PROPOSAL FOR GEF FUNDING
Medium-sized Project

PROJECT ID: 2836
COUNTRY: Ghana
PROJECT TITLE: Sustainable Land Management for Mitigating Land Degradation, Enhancing Agricultural Biodiversity and Reducing Poverty (*SLaM*)
GEF AGENCY: UNDP
OTHER EXECUTING AGENCY(IES): University of Ghana and consortium of Partners
DURATION: 4 years
GEF FOCAL AREA: Land Degradation
GEF OPERATIONAL PROGRAM: 15
GEF STRATEGIC PRIORITY: SP 2 Implementation of Innovative and Indigenous Sustainable Land Management Practices
ESTIMATED STARTING DATE: May 2004
IMPLEMENTING AGENCY FEE: $146,000

FINANCING PLAN (US$)	
GEF PROJECT/COMPONENT	
Project	945,000
PDF A	0
Sub-Total GEF	945,000
CO-FINANCING	
National Contribution	733,023
Others	80,000
Sub-Total Co-financing:	813,023
Total Project Financing:	1,758,023

RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT:
E.O. Nsenkyire, Operational Focal Point and Chief Director, Ministry of Environment, Science and Technology
Date*: May 28, 2003*

MEDIUM-SIZED PROJECT BRIEF

CONCEPT PAPER

Project Identifiers	
1. Project name: Sustainable Land Management for Mitigating Land Degradation, Enhancing Agricultural Biodiversity and Reducing Poverty (*SLaM*) in Ghana	**2. GEF Implementing Agency:** University of Ghana (backstopped by United Nations Development Programme - UNDP)
3. Country or countries in which the project is being implemented: Ghana	**4. Country eligibility:** Ghana: CCD Ratification - 27 December 1996 CBD Ratification - 29 August 1994
5. GEF focal area(s): Land Degradation, with additional benefits to Biodiversity	**6. Operational program/Short-term measure:** OP 15: Sustainable Land Management, with relevance to OP 13: Conservation and Sustainable Use of Biological Diversity Important to Agriculture

7. Project linkage to national priorities, action plans, and programs, and country drivenness:

1. The New Partnership for Africa's Development (NEPAD), October 2001, identifies "*the prerequisite for Africa of a healthy and productive environment*", and "*that the range of issues necessary to nurture this environmental base is vast and complex*" (p. 41). NEPAD further links Africa's poor social development with agrarian systems that are weak and unproductive, and how improvement in agricultural performance, the combating of desertification and the ability to withstand climatic uncertainty are essential for Africa's food security. These Africa-wide priorities were reaffirmed at the Johannesburg summit, August 2002, with the further priority for co-operative actions by countries to indicate the viability of partnerships towards tackling problems such as land degradation.

2. The highly favourably reviewed project, *People, Land Management and Environmental Change (*renamed *People, Land Management and Ecosystem Conservation* since August 2002) - *PLEC* (GEF-funded, 1998-2002), upon which this proposal builds, has demonstrated the potential to counter biodiversity erosion, conserve other biophysical resources and protect ecological integrity and, thereby, improve the basis of rural livelihoods, by sustainable land management practices, including '*agrodiversity*' [agricultural biodiversity, including all management and organizational aspects].

3. Integrated action plans for natural resources management are proposed by NEPAD, and are the main policy objective of the Ghana Government and of West Africa Regional organizations, such as ECOWAS and *CORAF/WECARD*. This project proposal aims to contribute to the sustainable management of land by resource-poor, marginal farmers, while at the same time addressing global incremental benefits to combat desertification and deforestation, and additional benefits in the conservation, sustainable use and equitable sharing of the benefits of biodiversity, forests and agro-ecosystems for rural people as embodied in the CCD and the CBD.

4. A key pervasive natural resource management issue identified by the Government of Ghana in policy statements is land degradation and associated desertification, deforestation and loss of biodiversity. Poor management, and unsustainable harvesting levels cause it. The principal root cause is growing human pressure. Contributing factors are the lack of effective institutional and

policy frameworks for implementing ecologically and socio-economically sustainable management systems in collaboration with local communities.

5. This proposal is in consonance with the spirit of Ghana's current Fourth Republic Constitution, the fundamental basis of official land policy. Realizing the fundamental importance of land in the national livelihoods, the Constitution vests all public lands in the President on behalf of, and in trust for the people, grants the Government absolute powers of land acquisition for purposes deemed to be in the public interest, and provides a Land Commission and other machinery for regulating and coordinating the use of land (Republic of Ghana 1992).

6. A basic medium-term vision of the Ghana government is to transform the country into a middle-income one where the people live in harmony with their natural environment, with the population deriving optimum benefits through sustainable use of the country's rich land resources. The country has a long-standing record on policies and strategies related to the land and overall environment.

7. The national 'Environmental Action Plan', provides the basic policy framework for land and overall environmental management. The Plan declares Ghana's environmental policy as aimed at "*ensuring a sound management of resources and the environment, and to avoid any exploitation of these resources in a manner that might cause irreparable damage to the environment*" (Environmental Protection Council, no date: ix). Issues described as central to the policy include management of: the solid land; forestry and wildlife; water; and marine ecosystems, all of which are under threat by both natural and anthropogenic forces. At the core of the implementation strategy are enhanced management practices and institutional capacity.

8. A complimentary policy, to which this proposal responds, is the 'National Land Policy'. It aims at "*the judicious use of the nation's land and all its natural resources by all sections of the Ghanaian society in support of various socio-economic activities undertaken in accordance with sustainable resource management principles and in maintaining viable ecosystems*" (Ministry of Lands and Forestry, 1999:6). With community participation in land management at all levels as a key underlying principle, the National Land Policy provides "*the framework and direction for dealing with the issues of land ownership, security of tenure, land use and development, and environmental conservation on a sustainable basis*" (Ministry of Lands and Forestry 1999: ii). Strengthening security of tenure for better development of land is the core aim of a 'Land Title Registration Law' (Provisional National Defence Council 1986: i).

9. Another relevant policy is the 'Forest and Wildlife Policy'. Through the use of suitable market mechanisms and promotion of permanent and wildlife estates, viable wildlife and forest-based industries, public education and participation, research and institutional capacity strengthening, the Policy seeks "*conservation and sustainable development of the nation's forest and wildlife resources for maintenance of environmental quality and perpetual flow of optimum benefits to all segments of society*" (Ministry of Lands and Forestry 1994: 8).

10. Policy inspired strategies for sustainable land improvement for food security include the following, which are embodied in the 'Medium Term Agricultural Development Programme (MTADP)' and the 'Soil Fertility Management Plan (SFMP)' of the Ministry of Food and Agriculture (1990, 1998): use of the most sustainable lands, i.e., usage based on land capacity and capability; crop rotations; agroforestry; and, soil and moisture conservation.

11. The most recent policy document directly relevant to this proposal is the 'National Biodiversity Strategy for Ghana', which seeks to "*conserve the country's biological diversity*

while ensuring that the biological resources provide lasting social, economic and environmental benefits to the population through their efficient and equitable use" (Ministry of Environment and Science 2002: 32). It highlights that "*the economic loss to the nation of loss of biodiversity through deforestation and land degradation [is] about US$54bn (about 4% of GDP)*"-(p. ii). One of the principal actions recommended in the Strategy is the promotion of community participation in sustainable management of biodiversity. In this regard, the Strategy specifies the following required action: "*undertake basic and applied research into the socio-economic and cultural importance and opportunities as well as ecology and the dynamics of ecological processes and how they affect the various systems and biodiversity*" (p. 40).

12. 'The National Action Plan to Combat Drought and Desertification' (2002 - in draft) addresses the serious status of land degradation in key vulnerable ecosystems in Ghana. The status is especially serious in the drylands but also in the more humid south where soil erosion and loss of quality of land resources has a great adverse impact on local people. As a component of environmental degradation, soil erosion has since the 1970s become the severest problem undermining agricultural productivity, mainly because of accelerated vegetative cover loss by unsustainable farming and grazing practices. About 70 percent of the country is subject to severe sheet and gully erosion (Asiamah 1987). This growing threat of soil erosion underlies the recognition of sustainable ecosystemic land management for control of land degradation as a critical need by the National Environmental Action Plan and the National Land Policy.

13. Government of Ghana policy further states, that initiatives to deal with critical environmental problems must be tackled with due regard to human development. For example, the Medium-Term Agricultural Development Programme (MTDP, 1990) stresses food security and poverty reduction, and the very recent Ghana Poverty Reduction Strategy (GPRS, 2002) links poverty with environmental degradation and the need for actions that address both simultaneously. The GPRS states: "*Safeguarding the environment is an essential condition for sustainable development and improving the quality of life. The long-term objective is to maintain a sound environment and to prevent all forms of environmental degradation*" (p. 25). It further states "*sound and sustainable management of the environment; promotion of commercial agriculture, using environmentally friendly technologies*" (p. iv) as a strategy for poverty reduction.

8. GEF national operational focal point and date of country endorsement:
Focal point: Edward O. Nsenkyire, Chief Director, Ministry of Environment, Science and Technology
Endorsed: 28th May 2003

9. Project rationale and objectives: Summary

Overall Goal

Contribute to sustainable ecosystem-based integrated land management in globally, nationally and locally significant land resources in agricultural areas under threat of land degradation, for greater ecosystem stability, enhanced food security and improved rural livelihoods.

Objectives:	**Indicators:**
1. Ecosystem recovery demonstrated and upscaled in priority degraded lands, using best practices in sustainable land management (SLM) to enhance ecosystem stability and	• Ecological functions as assessed by appropriate measures of soil, floral, faunal and hydrological conditions as well as of carbon sequestration in demonstration sites enhanced by at least 25%

functions, agricultural productive capacity, food security and rural livelihoods 2. Enhanced capacity for mitigation of land degradation and for sustainable land management through greater awareness, mainstreaming, and policy reform	• Agricultural productivity potential in demonstration sites increased by 50% • Livelihoods as assessed by farm incomes and nutritional levels enhanced by at least 25% • 5% spontaneous uptake of best practices in non-target areas • Recognition of SLM increased in public sectors • At least two national policy frameworks integrate SLM principles and are disseminated
10. Project outcomes: **Outcome 1** A participatory methodological framework based on joint farmer-scientist perceptions for identifying and prioritizing threatened lands, and criteria for identifying sustainable ('good/best') land management practices plus land use plans developed and applied by appropriate methodologies **Outcome 2** Sustainable ('good/best') land management practices applied to recover degraded lands, protect those under threat, and enhance their ecological functions, agricultural production capacity and rural livelihoods improvements role **Outcome 3** Capacity and enabling environment for mitigating land degradation and promoting sustainable land management enhanced	**Indicators:** • Systematic participatory methodological framework and criteria, applied in all pilot sites by year 1 • Evidence that changes in agricultural production and other livelihood aspects in pilot sites are correlated with changes in enhanced agrodiversity and ecological integrity by year 3 • Popular grassroots views are positive and high rate of adoption by extension agents and other officials. • Up to 20 policy-makers, 15-20 extension agents and 150-300 core farmers and other land users sensitized or trained in mitigative land degradation and ecosystem recovery • Evidence of positive uptake by non-target populations • Majority of farmers, extension agents and policy makers sensitised to and trained in sustainable land management • Institutions/establishments, notably farmer associations, created and/or enabled to facilitate sustainable land management • Access to institutionalized credit enhanced for at least 60% of farmers' associations

	• Adaptive management through participatory M&E • At least 2 policy reform papers developed and disseminated
11. Project activities to achieve outcomes: ***Activity 1.1*** Formulate and apply framework for identifying threatened lands and criteria for identifying sustainable ('good/best') land management practices ***Activity 1.2*** Evaluate barriers to upscaling of best practices in each pilot site and at national level ***Activity 1.3*** Organize stakeholder meetings to discuss evolving methodological framework for identifying threatened lands, and choose most adapted sustainable ('good/best') land management practices ***Activity 1.4*** Determine baseline conditions, and their evolution, including land degradation and biophysical status relative to prevalent land holding arrangements in all demonstration sites for purposes of M&E of impact of project ***Activity 1.5*** Development and functioning of database of land degradation and sustainable ('good/best') management practices in relation to livelihoods of local communities and environmental protection, starting from year 1 ***Activity 1.6***	**Indicators:** • Draft methodology and Draft criteria developed by mid-year 1 • Land use plans developed for at least 3 sites by end of year 1 • Barriers identified for all 5 pilot sites by mid year 2 • 2-3 Meetings at village, district, regional and national levels in year 1 • Framework field-tested and revised in light of field experience on a continual basis • Final framework and a set of criteria produced and published for replication, by year 3 • Baseline data available by end of year 1 • Periodic data collection to assess project impact • A set of computer-based data stored according to GIS principles and linked to other relevant institutional databases ready by end of year 2 • Database format, criteria and critical components including selection of software, for components of agricultural land management prepared by mid year 1 • System of information sharing between the planned database and others at the national level and international levels • Periodic updates to facilitate monitoring, evaluation (M&E), synergies and comparability of work outputs

Environmental and social impact assessment of the practices being demonstrated, including gender and cost-benefit analyses at household level	• A trade-off analysis to determine the net benefit of practices, and stakeholder groups that receive the benefit, developed by end of year 1
Activity 1.7 Regular "feedback loops" between researchers and farmers functioning	• At least 3 occasions per year for transferring knowledge between farmers and scientists • Positive perception by farmers and policy makers of scientific input and value
Activity 2.1 Establishment of a national network of at least three demonstration sites with partnerships between expert farmers, scientists and policy-makers	• 3 demonstration sites established by year 1, and 2 more by year 2 • Sensitization forums for all stakeholders in demo sites by end of year 1 • One partnership agreement developed per site between all stakeholders by end of year 1 • linkages between demonstration sites by visits, exchanges and sharing knowledge; continuous but at least 5 visits per year starting in year 2
Activity 2.2 Demonstrating potential of sustainable management practices, including agricultural biodiversity and land use planning based on agricultural capability, in combating land degradation and enhancing productivity, including the protection of watersheds, river basins and forests, following the farmer field schools concept developed by the FAO, and the expert farmer strategy articulated by UNU/PLEC	• At least 10 commercial community-and individually-owned plant nurseries, woodlot and afforestation activities by end of year 4 • Demonstrate income-generating agroforestry units and snail rearing in at least 20 backyards, by year 3 • Demonstrate use of household refuse for compost pits to enhance productivity of home gardens, in at least 30 households by year 4 • At least 10 model biodiverse food-crop farms developed on basis of the traditional agroforestry practice of growing such crops among useful naturally occurring trees purposely left *in-situ*, by year 3 • Models of the traditional *oprowka* system of mulching applied in at least 30 farms by year 4 • Stone lining, terracing and grass bunding in combination with tree planting demonstrated over 50 ha in at least 5 catchments, starting year 2 • At least 5 other potentially viable methods for combating land degradation and watershed management for wider use evaluated and demonstrated by year 4

	• At least 100 Field days organized to bring stakeholders (especially women and the poor) together to show how practices and technologies demonstrated do combat land degradation and enhance productivity, by end of year 4 • At least 10 Farmer-led evaluations facilitated and results disseminated to other farmers and stakeholders, by end of year 4 • Audio-visual aided farmer field schools, field demonstrations, informal training and farmer-to-farmer exchanges used regularly to share knowledge and experience of integrated land management • Special awards yearly to exemplary farmers in sustainable land management and eco-farming
Activity 2.3 Disseminating technologies and practices for the conservation, utilization and equitable sharing of the benefits of sustainable land management and enhanced biodiversity	• Results of previous activities documented and disseminated to at least 10 times as many as stakeholders at local level including at least 5 Policy forums
Activity 3.1 Dissemination of results and sustainable land management approach at universities and national levels	• At least 10 curricula and training manuals developed, and courses introduced at all levels of participating partner universities, and in local schools, by year 3 • Newsletter on sustainable land management published biannually by University of Ghana and partners • At least 10 relevant scientific publications, by end of year 4 • At least 20 Local professionals within extension services, NGOs and other appropriate institutions actively involved in all relevant aspects of the project at all times • Prepare at least 5 briefs on sustainable land management for government ministers, parliamentarians, local government officials and other appropriate government officials, by end of year 4 • At least one visit by policy makers/government officials to each demonstration site by year 4 • At least 5 presentations made to relevant national and international conferences and

	forums, • At least 10 emissions of public media and information support services, such as television and rural radio, mobile video plus scientific and other forms of publication
Activity 3.2 Influencing and triggering policy reform that gives greater recognition to sustainable integrated land management approach, local farmer knowledge and truly participatory methodologies in land resources management	• At least one policy-oriented key stakeholders forums organized per year • At least five policy briefs produced, by end of year 4 • At least 15 'sustainable land management days' featuring guided visits by government officials, school children and other organized groups to model landscapes including farms, fallow lands and forests managed sustainably • At least five sensitisation sessions organized on farmer policy reform inputs, by end of year 4 • Mainstream sustainable land management into national development frameworks, such as PRSPs, UNDAF and Forestry Action Plans • At least 60% of farmers' associations able to access commercial credit
Activity 3.3 Local communities and local policy-makers (e.g. District Assemblies) develop and implement bye-laws and regulations effective land tenure reform, and for the promotion and management of on-farm biodiversity and land degradation control particularly along threatened water bodies and other ecologically sensitive lands	• Policy gaps, tenurial shortcomings, gaps and disincentives in land use planning and regulations, possible lines of reform and incentive structures identified by scientists and local policy-makers in consultation with expert farmers, by mid year 2 • At least 5 Policy forums convened for relevant stakeholders, including custodians and operators of the land (i.e., owners and their tenants), and enforcement agencies • Appropriate bye-laws and regulations formulated, or enforced on an accelerated basis, in accord with Act 462 (under review)

12. Estimated budget (in US$) and time frame (months-years):

PDF: Nil

GEF: $945,000

Co-financing: $813,023; by source:

- *Co-financing in cash*: Estimated at $80,000 from UNU, UNU/INRA and the international NGO Heifer Project International)
- *Co-funding (in-kind):* $733,023, including: staff time, facilities and other dedicated support from project partners (University of Ghana, IRNR, UDS, CSIR, UNU/INRA and related projects); Ghana Government Ministries, MES, MOFA, EPA, MLF and related research organizations of CERSGIS and Ecological Laboratory) – see Annex 13 for all co-finance

letters.

