	Shopping	N/A	N/A	Post	Aug 22, 2004
	Inputs for community activities	107.80	CDD-proc. Proce-dures	N/A	N/A	Post	Various dates

(b) ICB Contracts estimated to cost above [*fill in threshold amount*] per contract and all Direct contracting will be subject to prior review by the Bank.

1. **Consulting Services**.

(a) List of Consulting Assignments with short-list of international firms.

1	2	3	4	5	6
Ref. No.	**Description of Assignment**	**Estimated** *Cost (US$000)*	**Selection Method**	**Review by Bank (Prior / Post)**	**Expected Proposals Submission Date**
	World Agroforestry Center TA	1,220.00	SSS	Prior	

(b) Consultancy services estimated to cost above US$ 100,00 per contract and Single Source selection of consultants (firms) for assignments will be subject to prior review by the Bank.

(c) Short lists composed entirely of national consultants: Short lists of consultants for services estimated to cost less than US$ 100,000 equivalent per contract, may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Annex 8B: Financial Management and Disbursement Arrangements

KENYA: Western Kenya Integrated Ecosystem Management

A. Project Financial Management System

Accounting System, Accounting Policies and Procedures. The overall responsibility for project implementation is assigned to KARI. Therefore, for the purpose of accountability under the GoK financial regulation and implementation of approved national budget, the Director - KARI will have "Accounting Officer" responsibility for funds released by the GOK against the approved budget (both donor funds and counterpart funds). The Director is empowered under the GoK guidelines to delegate the authority to manage the project funds to the persons working in the PCO. The Project Coordinator (PC) is responsible for the overall management of PCO and will coordinate the implementation activities of the various stake-holders and beneficiaries under the project At the PCO, established KARI accounting systems will be used in accounting for project funds.

Community organizations and other implementing agencies will receive and account for funds from KARI using a system of imprest accounting. Under this arrangement, a sum equivalent to 2 months average expenses will be released as an advance. The beneficiary is expected to utilize the funds against the approved expenditure in their work program and budget, and submit accountability reports at the end of each month in respect of amount already spent during the month. By the 10th of the following month the beneficiary will submit the accountability report to the PCO duly supported by the paid vouchers for replenishment of the amount spent during the previous month. The accountability report will be reviewed by the PCO and the amount spent replenished to the beneficiary within two weeks from the date of receipt by the PCO. Therefore, the beneficiary would have uninterrupted supply of funds to undertake the approved program of work.

The format of accounting records and reporting to the PCO by other implementing agencies and community based organizations will follow KARI procedures and will be defined in the Project Financial Procedures Manual. Details to be included in the manual will comprise budgeting and progress reporting requirements; funds flow arrangements; accounting records to be maintained at the PCO and implementing agencies including bank accounts, income and expenditure records, asset registers etc; monthly, quarterly and annual reporting requirements; and internal and external audit arrangements. The manual will be subject to review and approval by IDA.

Budgeting. The Project Coordinator will prepare annual work programs and budgets for the individual components, sub-components and activities under the project, for submission to the Director – KARI for review and approval. For this purpose the PC will interact with the Budget Officer at KARI HQ. The budget officer will review the draft budget with reference to the project documents and provision made in forward budget for KARI. The draft budget will be incorporated in the consolidated budget of KARI, reviewed and approved by the Board of Management of KARI and submitted to the MOF, though MOA in accordance with the GOK guidelines.

Community based organizations and other implementing agencies will produce work programs that include procurement and disbursement plans that will be consolidated at the PCO and used to plan and monitor cash flow needs. Community organization financing plans will be contained in their project proposals. To facilitate standardization, the Project Financial Procedures Manual will include budget proposal preparation guidelines and templates. The PCO will be responsible for authorizing expenditures for their respective components in accordance with the agreed budgets. Progress reporting in comparison with budgets will be compiled and reported to IDA on a quarterly basis as part of the Financial Monitoring Reports (FMR) prepared by the PCO.

Funds Flow. Funds will flow from the IDA credit account to the project Special Account, maintained by the Ministry of Finance in accordance with GOK procedures. A local currency project operating account will be opened in a commercial bank in Nairobi by KARI, to be operated by the authorized signatories appointed by Director – KARI. The operating account will form the primary source of financing for project activities and will receive funds from the Special Account. A subsidiary project account will be opened and operated in Kisumu for use by the PCO. Payments for centrally procured items will be made directly by the KARI HO, in line with existing KARI approval procedures. The PCO through the subsidiary account will make remittances to implementing entities and community based organizations following approval of funding applications and accountabilities. It will also make payments for operating activities from this account. The subsidiary account will be replenished periodically following KARI HQ review and approval of related expenditure statements and cash flow projections.