- TOTAL: $1,758,023

Time frame: 4 years (May 2004 - April 2008)

An additional three institutions have provided expressions of interest to assist in leveraging additional co-financing during the implementation of the MSP (USAID, Canada and IPGRI) – see Annex 14.

Information on institution submitting project brief

13. Information on project proposer:

The main proposer of this project is a network of institutes and scientists. Members were closely involved in the proposal development and contributed to the project formulation workshop in Ghana in September 2002, as well as to the subsequent revision of the initial formulation. The leading institution is the University of Ghana.

University of Ghana, Legon *(to lead implementation and co-ordination of project countrywide, and oversee southern Ghana demonstration sites).*

Overall National Project Co-ordinator and, also, Team Leader, southern Ghana work component: Professor Edwin A. Gyasi, Department of Geography and Resource Development, University of Ghana, Legon

History and Mandate: Ghana's premier and largest university, was created in 1961 from the University College of the Gold Coast (now Ghana) established in 1948 for the purpose of providing for and promoting university education, learning and researching, and to train local professionals through a liberal arts oriented programme under supervision of the University of London. Since then, the University has placed increasing emphasis on science-oriented teaching and research. The institution comprises 5 Faculties, 5 Institutes, 5 schools, over 40 Departments, and various other teaching and research units, involving over 17,000 undergraduate and postgraduate students. The 1992 Strategic Plan's vision of the University by the year 2000 and beyond, is 'a centre of excellence in research, teaching and delivery of extension services and a world-class institution of higher learning having a unique appeal to students and scholars world-wide in search of Africa's creative and innovative approach to scholarship'. Research work is increasingly development-oriented and carried out on an interdisciplinary and consultancy basis. The focus is on science and technology, food security, human health, population dynamics, natural resources conservation, environmental management, and outreach activities.

Personnel and Funding: There are 646 academic staff and 3,440 support staff. In 2002, the budget was over US$ 17 million, out of which $7.4 million was donor-assisted. Major donors include the World Bank; USAID; UNDP; NARP; DANIDA; UNICEF; ADB (African Development Bank) and VALCO (Volta Aluminum Co.).

Project Experience: The University of Ghana has led the West African cluster of the GEF-funded PLEC project, as well as a wide range of other donor-funded initiatives. UN institutions with which the University conducts projects include: UNU/INRA (United Nations University Institute for Natural Resources in Africa); UN/RIPS (United Nations Regional Institute of Population Studies); UNICEF; WHO; UNFPA and UNU/PLEC, including a major involvement with UNU since 1993. The University established in 1989 a Consultancy Centre to mobilize its skills and human resources. A Management Committee responsible to the Vice-Chancellor controls it. Among the wide variety of research projects administered through the Centre are those funded by GEF; UNDP; USAID; UNESCO; World Bank; Enterprise Programme of New York; Ghana Commercial Bank; and Ghana's Lever Brothers and Volta River Authority. Others include those

funded by/through: FAO; IDRC; UNFPA; UNU; DANIDA; NUFU; Stockholm Environment Institute; and Ghana's Mineral Commission. Individual funds up to more than US$600,000 are managed with independent monitoring and auditing. It is through the Centre that funds for PLEC activities in West Africa have been administered since 1993. Besides serving as the overall central co-ordinating node, the University of Ghana shall hold primary responsibility for managing the southern Ghana component of the proposed project.
14. Information on proposed executing agency (if different from above): *An additional four executing agencies are proposed to cover both geographical and thematic aspects of the project (see Annex 11 for details):* ➢ Institute of Renewable Natural Resource (IRNR), Kwame Nkrumah University of Science and Technology (KNUST), Kumasi (to oversee central Ghana demonstration site). ➢ University for Development Studies (UDS), Tamale (to oversee northern Ghana demonstration sites). ➢ Council for Scientific and Industrial Research (CSIR - to play a leading role in trials and demonstrations) ➢ United Nations University Institute for Natural Resources in Africa (UNU/INRA; Located at the University of Ghana, Legon - to play a leading role in human capacity development)
15. Date of initial submission of project concept: 15 September 2002
INFORMATION TO BE COMPLETED BY IMPLEMENTING AGENCY:
16. Project identification number: 2836
17. Implementing Agency contact person: Professor Edwin A. Gyasi, University of Ghana (Technically backstopped by Abdoulaye Ndiaye, Regional Coordinator; UNDP-GEF, Dakar, Senegal)
18. Project linkage to Implementing Agency program(s): The project will respond to UNDP's CCF-2 programme of Promoting National Strategies for Environmental Resource Management, which seeks to support the development of policies for regenerating environmental resources, and enhance capacity to track, monitor and report the status of environmental resource use. Specifically, results from the development of database components of land degradation and sustainable land management from this proposal will be used to support the application of GIS-based District Environmental Management Information System (DERMIS) of the CCF-2 programme as tools to identify low capacity gaps for district planning and community environmental assessment.

I. PROJECT DESCRIPTION

A. CURRENT SITUATION

Environmental context and Global Significance

1. This project focuses on sustainable management of land. It is justified by a need to stem the threat posed to humanity by land degradation, the progressive loss of the intrinsic quality of land, which is accelerating globally, particularly in developing countries.

2. In the document, *A Framework of GEF Activities Concerning Land Degradation* (1996), it is noted, "Prevention and control of land degradation, primarily desertification and deforestation, are critical to achieving sustainable development. However, the environmental and economic consequences of land degradation are not confined to the countries where it occurs. Its impact, in terms of **loss of biodiversity, reduced atmospheric and subterranean carbon sequestration, and pollution of international waters can be significant and global**" (p. iii). In a subsequent document, The *Challenge to Sustainability* (2002), the GEF reports, "On about one-fourth of the world's agricultural land, soil degradation is widespread, and the pace of degradation has accelerated in the past 50 years. In developing nations, productivity has declined substantially on about 16 percent of agricultural land-especially on cropland in Africa and Central America and on pastureland in Africa" (p. 21). It reports the annual loss of agricultural land due to degradation to be about 0.3 - 1.0% of the world's arable land. For Africa, it estimates cumulative crop yield reduction caused by past erosion to average 8.2% between 1945 and 1990.

3. A principal factor of the soil erosion is the growing deforestation and associated loss of biodiversity and decreased ability of the forests to discharge such global environmental functions as watershed protection, carbon sequestration and provision of a habitat for the diverse flora and fauna. Worldwide, an estimated 14.2 million ha. of the natural forest was lost annually through deforestation in the 1990s. About 97.3% occurred in the tropics, home to the greatest proportion of the increasingly threatened reserves of biodiversity (GEF 2002).

4. The New Partnership for Africa's Development (NEPAD), October 2001, identifies "*the prerequisite for Africa of a healthy and productive environment*", and "*that the range of issues necessary to nurture this environmental base is vast and complex*" (p. 41). NEPAD further links Africa's poor social development with agrarian systems that are weak and unproductive, and how improvement in agricultural performance, the combating of desertification and the ability to withstand climatic uncertainty are essential for Africa's food security. These Africa-wide priorities were reaffirmed at the Johannesburg summit, (August 2002), with the further priority for co-operative actions by countries and communities to indicate the viability of partnerships towards tackling problems such as land degradation.

5. In Ghana, land degradation together with desertification is a threat spanning decades. Foremostly, it is manifested by soil erosion. Of the country's total land surface, 23% is prone to very severe sheet and gully erosion, 46% to severe erosion, and 31% to moderate to slight erosion (Asiamah, 1987, quoting Ghana's Soil Research Institute). The soil erosion is common and severe where the vegetation is disturbed in both major ecological zones, forest and savanna. However the most vulnerable zone is the northern savanna, which covers nearly 50% of the country (Annex A). Hilly and steep slopes, particularly those having little or no vegetative cover in areas experiencing heavy rainfall, are equally vulnerable.

6. Closely associated with the erosion of soils and their desiccation, structural breakdown and loss of productivity, is vegetative cover loss. The *National Biodiversity Strategy for Ghana (2002)* reports a reduction in the country's closed forest cover by 64% (from 111,000 km^2 to 69,800 km^2) between 1938 and 1981. Currently the remaining forest is estimated at between 15,800 and 17,200 km^2, which represents between 10.9 and 11.8% of the original

cover and 6.9% of the country's total area. The rate of deforestation is estimated at 1.3-1.7% per annum.

7. A major consequence of the loss of vegetative cover and the associated soil erosion, plus increasing dry climatic condition is desertification. It affects 35% of the country, especially the semi-arid northern savanna zone. According to one report, in portions of northeastern Ghana, desertification and land degradation have rendered soils so humus deficient that they no longer respond to chemical fertilizer application[1].

8. Land degradation results in diminished land based livelihood opportunities, and induces emigration of rural youth to urban centres. This process further undermines capacity of rural communities by depriving them of the energetic youth required for self-reliant sustainable development founded on land resources.

9. The global significance of this project is that it seeks to demonstrate and mainstream sustainable land management in Ghana in order to reduce costs and externalities of land degradation, and to generate global, national and local benefits from ecosystem stability for:
   a) Supporting sustainable agriculture;
   b) Ensuring food security and rural livelihoods;
   c) Maintaining biodiversity; and,
   d) Providing ecosystem services that will ameliorate climate and protect water bodies.

Socio-economic context

10. Ghana's 239,000 km^2 mainland (4.6% water) contains some 18.5 million people, which yields a density of only 77 persons per km^2. However, the yearly 2.6% growth rate implies a diminishing land per caput. This accelerated population growth has far reaching implications for livelihoods in the rural areas, where 50 - 60% of the people are smallholder farmers.

11. Agriculture still forms the pivot of the national economy. It employs 55% of the labour force, generates 42% of the GDP, contributes 40% of the export earnings, and is growing at 4.4% annually. However, productivity remains low, and there persists a wide gap between actual and potential yields.

12. Key factors of the low yields include the extensive nature of farming, a weak technological base and poor agri-support services. Erosion of the ecological base is another. In recognition of this constraint, the 'Ghana Poverty Reduction Strategy (GPRS) 2002 – 2004' declares, *"In addressing issues of increased agricultural production, the conservation and sustained use of biodiversity of plants, animals and microbes shall be encouraged. Threatened ecosystems and habitats of species shall be rehabilitated using the Ecosystem Approach"* (p. 61).

13. The poor agricultural performance underlies the still endemic poverty which is reflected by the 45% of the country's food crop farmers estimated to be extremely poor, the barely growing less than $400 real per capita GDP, and a growing national debt burden, which has propelled Ghana into the orbit of the world's most heavily indebted poor countries (HIPC).

[1] *A Social-Economic Survey in the Upper East Region with reference to Drought and Desertification Control in Ghana* (Environmental Protection Council 1992)

14. The agricultural systems are in a transition from essentially migratory to more sedentary modern ones and their local adaptations. Bush fallow or land rotation, an offshoot of the classical shifting cultivation, dominates the arable farming throughout Ghana. In the drier savanna zone, nomadic herding assumes considerable importance. Because of their extensive land requirements, without major structural changes, these systems can hardly be sustained in the wake of the growing land shortage associated with the increased pressures of population. The biodiverse nature of the traditional bush fallow, agroforestry, horticultural and compound farming systems, offers positive lessons in sustainable biodiversity management.

15. Traditionally the land is generally owned on a group or communal basis. As such, access to it for subsistence purposes is achieved free of charge on kinship basis by those owning the land. However, influenced by production pressures, commercialization and European individual freehold tenurial concepts, access to land is increasingly by purchase and above all, by sharecropping and renting, which fuels overexploitation of the land in order to meet exacting tenancy obligations. Other tenurial shortcomings include uncertain boundaries and titles or a lack of landholding security, which a 'Land Title Registration Law (PNDCL 152)' seeks to address. Also, the fact that women are the central players in food crop farming, but have only limited control over the farming land is a social injustice and a disincentive to optimal land usage.

16. Although, by tradition land is owned by communities, the government retains absolute powers of acquisition, in addition to regulatory powers of use through various authorities, notably:

- the Ministry of Lands and Forestry;
- the Lands Commission;
- the Land Valuation Board;
- the Lands Registry;
- the Forestry Commission;
- the Town and Country Planning Department; and,
- the District Assemblies.

17. An imperative is to better co-ordinate their functions, and to educate the public on those functions so as to enhance their impact on society and ecological integrity and production capacity of the land, as the Land Administration Project (LAP) seeks to achieve under the Ministry of Lands and Forestry.

Causes and barriers

18. The causes of land degradation in Ghana are varied and depend on the particular ecosystem and production system. Annex 4 provides a matrix that captures the complexity and diversity of these causes and barriers. The most important causes of land degradation and deforestation are: unsustainable agricultural practices, overgrazing, overharvesting for fuelwood, and uncontrolled brush fires.

19. Unsustainable agricultural practices are primarily due to the reduction in fallow lengths in the wake of increased pressure on farmlands. For example, reportedly cassava growers now practise an average of 2 years of fallow in the forest and coastal areas, and 3

years in the transitional zones with as many as 48.6% of the farmers in the coastal areas eliminating fallowing altogether. In addition, farmers fail to substitute other soil-ameliorating practices for the fallow periods owing to financial, technological and other input constraints. Other factors that contribute are:

- Short-term tenant farming arrangements, which discourage land resources conservation.
- Growing monocultures, which are replacing the traditional biodiverse farming practices with a resultant erosion of agrobiodiversity, notably in the cereals such as maize and rice, and in cowpeas.
- The adoption of improved exotic cultivars, which discourages the conservation of native land varieties. The growing imbalances in cultivar diversity is associated with the de-emphasis of several land varieties of starchy staples such as yams, cocoyams and plantains, in favour of higher yielding, but locally less adapted and risk-prone crops.

20. Land degradation is exacerbated in northern Ghana by decreasing rangelands and the resulting imbalance between the number of domestic animals and per capita rangeland. In areas where cattle are maintained there is a marked overgrazing of perennial grasses with a further reduction of biological productivity and carrying capacity of the land. Studies show a marked decline in number of plant and wildlife species over the last 20 years in rangelands in Ghana, a trend that is attributed to overgrazing (Alhassan et al., 1999). Overgrazing leaves the ground bare resulting in excessive runoff from the grazing land during rains, which causes serious soil erosion. According to Telly and Fiadjoe (1996) overgrazing is a major factor of environmental resource depletion and degradation.

21. The rampant bush fires, which cause significant damage in both the forest and savanna zone. It is the most pronounced in the northern regions where the savanna vegetation predominates (Nsiah-Gyabaah, 1996). Causative factors include natural as well as anthropogenic or human ones. But, human activities such as hunting and land clearing, and burning of the bush by herdsmen in order to assist germination of new grass in the grazing areas are considered to be the primary source of uncontrolled and indiscriminate bush fires in Ghana. In 1983 an anti-bush fire law (PNDC Law 46) was promulgated in order to restrain nationwide the activities that lead to uncontrolled bushfires. However, initially, the law failed to register a significant impact because its enforcement was not assigned to any specific government agency. Subsequently, government sought to correct this anomaly by the introduction of the National Anti-Bush Fire Committees in 1984 and of PNDC Law 229, 1990.

22. Fuelwood gathering, which in the proposed project sites, as in most of the rest of the country, is the primary way of obtaining energy for household heating and cooking in virtually all rural communities, and also among significant portions of urban communities. The fuelwood is collected freely from the wild either for direct use, or for conversion into charcoal before use, with virtually no attempt at replanting.

23. The alien invasive species, e.g., *Chromolaena odorata, Leucaena, Lantana sp.,* are increasingly colonizing the Ghanaian landscape to the detriment of plant biodiversity. There are also some indications that these invasive colonies contribute to destabilization of the ecosystem and increased soil loss. However, this cause is of lesser priority than those aforementioned.

24. Deforestation from these causes is the major factor undermining productive capacity of the soils by exposing them to forces of erosion, leaching and desiccation, and by reducing soil-enriching biomass. Deforestation may have other adverse impacts. Farmers interviewed through PLEC research work in Ghana, upon which this project proposal builds, said that deforestation and removal of savanna woodland, leads to micro-climate disturbances, including a reduction in quantum and reliability of rainfall and increasing atmospheric warming. This was a widely held perception and seen as undermining agriculture and rural livelihoods.

25. Deforestation is also a major factor in the loss of biodiversity, especially by destruction of floral and faunal habitats. The *National Biodiversity Strategy* highlights that "the economic loss to the nation of loss of biodiversity through deforestation and land degradation [is] about US$54 billion (about 4% of GDP)" – (p. ii). Even so, the estimate appears rather conservative, for it undervalues or fails to reckon costs that are not readily quantifiable, e.g., recreational, educational and potential future uses; water conservation functions and ecosystem services.

26. Soil erosion resulting from deforestation is widely seen as the principal factor in the growing siltation of Ghana's surficial water bodies. A case in point is Volta lake, created by damming the international river Volta at Akosombo in Ghana for the primary purpose of generating hydroelectric power, which provides Ghana's needs as well as those of neighbouring Togo and Benin. A 1998 study by the University of Ghana's Volta Basin Research Project (VBRP) ascribes the reported siltation of the lake and resultant diminished power generating capacity of the Akosombo dam, to soil erosion resulting from deforestation of the banks of the lake. Siltation associated with soil erosion induced by deforestation, is observable in other water bodies including the Densu, portions of whose basin are a focus of this project, and which, together with the Volta, constitutes the primary sources of water for Accra, the national capital.

27. Barriers to sustainable land management include: (see Annex 4)
    a) Land use conflicts due to conversion of prime agricultural and forest lands into urban, industrial and other uses in ways that disfavour food security, economic returns and social stability;
    b) Inappropriate land use patterns (e.g. cropping marginal land due to short term goals or lack of viable options);
    c) Lack of awareness of land management practices and benefits, with best practices not being disseminated enough;
    d) Weak institutional capacity and little involvement of communities in natural resource management;
    e) Weak inter-sectoral co-ordination in land use planning and monitoring natural resource use, especially at district and community levels; and,
    f) The unavailability of effective policies, regulations or guidelines on issues related to land, the right of access to and the use of resources by rightful owners, protection of indigenous knowledge, and intellectual property rights[2].
    g) Continued reliance on extension modes of agricultural production due to unfamiliarity with alternatives for either intensification, and-or alternative income generation (e.g. bee-keeping, snail rearing, planting fast growing trees for fuelwood and litter production in fallows).

[2] World Bank, *Project Appraisal Document, Report No. 21847-GH*, February 2002

28. The root causes of land degradation in Ghana are the tremendous pressure from growing human populations, and growing poverty. These pressures are compounded by mass poverty and conspicuous consumption of an expanding elite.

Policy, legal and institutional context

29. A basic medium-term vision of the government is to transform the country into a middle-income one where the people live in harmony with their natural environment, with the population deriving optimum benefits through sustainable use of the country's rich land resources.

30. Land degradation and associated deforestation and loss of biodiversity are identified in Government policy statements as a key pervasive natural resource management issue. Ghana has a long-standing record on policies and strategies aimed at land and overall environmental protection. The Summary section 7 of this Brief provided a detailed description of the policy and legal frameworks in place. Other notable policy instruments are:

- Land Planning and Soil Conservation Ordinance No 32, of 1953, amended in 1957, which contains a number of provisions to control and abate land degradation and manage soil conservation.
- Miners and Mining Law of 1986 (PNDCL 153), which seeks to regulate pollution by mining
- Environmental Protection Agency Act, 1994, Act 490, Section 12 of which gives the Agency the power to request for EIA. Section 12(1) states: "The Agency may by notice in writing require any person responsible for any undertaking which in the opinion of the Agency has or is likely to have adverse effect on the environment to submit to the Agency in respect of the undertaking an environmental impact assessment containing such information within such period as shall be specified in the notice".

31. Government of Ghana policy emphasizes that initiatives to deal with critical environmental problems must be tackled with due to human development. For example, the Medium-Term Agricultural Development Programme (1990) stresses food security and poverty reduction, and the very recent Ghana Poverty Reduction Strategy (GPRS 2002) links poverty with environmental degradation and the need for actions that address both simultaneously. The GPRS states: "*Safeguarding the environment is an essential condition for sustainable development and to prevent all forms of environmental degradation*" (p. 25). It further states "*sound and sustainable management of the environment; promotion of commercial agriculture, using environmentally friendly technologies*" (p. iv), as a strategy for poverty reduction.

32. Realizing the fundamental importance of land to the national livelihoods, the Constitution of the current Fourth Republic of Ghana vests all public lands in the President on behalf of, and, in trust for the people, grants the Government absolute powers of land acquisition for purposes deemed to be in the public interest. It further provides a Land Commission and other machinery for regulating and coordinating the use of land (Republic of Ghana 1992).

33. Legislation and other rules and regulations, either actual, or planned, include those banning farming on critical hill slopes and fire for hunting and for clearing bush, and those

regulating use of the chainsaw for harvesting and sawing timber. However, many of these frameworks need to be clarified and tested/adapted at local levels. Furthermore, there is no policy document that provides an integrated guidance on sustainable land management that addresses the overall goal of ecosystem stability, functions and services while promoting poverty alleviation. There is no policy or regulatory guidance that helps to entangle conflicting uses and demands on land. And finally, there are no locally appropriate procedural documents that prescribe rules and codes for land use planning and land tenure reform involving both local communities and local authorities.

34. Burden of policy implementation lies primarily with government ministries including the following:
    - Ministry of Environment and Science (MES);
    - Ministry of Lands and Forestry (MLF); and,
    - Ministry of Food and Agriculture (MOFA).

35. They operate through various projects and programmes such as those focused on forestry conservation, soil improvement, crops breeding and poverty alleviation by a decentralized administration through District Assemblies, other government organizations and extension agents, often in collaboration with CBOs and NGOs. All of these organizations have extension services and units, which are adequately funded for their recurrent, but not necessarily operating costs (see Baseline section for more details).

36. However, very often these programmes either tend to contradict each other, because they adopt short-term goals (e.g. promotion of mono-cropping), or they only look at one sector or threat (e.g. conservation of forests, but not mitigation of agricultural run-off). Furthermore, a general lack of rigour and consistently high engagement in implementation, which is associated with limited technical capacity, lack of integrated policies that address ecosystem stability, and, above all, limited grassroots involvement, constraints the effectiveness of existing policies and legal frameworks, with a few exceptions (notably the collaborative Forest Management Project of the Ministry of Forestry and Lands). Also, there are relatively few attempts to demonstrate ways to promote synergies between farmers/land managers on one hand, and scientists and policy makers/agents on the other.

Baseline situation

37. Land is a vital resource in Ghana. It underpins the national economy by generating the bulk of the country's employment and income directly and indirectly. The baseline situation is characterized by inadequate emphasis on sustainable land management; lack of legislation regulating farming and other activities in ecologically sensitive areas; haphazard and unsustainable land use patterns; lack of clarity in property rights and access related to natural resources; lack of integrated land policy and land use planning as a tool at national and local levels; and the dying out of traditional customary resource conservation knowledge, regulations and practices.

38. Ghana is currently completing its National Action Plan to Combat Desertification. The methods, priorities and lessons learnt from this project are intended to feed into this Plan. The basic approach was so formulated as to engender popular participation both in the design and implementation aspects. The EPA together with the team of consultants was divided into two teams to facilitate consultations, sensitization and awareness creation at institutional, district, regional and national levels. Eight Regional workshops were

organized, in addition to a national one convened to facilitate the finalization of the NAP document. Key achievements to date include:

- The strengthening of the Environmental Protection Agency as a National Coordinating Body.
- The establishment of NAP consultative process based on the bottom-up approach.
- The identification of stakeholders and defining their roles and responsibilities.
- The establishment and initiation of public awareness and education.
- The establishment of partnership with stakeholders and other partners in development.
- Building the capacity of various stakeholders to enhance their participation in the NAP process.
- The identification of financial resources and funding mechanisms including establishment of a National Desertification Fund (NDF)

The Baseline situation in each of the pilot sites is as follows:

Southern Ghana: Obodan Site and Upper Manya/Krobo Site

39. In Obodan and Sekesua-Osonson (Upper Manya Krobo/UMK) – Atewa Range corridors, as in all the other proposed sites, the government Ministries operate through relevant Directorates through the District Assemblies. Obodan was the site of a major government research work sponsored through the CSIR under the National Agricultural Research Project (NARP). Other relevant government activities include those carried out under ASSIP, AGSSIP, the Poverty Alleviation Fund and the Land and Water Resources Management Project. In both sites, there are operative environment-oriented NGOs and CBOs. They include HPI (Heifer Project International), ADRA (Adventist Development and Relief Agency) and Okyeman Foundation in the UMK-Atewa corridor. Other environment-oriented Church organisations operate in both sites.

40. The proximity of Obodan and Sekesua-Osonson (UMK)-Atewa corridor to Legon facilitates research work there by scientists and students of the University of Ghana. Through PLEC, University of Ghana scientists and their students have, since 1993, carried out research on agro-environmental and biodiversity changes at Sekesua-Osonson and Obodan. A research work recently concluded by a student focused on effects of monocultural pineapple production on the biophysical environment around Obodan. Those on-going include one on sedimentology and hydrological changes in the basin of river Ponpon, a tributary of river Volta in Sekesua-Osonson, and another on sedimentation of river Densu, within whose basin Obodan falls.

Central Ghana: Tano Basin Site

41. In Tano basin various land and water management activities take place under the Ministry of Food and Agriculture (MOFA). They include composting and cereal-legume intercropping experiments and demonstrations.

42. In the Tano Basin, projects involving Kwame Nkrumah University of Science and Technology include the following:

- the FAO project on Erosion Induced Loss in Soil Productivity.
- IBSRAM Africaland Project on The Management of Upland Soils for Sustainable Crop Production.

- ASNAPP (International Board for Soil Research and Management) project on Agribusiness in Sustainable Natural African Plant Products, and on Domestication of medicinal plants – germplasm collection, cultivation and conservation (gene bank, tissue culture). *Lippia multiflora, Cryptolepis sanguinolenta, Mondia whitei, Moringa, Piper nigrum, Xylopia.*
- The Netherlands Government funded projects under the Centre for Biodiversity Utilization and Development (CBUD).
- Ghana-Canada IN CONCERT (Initiatives for conservation in Northern communities: Entrepreneurship, Resources and Training by CIDA and Lakehead University/IRNR).

Northern Ghana: Fihini Site and Kugur Site

43. In Fihini site, Village Water Reservoirs (VWR), an NGO, aims at building dams and reservoirs to meet water shortage, especially during the dry season. Other activities by VWR include training of the village communities in planting of vitiver grass on the embankment of the water retention reservoir. The Ministry of Health's communicable diseases unit is responsible for primary education relating to a Guinea Worm Eradication Programme. Also active in the area is the NGO, Ghana Danish Community Programme (GDCP), which supports construction of accommodation for teachers, and operates a small-scale loan scheme to assist farmers acquire agricultural inputs and storage facilities. All these are facilitated by the traditional leadership headed by Vo-naa, a divisional chief, who decides in consultation with a council of elders. A District Assemblyman serves as a liaison officer between the community and District Assembly headquartered at Tolon, while the chairman of the local development committee is responsible for planning community projects, and for liaising with donor agencies and community projects.

44. In Kugur, as in Fihini site, several government organizations are active. They include the Ministry of Food and Agriculture (MOFA), which operates through extension agents. However, reportedly, only about 30% of the inhabitants do benefit from the extension service. There is a rural credit organization, Bawku East Small Scale Farmers Association (BESSFA), but only a limited number of farmers benefit from it. In 1996, under the Agricultural Sector Investment Programme (AgSIP), the World Bank, in recognition of a need to improve agricultural water supply in the wake of the impaired functioning of the old earth dam in the area, undertook a study into the feasibility of an irrigation project for vegetables cultivation in the dry season.

45. In Fihini site the UDS collaborates with the approximately 7 well established CBOs (total membership = 219), which focuses on one or more of the following activities: watershed protection and management using combined stone bunding and tree planting; dry season vegetable cultivation using moisture retained in the soil at the end of the rainy season; earth bunding of rice fields to retain moisture; protection of sacred groves and wood lots in the area by bush fire prevention education and collaboration with local authorities, as well as planting additional seedlings of local tree species; establishment of woodlots and community nurseries for economic trees; cultivation of bees and harvesting of honey; and cotton spinning and weaving as an economic activity for women groups.

46. In the vicinity of Kugur site, the UDS collaborates with about 5 CBOs (total membership = 248) that are engaged in the following activities: protection against erosion and watershed management using stone bunding and vitiver grass; water management to minimize dry season irrigation requirements; conservation of local rice (Oryza glaberrima) species grown by women; cultivation of dry season crops under irrigation to support income; establishment of woodlots and community nurseries; and conservation of medicinal plants.

47. A project, on-going with the involvement of UNU/INRA at a cost of $18,000 to it, focuses on *Integrated Nutrient Management for Sustainable Crop Production* in the interior savanna zone, where are located Fihini and Kugur, two of the sites targeted under the SLaM project. It is inspired by recognition that the inability of farmers to purchase mineral fertilizers to replenish soils depleted of nutrients is a major factor accounting for declining crop yields on smallholder farms in the interior savanna zone of Ghana and contributing to chemical pollution of land and water resources. The supplementation of inorganic sources of nutrients from local materials provides opportunity to improve fertility of cropland, enhances productivity and checks land degradation. Accordingly, the project focuses on the following activities:

- Conducting a survey to assess the availability and quantity of potential organic sources of plant nutrients
- Conducting decomposition studies to evaluate the quality of available organic materials and their nutrient supply capacities
- Carrying out greenhouse and on-farm trials using different rates and combinations of organic and inorganic inputs to evaluate their effects on maize yields
- Monitoring and evaluating changes in physical, chemical and microbiological properties of the soils in the experimental sites.

48. A second project, *Land Degradation and Sustainable Rural Livelihoods: Training in Field Assessment Techniques for African Professionals*, costing at least $40,000 is planned by UNU/INRA for the year 2004). It is an institutional and human resource capacity-building initiative (training course) that will provide the added value to practicing professionals and farmers to better accomplish their tasks in sustainable land management. Issues to be addressed during the three-week training course will include:

- Current theory and perspectives on land degradation assessment in the context of efforts by communities to protect the environment and promote human welfare and livelihoods.
- Comprehensive field instruction and exercises.
- Use of simple visual and semi-quantitative techniques for land degradation assessment.
- Examining how far technologies and approaches to control land degradation can be applied to the real life circumstances of land users.
- Relating land degradation – its impacts and control measures—to the sustainable livelihood framework.

49. The CSIR (Council for Scientific and Industrial Research) carries out research and provides services on use and/or conservation of soils, crops and other plants, livestock and various other natural resources across Ghana's major ecological zones through institutes and centers, including the following located within or near the proposed SLaM project sites:
- The Savanna Agricultural Research Institute (SARI);
- Soils Research Institute (SRI);
- Crops Research Institute (CRI);
- Forest Research Institute of Ghana (FoRIG);
- Water Research Institute (WRI);
- Animal Research Institute (ARI);
- Oil Palm Research Institute (OPRI);
- Plant Genetic Resources Centre (PGRC).

50. This project proposal aims to contribute to sustainable management of the land in Ghana, especially by resource-poor, marginal farmers, while at the same time addressing global incremental benefits in the conservation, sustainable use and equitable sharing of the benefits of biodiversity, forests and agro-ecosystems for rural people as embodied in the CBD and CCD. In this aim, this project will build upon its predecessor, the project, *People, Land Management and Environmental Change* (renamed *People, Land Management and Ecosystem Conservation* since August 2002) – PLEC (GEF-funded, 1998-2002). PLEC has demonstrated the potential to counter biodiversity erosion, conserve other biophysical resources, protect ecological integrity and, thereby, improve the basis of rural livelihoods, by sustainable land management practices, including '*agrodiversity*' (agricultural biodiversity, including all management and organizational aspects). Annex 9 provides more details on the results of PLEC and lessons learnt that have been incorporated into this project design.

51. PLEC has been instrumental in pioneering a methodology and local level system for integrating traditional sustainable agricultural knowledge with modern, scientific techniques. The results of this approach in the 5 pilot sites in Ghana are very promising and a baseline has been developed of high farmer awareness and acceptance of change. However, PLEC's results have not spontaneously replicated because the former regional project did not have the capacity to address local and national barriers to upscaling. Furthermore, beneficial impacts of promoting biodiverse and sustainable land practices are mostly anecdotal and have not been of sufficient scale to achieve real impacts on ecosystem stability and productivity. If farmers do not see the latter, and if there are no supportive local regulations and policies, they will not have enough incentives to sustain these changes to their production system. This project will therefore work to consolidate the achievements of PLEC at the local level, as well as lift barriers to their upscaling at both local and national levels.

52. The foreseeable worst-case baseline scenario, if non-integrated and even contradictory policies, programs and projects continue to be implemented, would have limited impact on reducing land degradation, or even result in an estimated 239,000 km^2 of denuded national landscape no longer able to support its people and contribute positively to a functioning stable benign global environment.

53. The identified critical land degradation issues that require urgent attention are how to:
    a) find innovative ways to counter adverse environmental and socio-economic impacts of pressures on land;
    b) encourage active participation of rural communities in strategic policy decisions in respect of land use planning and management, and modify such policies and legal measures where value added is expected
    c) encourage community-based management actions and the development of alternative livelihood systems by building on indigenous knowledge to enhance productive capacity of land to sustainably protect indigenous crop varieties, medicinal plants, water sources and other land resources; and,
    d) expand institutional capacity and human skills for sustainable management of biodiversity and land resources through sustainable practices;
    e) persuade and facilitate reform of existing land resources management policies and associated rules and regulations; and,

f) improve livelihoods sustaining capacity of the land, whiles generating benefits for the global environment and positively feeding back into environmental policy at all levels – local, national, and global.

B. PROJECT RATIONALE AND OBJECTIVES

Alternative situation

54. The project's overall rationale is to build on the baseline situation by demonstrating recovery, upscaling, mainstreaming and capacity building, of sustainable land management approaches to optimize the positive ecological, economic and social benefits of activities aimed at maintaining the integrity of land. This application will be within the context of sustainable development for resource poor and food-insecure smallholders living in areas of Ghana whose lands still have significant natural vegetative cover, productive soils and on-farm biodiversity, but are becoming or could become severely degraded.

55. **The overall goal** is to contribute to sustainable ecosystem-based integrated land management in globally, nationally and locally significant land resources in agricultural areas under threat, for greater ecosystem stability, enhanced food security and improved rural livelihoods. Achievement of this goal would be through two **Objectives**:

    a) Ecosystem recovery demonstration and upscaled in priority degraded lands, using best practices in sustainable land management to enhance ecosystem stability and functions, agricultural productive capacity, food security and rural livelihoods;

    b) Enhanced capacity for mitigation of land degradation and for sustainable land management through greater awareness, mainstreaming and policy reform.