Initially, up to the mid term review (MTR), disbursement of funds by IDA to the Special Account will be based on SOE procedure. During the MTR this issue will be reviewed taking into account the actual performance of project implementation in terms of financial management and procurement and an appropriate decision taken on the use of FMR. If at that time it is assessed as feasible, then the FMRs will be implemented as the persons involved in the utilization of funds and submission of accountability reports would have been adequately trained to follow the FMR procedure.

Financial Monitoring and Reports. Reports to be prepared on a quarterly basis by the PCO will comprise statements of:

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

Project Financial Statements. In addition to the monthly expenditure reporting and bank reconciliation statements and quarterly FMRs, the Project will present 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;
- 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.

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

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 Grant 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. The existing KARI internal audit function will be responsible for ensuring compliance with laid down accounting, internal control and general project management requirements at the PCO, implementing agencies and community-based organizations. The internal audit department will prepare and follow an annual work program that will ensure adequate in-depth coverage of all project activities. Its reports shall be presented to the Director - KARI for follow-up action.

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 for review by the project team. The FMS will also review annual audit reports and management letters from the external auditors.

Monitoring. Project monitoring will take the following forms:

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

Disbursement Arrangements. Disbursements from IDA would be initially made on the basis of incurred eligible expenditures (transaction-based disbursements). IDA would then make advance disbursement from the proceeds of the Grant by depositing into a borrower-operated Special Account to expedite project implementation. The advance to a Special Account would be used to finance IDA's share of eligible expenditures. Another acceptable method of withdrawing funds from the Grant is the direct payment method, involving direct payments to third parties for works, goods and services upon the borrower's request. Payments may also be made to a commercial bank for expenditures against IDA special commitments covering a commercial bank's letter of credit. IDA's Disbursement Letter stipulates a minimum application value for direct payment and special commitment procedures.

Upon credit effectiveness, the PCO would be required to submit a withdrawal application for an initial deposit to the Special Account, drawn from the IDA Grant, in an amount to be agreed to in the Development Grant Agreement. Replenishment of funds from IDA to the Special Account will be made upon evidence of satisfactory utilization of the advance, reflected in SOEs and/or on full documentation for payments above SOE thresholds. Replenishment applications would be required to be submitted regularly on a monthly basis. If ineligible expenditures are found to have been made from the Special Account, the borrower will be obligated to refund the same. If the Special Account remains inactive for more than six months, the borrower may be requested to refund to IDA amounts advanced to the Special Account.

Strengthening its accounting and financial management capacity will enable PCO to establish effective financial management and accounting systems, which should eventually facilitate the introduction of Financial Monitoring Report (FMR)-based disbursements in periods subsequent to project effectiveness. The adoption of this approach will enable the project to move away from time-consuming transaction based disbursement (voucher-by-voucher) methods to quarterly report based disbursements to the Project's Special Account, based on the FMRs. Report-based disbursements offers more flexibility.

IDA will have the right, as to be reflected in the Development Grant Agreement, to suspend disbursement of the Funds if reporting requirements are not complied with.

Training Plan. The PCO finance officer and key project management staff 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 PCO finance officer.

B. Risk Assessment

Country Risk Assessment. The new Government that came into office in December 2002, has made a commitment to strengthen the financial management and control environment in order to achieve economy, efficiency and effectiveness in the use of public funds. Thus, with the support of a number of donor assisted initiatives, including the IDA-funded Public Sector Management Technical Assistance Project (PSMTAP), GoK is seeking to rapidly enhance the financial accountability framework, particularly through strengthening the legislation related to public financial management and the Office of the Controller and Auditor General.

The most recent piece of diagnostic work that provides an up to date critical assessment of issues that may impact on this operation at country level is the Country Portfolio Performance Review (CPPR) carried out in January 2004. A new Country Assistance Strategy (CAS) has also just been completed in May 2004. Both these works reviewed government's performance since the last CPPR (in 1997) and CAS (in 1998). A recurring theme noted was that policy changes agreed under projects were not consistently implemented. The sustainability of projects were also impeded by lack of adequate and timely release of budgetary allocations.

The CPPR especially highlighted the GoK's commitment to improving portfolio performance, particularly in the last three years, and agreement was reached on several key issues, some of which have been applied in the design of this operation. These include the use of private auditors, and allowing funds to flow directly to the project. In the meantime, a Country Financial Accountability Assessment (CFAA) update is planned for fiscal 2005.

Project-Specific Risks.

(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 Treasury delaying project implementation through lack of counterpart funds.

Mitigation Measures. A number of project-specific risk mitigation arrangements have been proposed in order to address noted concerns:

(i) Institutional arrangements place fiduciary responsibility with KARI, an entity that has significant experience of managing IDA funded projects and is familiar with IDA fund management and reporting requirements and community-driven development projects. KARI's accounting and internal control systems are assessed to be capable of satisfactorily managing the project.

(ii) The independent annual audit of the project will be subcontracted to a private firm of auditors who will report to the Government CAG. This arrangement is intended to ensure effectiveness and efficiency of the audit process.

(iii) The project will be subject to regular IDA supervision missions aimed at closely monitoring performance and the timely resolution of issues. In addition, the action plan resulting from the recent CPPR will be applied to this Project.

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	Draft Project Financial Procedures Manual prepared by management, reviewed and considered acceptable to IDA.	Negotiations	Condition of Negotiations
2	Financial Monitoring Report formats and input by implementing agencies agreed.	Negotiations	Condition of Negotiations
3	Recruitment of appropriately qualified and experienced financial officer at PCO.	Effectiveness	Condition of Effectiveness
4	Training for PCO and implementing agencies' financial managers and accountants on IDA FM and Procurement procedures.	Effectiveness	Condition of Effectiveness
5	Financial management system installed at the PCO. This includes: ▪ Procedures Manuals ▪ Information System ▪ Staff Training	Effectiveness	Condition of Effectiveness
6	Project accounts opened and initial deposits of counterpart funds made.	Effectiveness	Condition of Effectiveness
7	Ability of PCO to prepare FMRs and of implementing agencies to prepare FMR input.	Effectiveness	Condition of Effectiveness
8	Relevantly qualified external auditor for the project appointed on approved terms of reference.	6 months following effectiveness	

Annex 9: Project Processing Schedule

KENYA: Western Kenya Integrated Ecosystem Management

	Planned	Actual
PCN review		09/23/03
Initial PID to PIC		10/17/03
Initial ISDS to PIC		10/29/03
Appraisal		05/25/2004
Negotiations	08/23/04	
Board/RVP approval	11/30/2004	
Planned date of effectiveness	1/30/05	
Planned date of mid-term review	06/30/07	
Planned closing date	06/30/10	

Bank staff and consultants who worked on the project included:

Name	Title	Unit
Berhane Manna	Lead Specialist, agricultural services	AFTS2
Andrew Karanja	Agricultural Economist	AFTS2
Yves Coffi Prudencio	Lead Operation Officer	AFTS2
Julian Dumanski	Consultant	
Melissa Brown	Junior Professional Associate	AFTS2
Dahir Warsame	Procurement Specialist	AFTPC
Enos Esikuri	Environment Specialist	ENV
Christophe Crepin	GEF Coordinator, AFR	AFTS4
Moses Wasike	Financial Management Specialist	AFTFM
Hyacinth Brown	Senior Finance Officer	LOAG2
	Legal Counsel	LEGAF
Jaime Webbe	Junior Professional Associate	AFTS4
John Boyle	Environment Safeguards Specialist	AFTS1
Roxanne Hakim	Social Safeguards Specialist	AFTS2
Sandra Jo Bulls	Team Assistant	AFTS2
Christine Cornelius	Lead Operations Officer	AFTS2
Wendy Wiltshire	Operations Analyst	AFTS2
Lucie Muchekehu	Team Assistant	AFMKE

Annex 10: Documents in the Project File

KENYA: Western Kenya Integrated Ecosystem Management

A. Project Implementation Plan

1. Draft Project Implementation Plan

B. Bank Documents

1. Project Concept Document
2. Project Information Data Sheet (PCD stage)
3. Integrated Safeguards Data Sheet (PCD stage)
4. Minutes of the PCD Review Meeting
5. Minutes of Decision Meeting
6. Project Appraisal Document
7. Project Information Data Sheet (PAD stage)
8. Integrated Safeguards Data Sheet (PAD stage)
9. Minutes of Negotiation
10. Exemption from Riparian Notification Requirement

C. Project Studies and Reports

1. Roots of Ecosystem Degradation working paper
2. Economic and Financial Analysis working paper
3. Biodiversity in Western Kenya background paper
4. Project Monitoring and Evaluation plan

Annex 11: Statements of Loans and Credits

KENYA: Western Kenya Integrated Ecosystem Management

Annex 12: Monitoring and Evaluation Plan

KENYA: Western Kenya Integrated Ecosystem Management

A. Project Intervention Area[5]

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

[5] This annex presents a summary of the monitoring and evaluation plan for the project. For a fuller description, see the working paper in the project file.

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.

B. 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[6], 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[7].

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[8] will be acquired each FA, and georegistered. Complete inventories of woody vegetation cover will be completed, using standard image interpretation

[6] Note that this assumption will be quantified prior to initiating plantings

[7] 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

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, 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.

[8] http://www.digitalglobe.com

C. 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.

D. 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 13: Root Causes of Ecosystem Degradation

KENYA: Western Kenya Integrated Ecosystem Management

A. 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[9] 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 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,

[9] 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.

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.

B. 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 14: Biodiversity in Western Kenya

KENYA: Western Kenya Integrated Ecosystem Management

A. Introduction

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.

B. 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[10] 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

[10] "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

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.

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.

C. 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, Greater Swamp-warbler, fish	Sedimentation, agricultural encroachment, drainage for agricultural purposes

					species to be determined	
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	