56. The challenge, then, is to enhance capacity for sustainable land management and to mainstream into both national and local levels (land managing communities, local government), appropriate policies on sustainable land management, and ways that enhance livelihoods sustaining capacity of the land, while generating benefits for the global environment and positively feeding back into environmental policy at all levels - local, national, and global.

57. The project is inspired by the achievements of the recently concluded GEF-funded maiden UNU/PLEC project on biodiversity conservation carried out four years between 1998 and 2002 (Annex 10). A desk evaluation of that project states, "*By building on locally adapted agroecosystems and locally adapted management practices, PLEC offers ecologically sustainable alternatives to extractive and destructive practices that degrade lands and threatens forests, grasslands…".* It expresses the view that "*PLEC is an ideal development program because it primes the pump that then continues to work with minimal investment,"* and also because "*PLEC has demonstrated [that] biodiversity can be maintained in agricultural systems in ways that also improve farmers livelihoods and reduce their risks across a variety of social and ecological systems"* (Alcorn/UNEP, 2002). Methodological advantages associated with the pioneering PLEC experiment with agrodiversity should be further adapted to local conditions and barriers lifted for upscaling to benefit a wider community of farmers in degraded and economically impoverished agricultural areas.

58. The project has selected three ecosystems experiencing varying degrees of land degradation, but mostly focusing on the "moderate to severe erosion" category (see Annex 8) within nationally and regionally important river basins in the three principal agroecological zones in Ghana (forest, savanna and forest-savanna mosaic; Annex 9).

59. By selecting a wide range of sites, this project will be able to demonstrate the application of policy options in a wider range of conditions, and will therefore have a greater combined effect on desired policy mainstreaming. Five demonstration sites have been tentatively identified in these three ecosystems. The project will, in its first 6 months, identify and prioritize land degradation in the 5 pilot sites, as well as work with local farmers and leaders to develop and apply criteria for selecting best practices, target communities and field sites. Baseline data will be collected in the first 6 months in both selected sites and "off site" so as to constitute a basis for monitoring and evaluating the impact of the project.

60. The scale of intervention of this project on the ground is dependent on the progress made by the former PLEC project in each pilot site. However, the scale will be kept commensurate with the absorptive capacities and resources available. It is expected that the project will work with up to five farmer associations (excluding their affiliates) in the target communities. Most of these associations have already been set up as part of the PLEC project and others will be created to achieve a wider impact. Assuming an average of 200 farmers per association and 0.2 ha of demonstration plots per farmer, then the project is expected to demonstrate change in 40 ha of farmland per association. Furthermore, the project expects to have a 5% spontaneous ripple effect, bringing the total to 210 ha. The project will also work with communities on soil conservation measures in common forest and savanna land. Assuming an average of 20 ha per farmer association, then the project is expected to show impact on 100 ha of natural resources.

61. PLEC's preliminary results will be consolidated with other best practices derived from indigenous knowledge in the pilot sites. Only the practices that lend themselves to low input agriculture and, hence, are easily replicated will be selected. Using the participatory method developed by PLEC, the best practices will be jointly selected by collaborating farmers (already organized into farmer associations), researchers, as well as governmental and non-governmental organizations that are linked to the rural farmers. This will increase the chances of adoption of the practices that are demonstrated, and will allow infusion of guidance from policy frameworks and practical know-how.

62. The project will evaluate the barriers to upscaling, both at the local (pilot site) and national (policy) levels, and determine the key barriers that it can lift during its lifetime, in particular focusing on capacity building and policy reform.

63. A number of key innovatory aspects, derived from lessons learnt, have been integrated into the project design:

- The building of a network of farmer associations and other community-based organizations to facilitate exchange of land management knowledge.
- The integration of local, indigenous or traditional knowledge on sustainable land management and the conservation and sustainable use of biodiversity, with formal scientific knowledge and analytical methods.
- The employment of participatory social cost-benefits analysis for the valuation of the various costs and benefits to local communities and households, including the different household members, of agricultural biodiversity, so as to capture both use and non-use values within a Sustainable Rural Livelihood Framework (SRLF).
- The emphasis upon land use planning based upon land capability classification
- The inclusion of a strong focus on mainstreaming in order to tackle the main barriers to upscaling of sustainable land management innovations.

64. Typical examples of best practices that have already been identified in Ghana, and will be further consolidated and demonstrated are:
   - 'good/best' indigenous land management practices such as: home gardening on agroforestry principles; intercropping and grazing among trees left *in situ*; and the no-burn *oprowka* mulching system, all of which favour biodiversity and ecological integrity and, through them, the functioning of the global environment.
   - community level land regeneration interventions such as: composting, bunding, terracing and contour farming to improve soils and enhance productive capacity of soils; afforestation, reforestation, other forms of vegetation regeneration, and buffers to protect watersheds and banks of surficial water bodies.
   - Livelihood options that sustain capacity of the land, for example, commercial honey beekeeping in forests conserved nearby, groves of medicinal plants, woodfuels lots and other such activities that generate locally beneficial income while, at the same time, providing ecological services of benefit to the global environment.

65. The project will continue to share experiences with other similar projects in Ghana and other African countries, notably the Republic of Guinea, Kenya, Tanzania and Uganda, all focal partner countries of previous PLEC work. This will enhance impacts regionally, continentally and globally.

Program and Portfolio Conformity

66. In order to deliver its aims, the project will adopt the following three purposes based, first and foremostly, upon GEF Operational Program 15, which is in development towards achieving global environmental benefits while, at the same time, assuring developmental benefits for poor people through combating land degradation. The project will specifically addresses both Strategic Priorities of Land Degradation Focal Area, by focusing on mainstreaming and capacity building for sustainable land management (SP1), as well as inducing beneficial impacts on ecosystem recovery in pilot sites by building on innovative indigenous systems (SP2). The project will also develop strategic partnerships and shared knowledge between all stakeholders [policy makers, local people, local professionals, scientists]. In terms of classification, the project will focus primarily on SP 2.

67. The project will also have relevance and benefits for OP 13, which seeks to achieve conservation and sustainable use of biological diversity important to agriculture on lands of poor households, and equitable sharing of benefits of biodiversity and improved land resources, through ensuring that the distribution of benefits of agricultural biodiversity and enhanced productivity are retained by local communities and are accessible especially by disadvantaged groups such as the very poor, women and the old.

C. EXPECTED PROJECT OUTCOMES, WITH UNDERLYING ASSUMPTIONS

Objectives

68. The project's objectives (Annex 2) are:

   - Ecosystem recovery demonstration and upscaled in priority degraded lands, using best practices in sustainable land management to enhance ecosystem stability and functions, agricultural productive capacity, food security and rural livelihoods
   - Enhanced capacity for mitigation of land degradation and for sustainable land management through greater awareness, mainstreaming and policy reform.

Outcomes and activities

69. Corresponding expected outcomes and activities (Annex 2) are:

Outcome 1: Developed and applied participatory methodological framework for identifying and prioritizing threatened lands, and criteria for identifying sustainable ('good/best') land management practices. This will be done through a series of participatory activities aimed at identifying and selecting target communities and sites for demonstrating best practices. Furthermore, relevant analyses (e.g. barrier identification) and baseline information will also be collected, and information stored in a database for networking and dissemination.

Outcome 2: Identified sustainable ('good/best') land management practices applied to recover degraded lands, protect those under threat, and enhance their ecological functions, agricultural production capacity and rural livelihoods improvements role. Demonstrating best practices in the selected sites, and disseminating information to a wider set of stakeholders will achieve this outcome. Best practices will be a combination of traditional systems combined with improvements for greater productive potential, generation of alternative income, and ecosystem stability.

Outcome 3: Enhanced capacity and enabling environment for mitigating land degradation and promoting sustainable land management. This outcome will be achieved by a series of activities aimed at disseminating project results and approaches through universities and schools, and to policy makers at national and local levels. Mainstreaming of sustainable land management, policy reform papers, and other mechanisms will be used for influencing policy reform. Finally, farmer associations will be assisted to obtain greater access to commercial credit (e.g. bank accounts, training in financial management, etc.). This outcome will also include a participatory M&E component to allow adaptive management of the project and farmers associations.

D. FINANCIAL INPUTS

70. The GEF Alternative (project) will require a combined package of funding from GEF and other sources, for a total $1,758,023. Additional financing will be sought during MSP implementation to provide resources for replication to a wider set of stakeholders. Likely donor agencies are USAID, Canada, and IPGRI (see Annex 14).

PROJECT OUTPUT BUDGET

Component	GEF	Other sources		Project total
		Co-financing	National in-kind contribution	
Outcome 1 Developed and applied participatory methodological framework for identifying and prioritising threatened lands, and criteria for identifying sustainable ('good/best') land management practices	**200,000**	**30,000**	**150,000**	**380,000**
Outcome 2 Identified sustainable ('good/best') land management practices applied to recover degraded lands, protect those under threat, and enhance their ecological functions, agricultural production capacity and rural livelihoods improvements role	**600,000**	**50,000**	**483,023**	**1,133,023**
Outcome 3 Enhanced capacity and enabling environment for mitigating land degradation and promoting sustainable land management	**145,000**	**0**	**100,000**	**245,000**
Project total	**945,000**	**80,000**[1]	**733,023**[2]	**1,758,023**

[1] $30,000 pledged by UNU and $50,000 pledged by Heifer International Project.
[2] In-kind contributions by Ghana's MES, MLF, MOFA, CSIR, UNU/INRA and partner Universities assured. They include unspecified support under a capacity enhancing UNU/INRA programme planned to be implemented in collaboration of PLEC/SLaM (Annex 13).

II. SUSTAINABILITY ANALYSIS, REPLICABILITY AND RISK ASSESSMENT

71. To the extent that, through a determined participatory approach, the project addresses land degradation, a major threat to rural livelihoods, it is bound to evoke an enduring popular interest, whose sustainability is further assured by:

a) its functioning through income-generating, financially self-reliant and expert-farmer-led local farmer associations developed along the tested PLEC model;
b) its integration into programmes of local schools, CBOs, NGOs and governmental organizations, notably District Assemblies; and

c) its linkages developed with banks and other external facilitating or supportive institutions.

Recognising lack of capital as a major constraint on farmers ability to invest in activities that increase the value of conservation, during the first phase of its work, PLEC encouraged all of its farmer associations to open and operate bank accounts to facilitate access to loan or credit. SlaM would consolidate this pilot initiative and introduce farmers, through their associations to rural banks (e.g. Akuapem Rural Bank in Nsawam near Obodan site, Atwima-Kwawoma Rural Bank in the Tano basin, Bonzali Rural Bank Tamale near Fihini site), and to other forms of credit support so as to enhance their capacity for land improvement measures and ensure sustainability of results after project completion.

72. Expert farmers identified, recognized, trained and motivated through the farmer associations following the FAO farmer field school concept and the proven PLEC expert farmer stratagem will, in collaboration with relevant organizations, play a central role in replicating and upscaling both during and after the project. Risk of post-project failure is considerably reduced by the *de facto* popular ownership of the project by the farmer associations, and by a vested government interest in its success over the long haul, for both political and social reasons.

73. The consolidation of PLEC results, which in itself has already shown successful but limited results, will help to ensure a wider dissemination of impacts. But consolidation is not enough; upscaling is hampered by various factors related to the policy environment, capacity and knowledge base, which this project aims to also have an impact upon.

74. Annex 7a provides in tabular form an analysis of the key identified risks. They centre on:

- knowledge sharing;
- availability of scientific expertise;
- availability apprentice graduate students
- willingness of farmers, scientists and policy-makers/government agents to work as partners;
- grassroots acceptance/sustainability of community and other local stakeholder interest;
- policy intake;
- national political and local social stability; and,
- expected additional co-financing.

In the main, it is planned to monitor them by regular situation assessment, and to manage them by inducement, capacity building and demonstration of success stories and benefits.

III. LESSONS LEARNT AND ALTERNATIVES CONSIDERED

75. This project builds upon successful aspects of the GEF-supported PLEC 1 project, particularly upon the demonstrated potential of:
    a) indigenous agrodiversity management systems for conserving land resources; and,
    b) a community participatory approach based on a partnership of farmers, scientists and policy agents as an instrument for addressing development challenges from the grassroots, in line with a growing government policy thrust.

76. A lesson learnt from PLEC was an unsuccessful and hasty attempt to encourage popular adoption of grass bunding and stone filters to protect biodiversity by checking soil erosion.

This failed effort demonstrates a need for an in-depth understanding of the social context and for a deliberate social sensitization drive before introduction of innovative conservation and development projects in rural communities. This observation is underscored by the dismal failure of government-owned state farms that were hastily introduced in an accelerated agricultural development programme in the immediate post-independence era in Ghana.

77. Before a committal to a farmer-centred, community-based, bottom-up participatory ecosystems approach, this project proposal considered other options. They included, above all, proceeding in a business-as-usual manner through the government extension apparatus. But this and other conceivable options were rejected in favour of the essentially PLEC approach, because of recognized need to build upon its initial successes in the continuing search for optimal ways of managing land resources.

78. Another option considered was a regional approach linking the two West African PLEC sites (Guinea and Ghana), but this approach was also rejected because of a lack of regional justification to such a project.

IV. LINKAGES WITH OTHER GEF PROJECTS

79. This project proposal relates to the GEF grant (US$ 8.7m) and World Bank (US$ 9.3m) for the Natural Resources Management Project (NRMP), Phase I (1999-2000, extended to 2002). Comprising two principal components, namely the Forest Resources Management (FRMP) and the Savanna Resources Management (SRMP), the NRMP aims at the protection, rehabilitation and sustainable management of national land, forest and wildlife resources, and the sustainable increase in income of rural communities who own these resources (World Bank Report No. 17879, Project Appraisal Document, 15 May 1998). In discussions with officials of the Ministry of Lands and Forestry, the executing agent of the NRMP I, and with those of the World Bank-Ghana during the preparation of this proposal, they indicated that the present follow-on PLEC project proposal on sustainable land management is mutually compatible with the aims of the larger implementation aspects of NRMP, and will be fully supportive of its objectives. Earlier, a similar positive sentiment of co-operation was expressed in an Aide Memoire by an NRMP Implementation Assistance Mission (IAM) of January 21-Februay 1, 2002. The IAM, which involved the Co-ordinating Leader of Ghana-PLEC (Prof. Edwin Gyasi) as a member, noted that the action programmes of SRMP and those of certain other projects (notably PLEC) interface, but "*there is no or little integration and joint coordination/monitoring of programmes and activities…*". Accordingly, "*The Mission agreed that this situation needs to be urgently and intensively assessed and ways found to ensure that interventions and best practices adopted by each of the projects complement rather than conflict. SRMP will establish closer collaboration with similar projects (e.g. FORUM, PLEC)…*". Co-ordination between SLaM, SRMP and NRMP as a whole shall be achieved principally through the representation of MLF (and, by implication, of SRMP/NRMP) on the Ghana/ SlaM Steering Committee, and by regular project-to-project meetings.

80. The proposal also relates to the following projects, either proposed or on-going, with a substantial GEF funding component:
    a) the on-going National Forestry Plantation Development Project (NFPDP), launched under the Ministry of Lands and Forestry in 2001 with the aim of replanting degraded forest areas;

b) the Northern Ghana Savanna Biodiversity Conservation Project (NGSBCP – See World Bank Report no. 21847-GH, Project Appraisal Document, February 13, 2002), whose basic aim is "*to improve the livelihood and health of communities in the northern savanna zone of Ghana, and the environment through the conservation and sustainable use of natural resources including medicinal plants*" (p. 3 of Project document);
c) the project proposal, 'Improved Soil Fertility, Carbon Sequestration, Conservation of Agrobiodiversity and River Basin Recharge in the Volta Basin', (UNEP-GEF) which is in development by a consortium of organizations, with the aim of increasing soil carbon, increasing water storage capacity, preserving agricultural biodiversity, replacing agricultural practices that result in land degradation and alleviate poverty by improved agricultural yields, all with reference to the international Volta River Basin, and with Burkina Faso, Ghana and Togo as the focal countries (Draft Proposal for Discussion, 19 Nov. 01); and,
d) the IPGRI project, 'Community-Based Management of On-farm Plant Genetic Resources in Arid and Semi-arid Areas of Sub-Saharan Africa', whose overall goal is "*To improve the effectiveness of traditional farming systems for conservation of crop landraces of local and global significance*" (IPGRI/GEF Project Document), with Ghana as one of the eight focal countries. Best practices from this project will be considered, adapted and prioritized along with indigenous ones identified by SLaM.

81. Further this proposal will support the Ghana National Capacity and Self-Assessment (NCSA) project in providing inputs for the priority-setting exercise for the NCSA process as a basis for examining the cultural, political and socio-economic factors, which serve as constraints for land degradation and biodiversity conservation-related issues.

V. INCREMENTAL COST ASSESSMENT

82. As embodied Annex 1, the incremental cost is estimated at $1,758,000 over and above the estimated $800,000 baseline cost.

83. In the absence of verifiable hard data, calculation of the baseline cost is based upon reasoned guess of the value (tangible as well as intangible, including moral and future use ones) from land usage by farmers, government organizations, NGOs and other local managers of the land.

84. Positive ecological and socio-economic impacts of those on-going domestic land use activities are constrained by limited capitalization and human capacity, hence a need for the complementary, but sometimes substitutional activities focused upon development of 'good/best' land management systems, whose benefits for the Ghana situation and the global environment (forest stock, biodiversity, carbon sequestration, water cycle, etc) far outweigh the $1,758,000 additional cost. Without this required minimum additional investment, the condition of land would deteriorate, not only to the detriment of the Ghanaian situation, but also to that of the global environment as a whole.

VI. IMPLEMENTATION ARRANGEMENTS AND WORKPLAN

85. Work is spread over four years, which provide a sufficient time span for project impacts and their assessment (Annex 3).

86. Ghana's Ministry of Environment and Science (MES) will serve as the Executing Agency for and on behalf of the Government of Ghana (See letter in Annex 13). It will report to the GEF through the UNDP (Annex 5).

87. As the leading institution, the University of Ghana (UG), Legon, which is located at Accra, the national capital in southern Ghana, would, in collaboration with UNU/INRA and CSIR (institutional partners) and with the concurrence of the Government of Ghana, serve as the Implementing Agency with backstopping by UNU, CIDA, etc. and other agencies and institutions. It also shall serve as the overall principal administrative and management node. Besides holding responsibility for co-ordinating project work nationally, UG would, following the tested PLEC model, hold primary responsibility for work in demonstration sites in southern Ghana (Annex 9) through a team of scientists and their assistants. It will report directly to MES. Work in central and northern Ghana would be managed, respectively, through Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, and University for Development Studies (UDS), Tamale, by teams of scientists based there, with University of Ghana, through which they shall report to Government, exercising oversight. The actual groundwork shall be carried out through PLEC farmers associations with collaboration of government extension services as happened in the successful maiden GEF-funded PLEC project.

88. UNDP/Ghana will provide technical backstopping of the project to ensure quality delivery of services and feedback from project management. It will oversee the preparation of evaluation reports by the implementing institution by ensuring that the appropriate GEF reporting guidelines are followed, sourcing of experts, review CV's and term of reference of local consultants, the procurement of goods and services and make payments in respect of project activities. An annual audit of the project shall be conducted under the overall supervision of UNDP and the Ministry of Finance.

89. Following the PLEC model, the UG overall implementation/management headquarters would be headed by a part-time National Project Director/Co-ordinator. As indicated in Annex 5, each of the sub-implementation/management nodes at KNUST and UDS would be headed by a Co-ordinator (part-time) who would report to the UNDP/GEF through the National Project Director/Co-ordinator. At the UG national headquarters, an Administrative and Research Officer, supported by assistants including a secretary and apprentice students, all responsible to the Project Director, would exercise day-to-day secretariat administration. Day-to-day administration of the KNUST and UDS Secretariat would be carried out similarly under overall supervision of the sector Co-ordinators. The Project Director through the University of Ghana Consultancy Centre would exercise financial administration, co-ordinate all other component activities including those by UNU/INRA and the farmer associations and liaise with all other organs, such as the FAO, UNU, CIDA and CEPF. He/She would report to the GEF, the primary funding agency, through MES, the executing agency.

90. Actual scientific and technical work would be executed by the multidisciplinary teams of scientists working in close collaboration with policy agents and, above all, farmers through associations of farmers or land managers, all under leadership of the sector Coordinators and the Project Director (Annex 5). Others involved in project execution include the Council for Scientific and Industrial Research (CSIR), which would play a leading role in trials and demonstrations, and the United Nations University Institute for Natural Resources in Africa (UNU/INRA), which would play a leading role in human capacity development.

VII. PUBLIC INVOLVEMENT PLAN AND SOCIAL ASSESSMENT (See Annex 6)

91. A key factor motivating this project is the interest expressed in it by farmers involved in phase 1 of the PLEC project focused on agrodiversity (Annex 10). Accordingly, in designing the project, farmers, particularly those belonging to the PLEC farmers association, were consulted, as were government organizations (notably, MES, MOFA and MLF), and NGOs (notably CI, FoE and HPI), all of which saw land degradation as a major threat to humanity and, therefore, deserving of priority attention.

Stakeholder identification

92. Land management cuts across sectors, and affects all and sundry, either directly or indirectly. The stakeholders include the following, which would be involved centrally in the project execution:
    a) farmers, organized into functional socio-economic groups such as the network of PLEC associations of farmers;
    b) research scientists drawn from the universities and other research institutions, and organized into a network;
    c) government officials, especially those of the District Assemblies, which are responsible for implementing national policies on a decentralized basis; and,
    d) NGOs such as HPI, CI and FoE.

93. Through their associations, farmers would be centrally involved as sources of traditional knowledge, demonstrators and propagators of sustainable land management practices as they affect both ecological status and human livelihoods. Research scientists will play a lead role in identifying, developing and documenting appropriate local land management technologies on basis of research and experimentation, and in organizing stakeholders for the purpose of sustainable land management. Logistical and administrative backstopping will be provided by NGOs and governmental organizations, which, in addition, would provide policy direction and collaborate in policy reform initiatives based on emergent lessons.

94. Information dissemination is crucial to project functioning and impacts, both in the short-term and long-haul. It will be achieved by:
    a) regular village level forums and workshops targeted at farmers and other local managers of land resources;
    b) periodic workshops and briefings targeted at government officials at district, regional and national levels;
    c) occasional meetings of an international character;
    d) publicity through mass media (radio, TV and newspapers);
    e) manuals, especially simple, essentially pictorial modules targeted at illiterates and semi-illiterates;
    f) publications, technical, as well as scientific in peer-reviewed journal, and also books.

95. All these will be preceded and informed on a continuous basis by direct consultations aimed at identifying threats, opportunities, and strategies for achieving outputs from the perspective of stakeholders.

Stakeholder participation

96. A key aspect of sustaining the farmer participation is the planned provision of supportive income generating activities (from new agroforestry schemes, snail rearing, etc.) and the forging of links with banks and other external facilitators through the farmer associations. Another is the involvement of their school-going children through their schools. It is expected that the visible positive output will stimulate, on a sustainable basis, interest of the district level government directorates of agriculture, education, environment etc,

Social and participation issues

97. Although women feature significantly in land management, often more than men, the recognition accorded the women, particularly by way of their empowerment by training, control over land, and access to capital, is generally low. Accordingly, through women's groups, programmes targeted specially at enhancing the capacity of women to diversify and add value to agriculture and other forms of livelihoods, would be accorded special attention, as would special capacity building programmes for the youth, especially through their schools. These interventions would accord pride of place to agrodiversity so as to enhance the nutritional base of people, especially children and nursing mothers.

98. Optimal usage of land resources is undermined by tension and mistrust between tenants and their landlords. The project seeks to resolve these problems, which arise mainly from uncertain and usurious tenancies, by reconciliation forums for the two parties. A moral obligation to society and a vested academic interest will propel, sustainably, participation of research scientists.

VIII. MONITORING AND EVALUATION PLAN

99. Annex 7b provides a summary of the monitoring and evaluation plan plus a provisional budget. Project performance will be monitored and evaluated on a continuous basis by consultants and a cross-section of stakeholders, whose work would be so facilitated as to enable them to visit project sites for first-hand, on-spot observations and interactions with farmers. Stakeholder workshops featuring farmers, local authorities, governmental and non-governmental organizations, CBOs and FBOs will be used on a continuous basis to monitor progress and disseminate results.

100. The views of farmers and the land resources management associations to which they belong shall be sought by questionnaire survey and group discussion, and those of policy agents/makers by face-to-face dialogue. These will be tempered by the research scientists' own observations, to serve as a basis for analysis and reporting.

101. External evaluators would be engaged to carry out a mid-term review as well as the final, terminal evaluation, from an independent perspective. These will follow UNDP standard procedures, as well as GEF requirements for reporting.

Annexes:

Annex 1: Incremental Cost Matrix for Sustainable Land Management (SLaM) Project in Ghana

Cost/Benefit	Baseline (B)	Alternative (A)	Increment (A - B)
Domestic Benefits	1. Harvesting of wood for fuel, construction, export, income and satisfaction of other human needs, but unsustainable because harvesting levels exceed regeneration rates	1. Reforestation, afforestation, woodlots and propagation of relevant policies and regulations plus activities aimed at streamlining tree tenure	1. Increased forested and wooded landscapes and strengthened ecological roles
	2. Harvesting of naturally occurring endemic plants used for medicine, food and other purposes, but threatens biodiversity because of imbalance between harvesting levels and regeneration rates	2. Agroforestry, intercropping among trees left *in-situ*, and other biodiverse farming practices modeled upon 'good/best' locally adapted traditional practices, backed by support for: conservation of forest relicts and other biodiverse patches; corridors linking biodiverse areas to less biodiverse one; and biodiverse plant nurseries	2. Enhanced biodiversity and ecological services
	3. Food production by extensive crop farming, but practice unsustainable because of population pressure	3. Intensive production systems that integrate 'good/best' locally adapted indigenous as well as land management practices, e.g. use of compost pits; manure household refuse; crop rotation; sequential cropping; mixed cropping; the *oprowka* mulching technique that avoids use of fire for land preparation	3. Food security and rural livelihoods enhanced by improved productive capacity of land
	4. Farming and other land uses in ecologically sensitive, fragile or vulnerable areas, e.g. steep slopes and river banks and catchments	4. Buffers, corridors, reforestation, afforestation, contour farming, terracing, bunding and other soil formation and stabilization practices	4. Threatened ecologically vulnerable areas recovered and/or protected
	5. Poverty reduction and livelihoods programmes in place, but impact constrained by limited number of programmes, by inadequate focus on access to land	5. Land based off-farm economic activities aimed at generating additional occupations and more value from the land, e.g. commercial plant nurseries, woodlots, apiculture and aquaculture, backed by measures focused on strengthening security	5. Improved rural livelihoods, social stability and land resources conservation

	resources and on sharing of benefits from their use, and by limited operational resources	of tenure and minimization of usurious tenancies so as to encourage a less exploitative land use	
	6. Training programmes in sustainable land management in place, but limited in scope and effectiveness by limited resources	6. Human and institutional capacity enhancement programmes by better resourced demonstration, extension and training backed by research and provision of appropriate facilities, especially through schools and farmer associations	6. Improved land management capacity
	7. Policies that exist, but registering only limited impact because of: weak policy maker/agent – land manager synergies; limited implementation capacity; and a lack of popular awareness	7. Activities supportive of policy implementation programmes, e.g. rehabilitation of degraded areas by reforestation, other activities, e.g. stakeholder workshops and publications aimed at awareness creation, and yet other activities, e.g. briefings and seminars targeted at policy reform	7. Greater effect to policy and improved information for policy reform
Global benefits	1. Export of processed wood, which depletes forest, woodland and soil biomass	1. Improved forest and general vegetation cover that: ensures wood supplies and habit for wildlife; improves carbon sequestration and oxygen recycling; minimizes erosion of soils and leaching of their nutrients; protects water bodies; and enhances other ecological functions sustainably	1. Environmental functioning enhanced by the ecological services provided by the conserved and regenerated forests and woodland
	2. Harvesting of naturally occurring useful endemic plants threatens the biodiversity needed by humankind for medicine, food, fibre, plant breeding, ecosystems stability, etc	2. Conserved, improved and protected biodiversity would ensure availability of a diversity fauna and landraces and other flora, as well as their ecological functions	2. Endangered floral and faunal diversity saved and conserved for present generations and posterity
	3. Agricultural produce trading, which imparts global food security by exports, but overtaxes soils and other	3. Agricultural production and food security by sustainable land management practices	3. The securing of globally significant crops including landraces

	biophysical resources that underpin farming		
	4. Farming in ecologically sensitive areas may yield exportable surpluses, but only in marginal quantities and at the expense of the fragile ecosystem	4. Protection of the ecologically sensitive areas by limitation of farming and other land uses will ensure their functions as: reserves of biodiversity; mediators in the hydrological cycle and carbon and oxygen flow; refuge for wildlife, etc.	4. Conserved habitat for endemic species peculiar to ecologically vulnerable areas, and protected environmental services by the vulnerable ecosystems
	5. Poverty and inadequate livelihood opportunities compel overuse of land resources by a desperate need for survival by the deprived, thereby endangering the environment	5. Provision of activities that enhance productive capacity of the land and others that support off-farm land-based income generating ventures targeted at the poor, economically marginalized and socially disadvantaged and, thereby, minimizes inequalities, will motivate optimal use of biophysical resources and conservation of ecosystems.	5. The social stability arising from the poverty reduction together with the enhanced environmental services induced by the improved land resources management
	6. A lack of knowledge and skills because of paucity of training constraints capacity for sustainable land management	6. Improved capacity will enable popular management of soils, forests, biodiversity and related land resources on a sustainable basis.	6. A. net gained capacity for environmental protection and improvement
	7. A weak policy mainstreaming and co-ordinating mechanism plus a lack of focus on critical issues, leave the disparate land management practices without a coherent sense of direction that favour socio-economic and environmental benefits	7. Activities supportive of popularization, implementation, co-ordination and reform, will result in a better environment by their wider social impacts especially through synergies between farmers and other land managers on one hand, and research scientists and policy makers/agents on the other	7. The enhanced land and environmental policy impact achieved by synergies through a strengthened stakeholder linkages

Costs **Outcome 1** Developed and applied participatory methodological framework for identifying and prioritising threatened lands, and criteria for identifying sustainable ('good/best') land management practices	• Direct and indirect costs of methodological development work and other research towards optimal land management **Total: US$200,000**	• Cost of electronic media, personnel orientation training, administration and farmer support **Total: $580,000**	**Total: US$ 380,000** **Cost to GEF: $200,000** **Co-finance (excluding in-kind counterpart contribution: researchers' time and related projects and government in-kind co-financing): $180,000**
Cost **Outcome 2** Identified sustainable ('good/best') land management practices applied to recover degraded lands, protect those under threat, and enhance their ecological functions, agricultural production capacity and rural livelihoods improvements role	• Cost of on-going sustainable land management work through government extension, CBO, NGOs etc **Total: $400,000**	• Establishment of demonstration sites, provision of equipment and farmer support **Total: $1,533,000**	**Total: $1,133,000** **Cost to GEF: $600,000** **Co-finance (excluding in-kind counterpart contribution: researchers' time and related projects and government in-kind co-financing): $533,000**
Cost **Outcome 3** Enhanced capacity and enabling environment for mitigating land degradation and promoting sustainable land management	• Cost of regular capacity building and policy implementation and reform **Total: $200,000**	• Training programmes and policy impact strengthening activities **Total: $445,000**	**Total: $245,000** **GEF: $145,000** **Co-finance (excluding in-kind counterpart contribution: researchers' time and related projects and government in-kind co-financing): $100,000**
Grand total costs	Baseline: **Grand Total: $800,000**	Alternative: **Grand Total: $2,558,000**	Incremental Costs: US$1,445,000 **GEF share: $945,000** **Co-finance: $813,000** **COMBINED TOTAL COST: $1,758,000**

ANNEX 2: PROJECT LOGICAL FRAMEWORK

PROJECT TITLE: Sustainable Land Management for Mitigating Land Degradation, Enhancing Agricultural Biodiversity and Reducing Poverty (SLaM) in Ghana			
Project strategy	**Objectively verifiable indicators**	**Sources of verification**	**Assumptions**
Overall Goal Contribute to sustainable ecosystem-based integrated land management in globally, nationally and locally significant land resources in agricultural areas under threat, for greater ecosystem stability, enhanced food security and improved rural livelihoods			
Project Objectives 1. Ecosystem recovery demonstration and upscaled in priority degraded lands, using best practices in sustainable land management to enhance ecosystem stability and functions, agricultural productive capacity, food security and rural livelihoods	• Ecological functions as assessed by appropriate measures of soil, floral, faunal and hydrological conditions as well as of carbon sequestration in demonstration sites enhanced by at least 25% • Agricultural productivity potential in demonstration sites increased by 50% • Livelihoods as assessed by farm incomes and nutritional levels enhanced by at least 25% • 5% spontaneous uptake of best practices in non-target areas • Recognition of SLM increased in public sectors • At least two national policy frameworks integrate SLM principles and are disseminated	• Project M&E reports	• Community and stakeholder interest • Community and general stakeholder involvement
2. Enhanced capacity for mitigation of land degradation and for sustainable land management through greater awareness, mainstreaming and policy reform	• Recognition of SLM increased in public sectors • At least two national policy frameworks integrate SLM principles • At least three new policy papers disseminated	• Participatory surveys • Number of trainees who are applying the methods • Continuous monitoring	• Government commitment to policy change
Outcome 1 Developed and applied by appropriate methodologies participatory methodological framework based on joint farmer-scientist perceptions for identifying and prioritising threatened lands, and criteria for identifying sustainable ('good/best') land management practices	• Systematic participatory methodological framework and criteria, applied in all pilot sites by year 1	• Stakeholder meetings and resultant reports • Farmer-centred forums and resultant reports • Methodological framework and criteria	• Availability of scientific expertise and expert farmers • Availability of logistics and a cross-sectional representation of stakeholders including policy makers/governme

plus land use plans			nt officials and their agents
Activity 1.1 Formulate and apply framework for identifying threatened lands and criteria for identifying sustainable ('good/best') land management practices	• Draft methodology and draft criteria developed by mid-year 1 • Land use plans developed for at least 3 sites by end of year 1	• Draft technical report	
Activity 1.2 Evaluate barriers to upscaling of best practices in each pilot site and at national level	• Barriers identified for all 5 pilot sites by mid year 2	• Draft technical report	
Activity 1.3 Organize stakeholder meetings to discuss evolving methodological framework for identifying threatened lands, and choose most adapted sustainable ('good/best') land management practices	• 2-3 Meetings at village, district, regional and national levels in year 1 • Framework field-tested and revised in light of field experience on a continual basis • Final framework and a set of criteria produced and published for replication, by year 3	• Reports of meetings • Technical reports of exercise including photographic evidence	
Activity 1.4 Determine baseline conditions, and their evolution, including land degradation and biophysical status relative to prevalent land holding arrangements in all demonstration sites for purposes of M&E of impact of project	• Baseline data available by end of year 1 • Periodic data collection to assess project impact	• Reported profiles of sites supported by maps, with a special attention to biophysical status relative to security of land holding and other management and organizational aspects of land	
Activity 1.5 Development and functioning of database of land degradation and sustainable ('good/best') management practices in	• A set of computer-based data stored according to GIS principles and linked to other relevant institutional databases ready by end of year 2 • Database format, criteria and critical components including selection of software, for components of agricultural land management prepared by mid year 1	• Hard and compact discs as well as paper document containing	• Skilled programmer(s) assured • Availability of a cadre of

relation to livelihoods of local communities and environmental protection, starting from year 1:	• Based on Microsoft Access, GIS, and other PLEC methodology, create database and data inserting guidelines by mid year 1 • System of information sharing between the planned database and others at the national level (e.g. Ghana's EPA database on land degradation, and FoRIG database on forest species) established by end of year 2 • System of information sharing between the planned database and others at the international level (e.g. the FAO database on land degradation, IIED database, and the UNU/PLEC database on agro-bio-diversity) established by end of year 2 • Periodic updates to facilitate monitoring, evaluation, synergies and comparability of work outputs	relevant data sets • Periodic updates • Reports of shared information • Products resulting from creative use of the databases	committed apprentice graduate assistants
Activity 1.6 Environmental and social impact assessment of the practices being demonstrated, including gender and cost-benefit analyses at household level	• a trade-off analysis to determine the net benefit of practices, and stakeholder groups that receive the benefit, developed by end of year 1	• Analytical reports	
Outcome 2 Identified sustainable ('good/best') land management practices applied to recover degraded lands, protect those under threat, and enhance their ecological functions, agricultural production capacity and rural livelihoods improvements role	• Evidence that changes in agricultural production and other livelihood aspects are linked to changes in agrodiversity and general ecological integrity • Popular grassroots views are positive and high rate of adoption by extension agents and other officials • Up to 20 policy-makers, 15-20 extension agents and 150-300 core farmers and other land users sensitized or trained in mitigative land degradation and ecosystem recovery • Evidence of positive uptake by non-target populations	• Field inspection • Sustainable livelihoods analytical framework • Analytical reports embodying sustainable practices • Mass media report coverage • Policy briefs	• Popular willingness to co-operate • Co-operation by all stakeholders
Activity 2.1 Establishment of a national network of at least three demonstration sites with partnerships between expert farmers, scientists and policy-makers	• 3 demonstration sites established by year 1, and 2 more by year 2 • Sensitization forums for all stakeholders in demo sites by end of year 1 • One partnership agreement developed per site between all stakeholders by end of year 1 • Linkages between demonstration sites by visits, exchanges and sharing knowledge; continuous but at least 5 visits per year starting in year 2	• Workshops and popular forae • Monitoring and evaluation involving field inspections • Reports	• A willingness of farmers, scientists and policy-makers/government officials, the key stakeholders, to work together as partners

Activity 2.2 Demonstrating potential of sustainable management practices, including agricultural biodiversity and land use planning based on agricultural capability, in combating land degradation and enhancing productivity, including the protection of watersheds, river basins and forests, following the farmer field schools concept developed by the FAO, and the expert farmer strategy articulated by UNU/PLEC	• At least 10 commercial community-and individually-owned plant nurseries and woodlot and afforestation activities (involving planting of preferred endemic and locally adapted exotic species, e.g. ebony, neem, *Cassia*, cedrela, mahogany, emire - *Terminalia ivoriensis,* osese -*Holarrhena foribunda,* and odum - *Milicia excelsa*) in support of carbon sequestration and to minimize global warming, by end of year 4 • Demonstrate income-generating agroforestry units and snail rearing in at least 20 backyards to improve rural livelihoods, by year 3 • Demonstrate use of household refuse by compost pits to enhance productivity of home gardens for enhanced food security and incomes, in at least 30 households by year 4 • At least 10 model biodiverse food-crop farms developed on basis of the traditional agroforestry practice of growing such crops among useful naturally occurring trees purposely left *in-situ*, by year 3 • models of the traditional *oprowka* system of mulching applied in at least 30 farms by year 4 • Stone lining, terracing and grass bunding in combination with tree planting demonstrated over 50 ha in at least 5 catchments to counter land degradation and conserve water by soil erosion control, starting year 2 • At least 5 other potentially viable methods for combating land degradation and watershed management for wider use evaluated and demonstrated by year 4 • At least 100 Field days organized to bring stakeholders (especially women and the poor) together to show how practices and technologies demonstrated do combat land degradation and enhance productivity, by end of year 4 • At least 10 Farmer-led evaluations facilitated and results disseminated to other farmers and stakeholders, by end of year 4 • Audio-visual aided farmer field schools, field demonstrations, informal training and farmer-to-farmer exchanges used to share knowledge and experience of integrated land management • Special awards yearly to exemplary farmers in sustainable land management and eco-farming	• Participatory impact assessment involving lay farmers, scientists and policy agents working in synergy through the tested PLEC farmer associations strategy • Estimation of carbon sequestered into vegetation and soils per hectare as a result of SLaM vegetative recovery activities, making use of appropriate regression and other mathematical models • Analytic reports embodying photographic and mapped evidence	• Community acceptance • Participation of specialists in communication and extension0

Activity 2.3 Disseminating technologies and practices for the conservation, utilization and equitable sharing of the benefits of sustainable land management and enhanced biodiversity following the farmer field schools concept developed by the FAO, and the expert farmer strategy articulated by UNU/PLEC	• Results of previous activities documented and disseminated to at least 10 times as many as stakeholders at local level • At least 5 presentations made to relevant national and international conferences and forums, highlighting the benefits of sustainable land management practices to biodiversity and other global environmental issues as well as to human development • At least 10 emissions of public media and information support services, such as television and rural radio, mobile video plus scientific and other forms of publication	• Reports of Stakeholder workshops • Mass media reports • Reports of conferences attended or convened for dissemination purposes	• Socially and academically enabling environment for dissemination
Activity 2.4 Local communities and local policy-makers (e.g. District Assemblies) develop and implement bye-laws and regulations effective land tenure reform, and for the promotion and management of on-farm biodiversity and land degradation control particularly along threatened water bodies and other ecologically sensitive lands	• Policy gaps, tenurial shortcomings, gaps and disincentives in land use planning and regulations, possible lines of reform and incentive structures identified by scientists and local policy-makers in consultation with expert farmers, by mid year 2 • At least 5 Policy forums convened for relevant stakeholders, including custodians and operators of the land (i.e., owners and their tenants), and enforcement agencies • Appropriate bye-laws and regulations formulated, or enforced on an accelerated basis	• Quantum of briefs, forae and their impacts • External evaluation • Documentary policy briefs towards project achievements - policy mainstreaming • Graphically illustrated oral briefings of District Assemblies and relevant national Parliamentary Select Committees	• An officialdom predisposed towards policy change in favour of ecosystems based land management
Outcome 3 Enhanced capacity and enabling environment for mitigating land degradation and promoting sustainable land management	• People sensitised to and trained in sustainable land management • Institutions/establishments, notably farmer associations, created or enabled to facilitate sustainable land management • Policy reform papers developed and disseminated	• Stakeholder workshops • Monitoring and evaluation • Reports	• A popular willingness to learn and to share knowledge and experiences

Activity 3.1 Dissemination of results and sustainable land management approach at universities and national levels	• At least 10 curricula and training manuals developed, and courses introduced at all levels of participating partner universities, and in local schools, by year 3 • Newsletter on sustainable land management published biannually by University of Ghana and partners • At least 10 relevant scientific publications, by end of year 4 • At least 20 Local professionals within extension services, NGOs and other appropriate institutions actively involved in all relevant aspects of the project at all times • Prepare at least 5 briefs on sustainable land management for government ministers, parliamentarians, local government officials and other appropriate government officials, by end of year 4 • At least one visit by policy makers/government officials to each demonstration site by year 4 • Organize training sessions on sustainable land management for extension agents, CBOs and FBOs with emphasis on value of local knowledge of land resources management • At least 15 'sustainable land management days' featuring guided visits by government officials, school children and other organized groups to model landscapes including farms, fallow lands and forests managed sustainably	• Open field days • Workshops • Monitoring and evaluation • Reports and publications publicly available and/or used • External evaluation	• Assured collaboration of UNU/INRA, relevant government Ministries, District Assemblies, schools, Conservation International, Friends of the Earth and other-NGOs
Activity 3.2 Influencing and triggering policy reform that gives greater recognition to sustainable integrated land management approach, local farmer knowledge and truly participatory methodologies in land resources management:	• At least one policy-oriented key stakeholders forums organized per year • At least five policy briefs produced, by end of year 4 • At least 15 'sustainable land management days' featuring guided visits by government officials, school children and other organized groups to model landscapes including farms, fallow lands and forests managed sustainably • At least five sensitisation sessions organized on farmer policy reform inputs, by end of year 4 • Mainstream sustainable land management into national development frameworks, such as PRSPs, UNDAF and Forestry Action Plans	• Monitoring and evaluation • Reports of policy impact analysis • Publications • External evaluation	• Assured collaboration of UNU/INRA, relevant government Ministries, District Assemblies, schools, and NGOs

ANNEX 3: INDICATIVE WORKPLAN

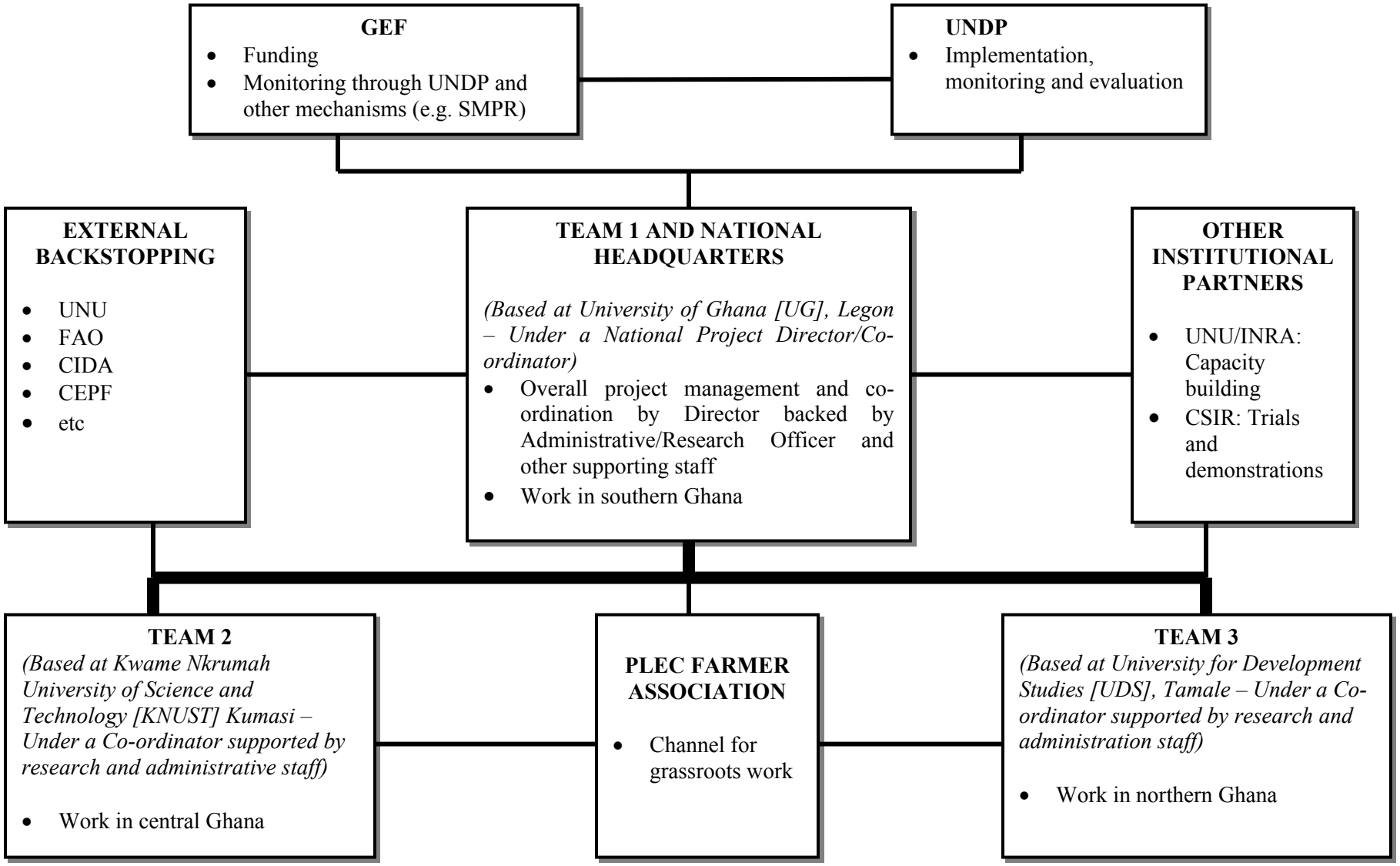
DURATION OF PROJECT (IN MONTHS):								
ACTIVITIES	**PROJECT-MONTHS**							
Completion of project activities	**6**	**12**	**18**	**24**	**30**	**36**	**42**	**48**
Activity 1.1 Formulate and apply framework for identifying threatened lands and criteria for identifying sustainable ('good/best') land management practices								
Activity 1.2 Evaluate barriers to upscaling of best practices in each pilot site and at national level								
Activity 1.3 Organize stakeholder meetings to discuss evolving methodological framework for identifying threatened lands, and choose most adapted sustainable ('good/best') land management practices								
Activity 1.4 Determine baseline conditions, and their evolution, including land degradation and biophysical status relative to prevalent land holding arrangements in all demonstration sites for purposes of M&E of impact of project								
Activity 1.5 Development and functioning of database of land degradation and sustainable ('good/best') management practices in relation to livelihoods of local communities and environmental protection, starting from year 1:								
Activity 1.6 Environmental and social impact assessment of the practices being demonstrated, including gender and cost-benefit analyses at household level								
Activity 2.1 Establishment of a national network of at least three demonstration sites with partnerships between expert farmers, scientists and policy-makers								
Activity 2.2 Demonstrating potential of sustainable management practices, including agricultural biodiversity, in combating land degradation and enhancing productivity, including the protection of watersheds, river basins and forests following the farmer field schools concept developed by the FAO, and the expert farmer strategy articulated by UNU/PLEC.								

Activity 2.3 Disseminating technologies and practices for the conservation, utilization and equitable sharing of the benefits of sustainable land management and enhanced biodiversity following the farmer field schools concept developed by the FAO, and the expert farmer strategy articulated by UNU/PLEC								
Activity 2.4 Local communities and local policy-makers (e.g. District Assemblies) develop and implement bye-laws and regulations effective land tenure reform, and for the promotion and management of on-farm biodiversity and land degradation control particularly along threatened water bodies and other ecologically sensitive lands								
Activity 3.1 Dissemination of results and sustainable land management approach at universities and national levels								
Activity 3.2 Influencing and triggering policy reform that gives greater recognition to sustainable integrated land management approach, local farmer knowledge and truly participatory methodologies in land resources management:								

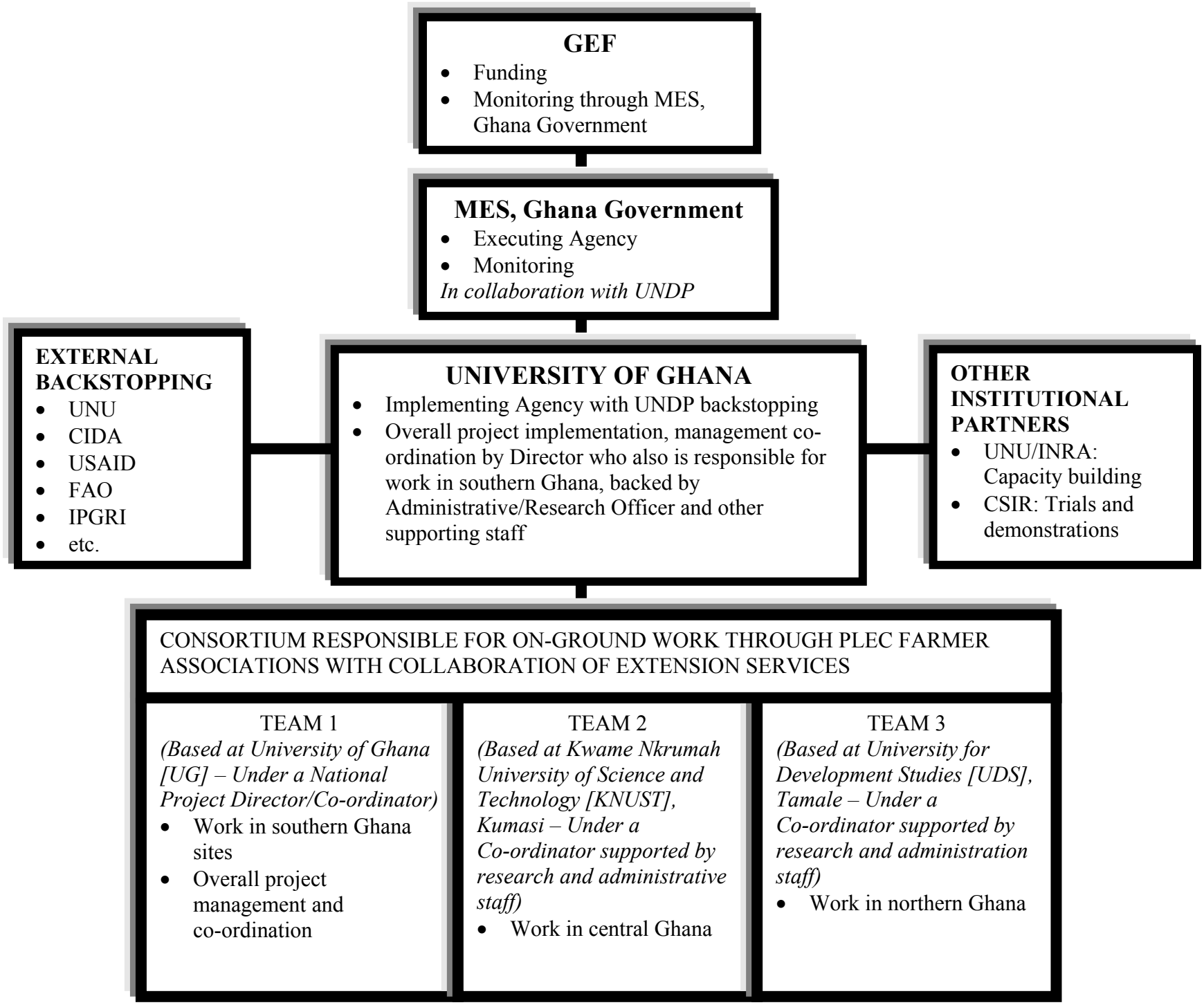
ANNEX 4: CAUSES AND BARRIERS MATRIX

Current situation	Threats or impacts	Barriers and Root causes	Baseline activities
1. A lack of rigour in implementation of policies, notably: ***a) Environmental Action Plan*** ***b) Forest and Wildlife Policy*** ***c) National Land Policy*** ***2. Weak enforcement of relevant rules and regulations, notably:*** ***a) Anti-bush fire legislation*** ***b) Regulation on use of the chainsaw for harvesting timber*** ***c) Regulation on farming on critical hill slopes*** ***d) Land Title Registration Law (PNDCL 152)*** ***e) Land Planning and Soil Conservation Act of 1957*** ***e) Wild Animals Preservation Act, 1961 (Act 43)*** ***f) NRCD 243 of 1974, as amended by PNDCL 142 of 1986, which seeks to protect forest and prescribes penalties for trespassers*** ***h) Minerals and Mining Law of 1986 (PNDCL 153)*** ***i) Environmental Impact Assessment requirement for major economic ventures***	1. Loss of vegetative cover: deforestation, disappearance of savanna woodland, and other vegetation 2. Biodiversity erosion 3. Soil deterioration: erosion, desiccation, leaching and structural breakdown 4. Drought and desertification 5. Lowered water table 6. Land use conflicts: conversion of agricultural and forest lands to urban, industrial and other uses in ways that do not enhance food security 7. Reduced productive capacity of soils and attendant diminished agricultural yield per unit area, which undermines food security 8. Diminished land based livelihood opportunities, especially in rural areas	1. Human pressures: pressures of production and pressures exerted by urbanization and other activities, ultimately linked with population growth, mass poverty and conspicuous consumption of an expanding élite 2. Unsustainable land use practices, e.g. bush fires, overcropping, overstocking, overharvesting of both renewable and non-renewable land resources 3. Introduction of exotic crops and management systems that are not adapted to local conditions 4. Erosion of viable indigenous knowledge of local resources management 5. Inadequate knowledge of appropriate and sustainable traditional and modern scientific management systems 6. Insecurity of land holding and indiscipline in land market 7. Haphazard and unsustainable land use, lack of integrated land policy and planning 8. Lack of legislation prohibiting farming and other human activities along water bodies and other ecologically sensitive areas 9. Inadequate emphasis upon land management and environmental education in school curricula 10. Lack of participatory management and protection of forest and wildlife resources 11. Local communities do not have mechanisms nor incentives to work collaboratively with local government on promoting ecological stability 12. Weak human capacity: poverty; limited resource management knowledge; lack of other resources	1. There are policies and legislation, such as those listed in column 1, for regulating usage of land resources, but their fragmented nature constraints their effect, hence the call for common framework for their harmonization 2. With respect to government regulations on timber trees occurring naturally on a farmer's land, a lack of clarity of the right or share of farmers in such trees. 3. Slowed or delayed government action to rehabilitate degraded areas, e.g. the one focused on the Densu basin 4. Delayed law on protection of farmer intellectual property rights with respect to knowledge of uses of plants, especially for medicinal purposes 5. Dying out of traditional customary resource conservation rules, regulations and practices, e.g. those forbidding farming, hunting and fishing on designated days, and the practice of conserving forest in selected patches perceived as sacred. 6. Lack of effective institutional and policy frameworks for implementing ecologically and socio-economically sustainable management systems in collaboration with local communities

Annex 5. Organigram of project implementation



Annex 5. Organigram of project implementation



Annex 6: Public involvement matrix

IDENTIFIED STAKEHOLDERS	MANNER OF INVOLVEMENT AND OF ENSURING SUSTAINABLE PARTICIPATION	MANNER OF DISSEMINATING INFORMATION AND OF CONSULTING
1. Farmers and other primary managers of land resources	• Sources of traditional knowledge • Demonstrators • Propagators • End-users • Supportive income generating activities provided • Evaluators of project impact • External linkages forged	• Village forums • Periodic workshops • Mass media • Manuals • Direct consultation
2. Research scientists	• Identifying, developing and documenting land management technologies • Monitoring and evaluation	• Occasional meetings of international character • Publications • Direct consultations
3. Government officials	• Logistical and administrative support • Policy direction and collaboration in policy reform initiatives • Demonstration effect of positive outcomes	• Periodic workshop and briefings • International conferences
4. NGOs	• Logistical support • Extensionists	• Periodic workshops • International conferences

Annex 7a. Key risks and plans for their monitoring and management

RISK	MONITORING AND MANAGEMENT	COMMENT
1. Knowledge sharing: Popular willingness to learn and to share knowledge and experience	Observation, record keeping and continuous demonstration of value of positive synergies achieved by knowledge sharing	On basis of PLEC experience, though a reluctance to share knowledge is real, the probability of its widespread occurrence is low.
2. Availability of scientific expertise	Regular situation assessment, material and financial inducement by publication support and capacity enhancement by training	On basis of PLEC and other experiences, there exists a minimum core of willing and able required scientific expertise
3. Availability of a cadre of committed apprentice graduate students	Regular situation assessment, and inducement by access to *SLaM* project research facilities, and by allowances, honoraria and training support	The growing student population should minimize the risk of inadequate graduate student availability
4. A willingness of farmers, scientists and policy-makers/government officials, the key stakeholders, to work as partners	Regular situation assessments, and periodic demonstrations of value of positive synergies from partnerships	On basis of PLEC and other experiences, some stakeholders may not be willing partners, but they appear few in numbers.
5. Grassroots acceptance: Sustainability of community and other local stakeholder interest	Regular situation assessment, and development of capacity for self-reliance or self-sustainability by training and income-generating activities	Although there is an element of risk, the PLEC experience gives cause for optimism
6. Policy intake: Officialdom predisposed towards policy change in favour of ecosystem-based land management	Situation assessment, especially through policy briefs, meetings with government officials and field visits organized for them	Problematic, most especially because of inertia. However problem could be minimized by demonstrations of positive outcome of ecosystem-based approach to land management.
7. National political and local social stability	Continuous monitoring of political and social trends and adaptation of *SLaM* project programmes to changes	Recent evidence points to a stabilization of the Ghanaian political-social situation over the past four years. This trend is expected to continue, given the developing national democratic framework
8. Expected additional co-financing	'Wait and see', project progress brief for potential donors and tactful reminders to them	Although failure cannot be discounted, the initial positive reaction of potential donors to *SLaM* project proposal provides cause for optimism.

Annex 7b: M & E Plan and Budget

Type of M & E activity	Lead responsible party in bold	Budget ($)	Time frame
Inception report	National Project Director/Co-ordination	No extra cost	Within first 12 months
Annual reports	National Project Director/Co-ordinator	No extra cost	Years 1, 2, 3 and 4
Mid term review	UNDP/GEF Nominees	20,000	End of year 2
Terminal report	National Project Director/Co-ordinator	4,000	End of year 4
Final Evaluation	UNDP/GEF nominees	30,000	By middle of year 3
Audit	UNDP/GEF Nominee	5,000	Years 1, 2, 3 and 4
Visits to field sites (at least twice a year)	Project scientists, officials of government and UNDP/GEF	15,000	Years 2, 3 and 4
Lessons learnt - exchange with similar projects	Project scientists, officials of government and UNDP/GEF, and farmers	10,000	Year 4
Total		84,000	

Annex 8: Soil erosion hazard according to administrative regions in Ghana

Region	Slight to moderate sheet erosion	Severe sheet and gully erosion	Very severe sheet and gully erosion	TOTAL
Northern	23,310	19,062	23,330	65,702
Upper East	4,574	3,774	964	9,312
Upper West	7,288	4,470	7,148	18,906
Brong-Ahafo	10,697	20,930	5,219	36,846
Volta	6,615	7,376	2,901	16,892
Ashanti	7,115	11,826	6,017	24,958
Greater Accra	3,005	101	85	3,191
Eastern	3,090	11,105	2,852	17,047
Central	2,002	7,780	521	10,303
Western	2,745	16,913	3,675	23,333
TOTAL	70,441	103,337	52,712	226,490
%	31%	46%	23%	100%

Source: Asiamah (1987)

Annex 9: Description of planned demonstration (project) sites

General background

1. The geographical focus of all activities will be at the demonstration sites, which will each feature an important aspect of resource conservation through addressing agricultural biodiversity. Demonstration sites are the forums for bringing stakeholders together, to share learning and knowledge between stakeholders and to address relevant conservation and development issues jointly in a participatory way. Selected appropriate indigenous technologies (Annex 10) will be replicated and tested/validated before widespread dissemination. The demonstrations will involve using 'expert farmers' as facilitators/resource persons to demonstrate locally applicable, sustainable effective indigenous practices that enhance low-input and ecologically low-impact farming. Among the spectrum of targeted farmers (marginal ones, extremely resource poor, women, tenants, strangers/migrants, etc. who, for PLEC purposes are organized into farmer associations), there are some who are exceptionally knowledgeable in various areas of land and biodiversity management and, who, therefore, are designated 'experts'. The PLEC expert farmer approach permits cost effective demonstrations and peer assessment and tutoring activities. Such a process enables the farmers to forge close linkages among themselves and to learn from one another.

2. Relevant NGOs (Non-Governmental Organizations) and GOs (Governmental Organizations), especially the Extension Department of the Ministry of Agriculture, and the Departments of Environment and of Rural Development (acting through the District Assemblies, the decentralized government structure) as well as traditional administrative structures, notably the institution of chieftaincy, and also schools, will be involved in the demonstration activities, thereby enhancing the chances of continuing the dissemination of identified technologies beyond the life of the project. Many of the organizations referred to have extension services units and are adequately funded to take up direct dissemination of the best practices that are identified.

3. The targeted demonstration sites to be developed by building upon experiences from development of the pilot sites and by using expert farmers from those sites are described below. They are located in Ghana's three principal agroecological zones, namely humid forest, semi-humid forest-savanna transition and dry savanna, which are experiencing severe vegetation degradation, soil deterioration, habitat destruction and loss of endemic landraces (Fig.1). Outcomes expected from the planned project activities include not only minimization of these and other negative manifestations of human-induced environmental stress at the local level within the demonstration sites, but also provision of lessons for restoring and improving integrity of similar ecosystems that characterize other areas of West Africa and of the world as a whole.

Southern Ghana: Eastern Akyem - Upper Manya Krobo corridor of forest and forest-savanna mosaic (Fig. 2)

4. Much of Ghana's remaining natural floral and faunal diversity occurs in scattered relict forests. They include those of the Eastern Akyem (especially the Atewa range forest) agricultural districts, a catchment of the river Densu, which is a primary source of water for Accra, the national capital, and other settlements. Adjoining the humid Atewa forest in the southeast is northern Upper Manya Krobo, a watershed of Ghana's foremost river, the Volta. The natural ecosystem of this area, like that of much of the rest of the agricultural Upper Manya Krobo, is in transition from semi-humid forest to a mosaic of dry forest and savanna, a process accompanied by a massive erosion of natural biodiversity. Both sectors (Eastern Akyem and Upper Manya Krobo) are characterized by gentle undulating to strongly hilly topography rising from 198 m (650 ft) to 594 m (1950 ft), covered by forest ochrosols that are prone to moderate-to-severe sheet and gully erosion. Besides tributaries of river Densu, they are drained by Akrum, Osonson,

Ponpon and other streams that discharge into the Volta, Ghana's dominant water body. Climate is of the wet semi-equatorial type marked by 1,500 (60 in) - 1,650 (66 in) average annual rainfall, with the highest in the Atewa. In Eastern Akyem, much of the natural moist semi-deciduous forest remains. However, in Upper Manya Krobo, the forest is conspicuously in transition to savanna.

5. A way of correcting the growing human-induced ecological imbalance and associated soil erosion, lowering of productive capacity of land and threat to rural livelihoods, between Eastern Akyem and Upper Manya Krobo, is through creation of a corridor or set of corridors for enhanced ecological and human interactions between the two contrasting biophysical ecozones. By (a) adapting demonstrated agro-technologies developed in collaboration with expert farmers in the neighboring Sekesua-Osonson PLEC demonstration site, (b) developing new appropriate conservation and resource management systems, especially in collaboration with the neighboring national Plant Genetic Resources Centre, (c) using tested PLEC participatory methods, and (d) integrating watershed management strategies, the work at the demonstration site will develop a corridor to:

- enhance biodiversity;
- combat land degradation;
- secure the natural environment;
- reduce poverty by improving the agricultural production base and enhancing income generation especially from conservation-oriented activities; and,
- rehabilitate and protect the Densu and Volta river basins in furtherance of government policy plans.

In line with a PLEC strategy of facilitating farmer-led scientific demonstrations on a decentralized basis by tapping expertise of nearby scientists, work at the Eastern Akyem-Upper Manya Krobo corridor, as at Obodan, the other site in southern Ghana would, in a fundamental way, involve scientists from the neighbouring University of Ghana.

Southern Ghana: Obodan site (in semi-humid forest-savanna transition zone; Fig.3)

6. Ghana's agricultural policy seeks to promote the production of non-traditional exports such as pineapples. Obodan is the leading centre of export-oriented pineapple production in the country. It is located between Accra, the national capital, and urban Nsawam, in a catchment of river Densu in the southern sector of the semi-humid forest-savanna transition zone.

The topography is undulating, rises from 76 m (250 ft) to 137m (450 ft), and is covered by forest ochrosols, which are prone to moderate-to-severe sheet and gully erosion. Mainly Dobora, a tributary of the Densu, drains it. Average annual rainfall ranges between 1,000 mm (40 in) and 1,170 mm (47 in). As the leading commercial producer of pineapples, Obodan is a priority agricultural area in the government's drive to encourage non-traditional exports alongside the more traditional ones such as cocoa. The policy priority is evidenced by research on pineapples supported by government through the National Agricultural Research Project (NARP). Increasingly the pineapples are grown on a mono-cultural basis, at the expense of the more traditional crops, notably cassava, maize, vegetables and legumes. The practice undermines biodiversity. Other adverse effects include deforestation, soil erosion and agro-chemical pollution of the soils and water bodies. These problems may be overcome by biodiverse organic methods founded on agro-technologies and management systems adapted to local conditions. We propose to use Obodan site for upscaling agro-technologies developed by PLEC for agricultural production on a sustainable, biodiverse basis.

7.

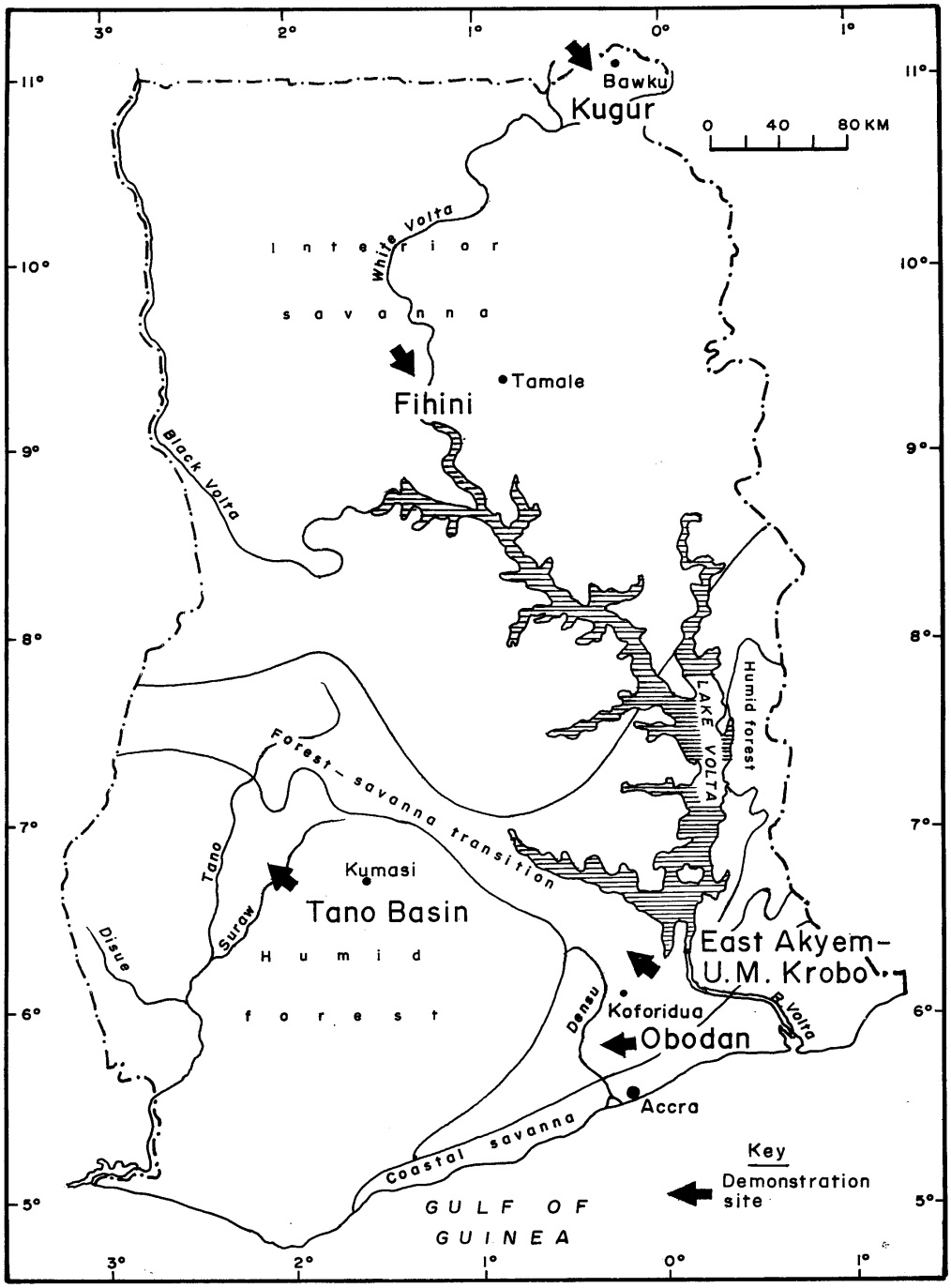


Fig. 1: Map of planned demonstration (project) sites

[Fig. 2: Sekesua/Osonson (Upper Manya Krobo) – Atewa range (Eastern Akyem) corridor: a potential PLEC study/demonstration] - *Separately forwarded*

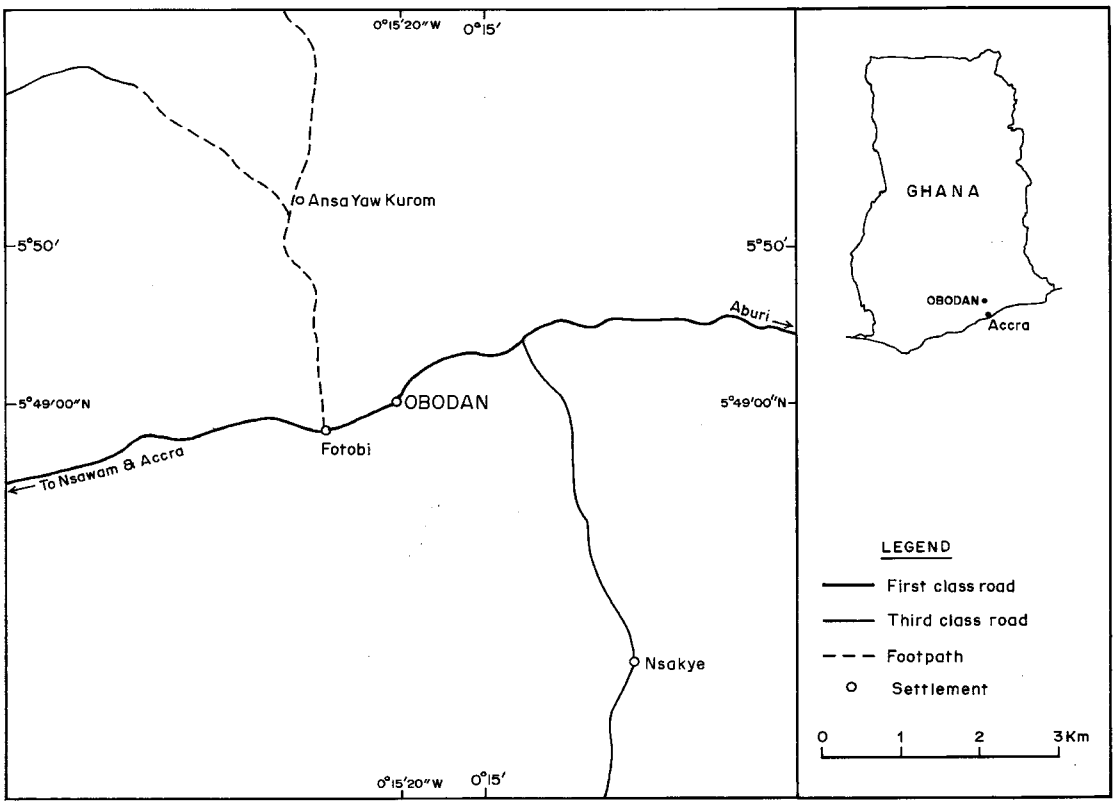


Fig. 3: Obodan area: a potential PLEC study/demonstration site

8. Appropriate soil management practices shall be demonstrated and further developed, as shall various systems of intercropping, agroforestry and mixed farming, to achieve a sounder agro-ecological environment for food security and sustainable rural livelihoods, and to support a special plan by the Ministry of Environment and Science that accords priority to rehabilitate this and other catchment areas of river Densu, a primary source of water for Accra, Nsawam and other neighbouring urban and rural settlements. Further, these planned activities offer an excellent opportunity to assess how communities in areas of growing monocultures and pressures of urban expansion may respond to innovative technologies that hold promise of enhancing ecological integrity through agrobiodiversity.

Central Ghana: Upper Tano River Basin (in humid forest zone)

9. The Upper Tano Basin lies within longitudes 1°50' East, and 20°45' West and latitude 5°55' and 7°40'. Rainfall is bimodal with amounts decreasing from about 1524 mm in the south to about 1270 mm in the north. The main wet season occurs in March to July with May and June as the wettest months. The rains are generally intensive and erosive. Temperature is high and fairly uniform throughout the year. Mean annual values vary little from 26°C. It is estimated that in 7 months out of 12, rainfall in is below potential evapotranspiration.

10. Vegetation is largely semi-deciduous forest. At present the natural forests are mainly confined to the periphery of the basin and serve the purpose of watershed protection for the Tano River and its major tributaries. Elsewhere the natural forest has been degraded by clearance for agriculture, charcoal production, timber logging and uncontrolled bushfires. The vegetation in the most degraded parts, especially northeast and west bordering the guinea savanna zone is transforming into a mosaic of forest and savanna.

11. The relief is strongly influenced by the geology. In general most of the basin consists of dissected hills with various degrees of steepness. The highest point reaches a height of 763 m above sea level on the Kwamisa hill. The soils in the basin are developed over sandstones mostly in the degraded northeastern section; phyllites, greywacke and tufts; biotite and hornblende granites and schists; superficial peneplain drifts; and greenstone granodiorites, amphibolites and dolerites. In addition, the soils are generally low in fertility. The fertility of the soils is therefore intimately linked with the topsoil organic matter, which presently has been depleted in most areas due to poor cultivation practices, bushfires and water erosion. The loss of organic matter has tended to make most of the soils highly erodible.

12. The Tano River is the second longest river in Ghana. It takes its source from the Voltaian sandstone hills near Techiman in the northeastern corner or the basin, and flows in southwesterly direction as far as Dadiesoaba. Thereafter it has a north-south flow till its exit into the lower Tano Basin. A number of the tributary rivers usually dry up during the dry season.

13. The major farming system is land rotation with fallow periods varying within wide limits depending on availability of land. The more important food crops include plantain, cocoyam, cassava, maize, rice, groundnuts and yams. Vegetables include pepper, tomato, and garden egg. Tree crops mainly grown in the southern portion of the basin include cocoa, coffee, oil palm and citrus. Domesticated animals include sheep, goats, pigs and chicken. Little attention is given to their feeding or management. Cattle rearing is limited, and is not a traditional occupation in the extreme northern grasslands of the basin, especially in the Techiman area.

14. The major forms of degradation in the basin include: deforestation, soil erosion and soil fertility decline.

15. Organizations currently working in the basin include Ministry of Food and Agriculture (MOFA), Ministry of Lands and Forestry and NGOs - such as the GTZ.

16. This humid area has been proposed by Government as a primary spatial unit for planning to combat desertification, because:

- the watershed is a natural unit for organizing information on water and material processes and movements in the landscape;
- the area is severely degraded by sheet and gully erosion;
- it has one of the highest population densities in Ghana;
- desertification is increasing there; and,

- the basin covers three major administrative regions, namely Ashanti, Brong-Ahafo and Western.

17. The loss of much of the forest cover and its biodiversity by inappropriate farming practices and other human uses and a consequential increase in evapotranspiration and water run-off, underscores a need for a programmed basin rehabilitation based upon ecologically sound management principles of the kind developed by previous PLEC work, to protect the natural basis of farming, stimulate rural development and ensure water supply for the large number of settlements notably Sunyani, capital of Brong-Ahafo Region, and Techiman, probably the leading rural market centre in Ghana. Scientists from the neighbouring Kwame Nkrumah University of Science and Technology would facilitate the work.

Northern Ghana: Fihini site (in semi-arid savanna zone)

18. Fihini site is located near Bongnayili-Dugu-Song, a pilot PLEC demonstration site in Tolon/Kumbungu district in the basin of the White river Volta in the semi-arid guinea savanna zone. The predominantly farming population is estimated at approximately 1,000. A major characteristic of this rural agro-pastoral area is low and erratic rainfall with all its negative implications for both crop and livestock farming. The cattle population is estimated at around 500. A mounting threat to the farming, the primary source of livelihood, is land degradation and loss of species diversity, which are exacerbated by nomadism. Mainly extensive gully and overland erosion and dwindling tree cover, wildlife, and crop genetic diversity manifest the land degradation. Principally anthropogenic forces, above all bush fire, monocropping, overfarming and overgrazing, and winning of sand and gravel drive it together with the biodiversity reduction. We propose to meet the threat by an ecologically based watershed management strategy combined with biodiverse farming practices. These activities will secure the natural ecological base and sustainably improve yields, and also prevent siltation of rivers and artificial dugouts that serve as water sources for humans and livestock alike. They would be enhanced by consolidating existing PLEC collaboration with the national Savanna Resources Management Project (SRMP) particularly through interchange of experience and joint activities. Scientists from the neighbouring University for Development Studies and the CSIR Savanna Agricultural Research Institute would facilitate work at Fihini and Kugur, the other site in northern Ghana.

Northern Ghana: Kugur site (in semi-arid savanna zone)

19. Kugur site is located in the upper reaches of the watershed of the White Volta River within the Sudan savanna ecological zone in the Upper East Region (UER). UER is Ghana's economically most impoverished administrative region. It features the following:

- the country's poorest soils;
- most degraded lands;
- highest desertification incidence;
- highest rural population density;
- outward migration rate;
- low and erratic rainfall; and,
- poor accessibility to schools, which accounts for the high illiteracy rate.

20. There are some 2387 inhabitants, distributed among 250 households in seven communities. Crop-farming and livestock farming are their main occupation.

21. Major crops are sorghum and millet for subsistence during the short single rainfalls season, and onions grown on an intensive basis for cash by irrigation in the dry season. Livestock, especially cattle, goats, sheep and fowls feature significantly. Low incomes are related fundamentally to low farm yields. Around Kugur are the Gambaga highlands. They are

characterised by agriculturally unfavourable scarps and rock outcrops having significant remnants of the original wooded savanna vegetation cover, which provides ideal baseline conditions for assessing impact of the planned human activities focused on development of:

- appropriate soil management practices for rainfed farming;
- irrigated agriculture practised by onion farmers, with a special aim of determining the rate of pollution and effect of the irrigated farming on the environment, an issue, which has not been investigated before;
- appropriate agroecological practices to minimize land degradation, improve soils, the quantum and diversity of flora, enhance farm yields and incomes and, in these ways, trigger off sustainable improvements in rural livelihoods

22. Kugur site is located within the larger site of the planned cross-border project, 'Improved Soil Fertility, Carbon Sequestration, Conservation of Agrobiodiversity and River Basin Recharge in the Volta Basin', which is in formulation with involvement of governments of Burkina Faso, Ghana and Togo for possible funding by GEF (IFDC-Africa, 2002). Activities planned for Kugur under PLEC-Ghana auspices and for the larger Volta basin under the cross-border project have much in common, hence our aim to encourage synergies, particularly those of a methodological character, by sharing experiences between the two projects

Annex 10: PLEC-Ghana achievements

Box 1: Overview

1. PLEC stands for 'People, Land Management and *Ecosystem Conservation* (*Environmental Change*, until recently)'. It is an international project conceived by the United Nations University (UNU).

2. Through participatory approaches that draw on farmer knowledge, PLEC seeks to develop optimal methods of conserving resources, above all, biodiversity and the supportive land, by sustainable management practices in the tropics, where those resources are under the most imminent threat.

3. In Ghana PLEC work started in 1993 with a pilot study of environmental changes and farmers reactions to them. The study resulted in publications and creation of contacts with farmers and other stakeholders for the further work.

4. Subsequently, work became more demonstrative and applied with a focus on agrodiversity conservation through a participatory approach led by farmers with support of scientists. A major output is establishment of five principal agrodiversity demonstration sites and two subsidiary ones, managed by farmer associations that serve as a medium for:
   - farmer - scientists interactions and collaborative work;
   - farmer - to - farmer interactions including exchange of knowledge and germ-plasm;
   - reaching out to farmers and sensitizing them to issues of conservation and development;
   - mobilizing the latent knowledge, energy and other resources of farmers for the purpose of conservation and development;
   - tapping or accessing external support for farmers;
   - carrying out demonstrations; and, in general, empowering farmers politically, socially and economically.

5. Through the farmer associations PLEC interventions have achieved the following:
   - scientific insights into plant-biodiversity through collaborative work by scientists and farmer expert ethno-botanists;
   - identification of traditional farm management practices that favour biodiversity and land conservation (Box 2 below); and
   - promotion of usage of the practices identified as favouring biodiversity, and of other modes of conservation.

6. As a result of the conservation promotion drive, mulching with chopped vegetation in a practice called *oprowka* (*proka*), which avoids ecologically destructive burning, is on the increase, as are the following practices:
   - management of assorted yams within agroforestry systems;
   - usage of forests conserved nearby for beekeeping, honey and wax;
   - establishment of woodlots and plant nurseries which yield poles, firewood and seedlings in commercial quantities;
   - conservation and production of local varieties of rare domestic fowls and rice, *Oryza glaberrima,* on a commercial scale;
   - management of medicinal plants within conserved forest or arboretum;
   - growing of foodcrops among trees conserved *in situ* in farms;
   - propagation of plantain and certain other crops through the split-corm techniques; and,
   - grafting and building of plants.

7. Because of the commercial orientation of these and other conservation practices encouraged

by PLEC, rural livelihoods and incomes are being improved. The process is encouraged by enthusiastic response of farmers to other value addition or income generating activities, notably the following, which are promoted by PLEC to motivate farmers to conserve:

- processing of cassava, a primary cash crop, into flour for bread and pastry, which involves a sizeable number of females;
- spinning and weaving of cotton, another important cash crop, into cloth by youthful women, which is helping to curb rural out-migration;
- raising of snails, a delicacy in some of the demonstration sites; and,
- piggery, introduced as the nucleus of a swine dispersal project.

8. Enrichment of biodiversity through PLEC interventions, above all those focused on promotion of agrodiversity and related activities, is manifested, among other things, by:
   - an apparent increased plant pollination and utilization of nectar by bees kept in home gardens and forests conserved nearby;
   - conservation and development of arboreta harboring various species of medicinal plants;
   - production of rare types of yam, *Dioscorea*, within agroforestry system;
   - integration of citrus and oil palms into traditional systems of food cropping;
   - development, by a local farmer, of an unique system of crop management based on a combination of traditional modern practices that has become a model because of its biodiverse character and high productivity;
   - regeneration of deforested areas;
   - a revival of the traditional agroforestry practice of growing crops alongside trees conserved *in situ* within farms; and,
   - increased number of biodiverse school gardens.

9. By successfully bringing together scientists from various disciplines into a functional research team, PLEC-Ghana demonstrates efficiency of an interdisciplinary methodology.

10. By sustainably teaming up scientists from Legon (University of Ghana) and two other Universities (KNUST and UDS) in Ghana, the project demonstrates the feasibility of generating positive research synergies through institutional collaboration by networking.

11. Above all, is the successful integration of farmers into PLEC, especially through farmer associations, in recognition of farmer resource management knowledge. The success suggests that this kind of integration is a possible strategy of mainstreaming indigenous resource management knowledge.

12. An external post-project review notes with satisfaction, acceptance of the PLEC approach by both farmers and scientists, and views with optimism the prospects of acceptance by policy makers in Ghana.

13. In another review of PLEC performance at the global level, the view is expressed that:

    > "A continuation of PLEC into the next phase offers the promise of radically reforming agriculture and landscapes in 'marginal areas' to nurture ecologically and socially sustainable agricultural systems that create a landscape that in turn supports the conservation of biodiversity".

Box 2: Traditional farm management practices identified in initial PLEC studies as favouring biodiversity and integrity of the land and ecosystem in Ghana	
PRACTICE	**MAJOR ADVANTAGE**
1. Minimal tillage and controlled use of fire for vegetation clearance	Minimal disturbance of soil and biota
2. Mixed cropping, crop rotation and mixed farming	Maximize soil nutrient usage, maintain crop biodiversity; spread risk of complete crop loss; enhance a diversity of food types and nutrition; favour soil regeneration.
3. Traditional agroforestry: cultivating crops among trees left *in-situ*	Conserves trees; regenerates soil fertility through biomass litter. Some trees add to production capacity of soil by nitrogen fixation
4. *Oprowka* a no-burn farming practice that involves mulching by leaving slashed vegetation to decompose *in-situ*	Maintains soil fertility by conserving and stimulating microbes and by humus addition through the decomposing vegetation; conserves plant propagates including those in the soil by avoidance for fire
5. Bush fallow/land rotation	A means of regenerating soil fertility and conserving plants in the wild
6. Home gardening	Conserves a diversity of plants including medicinal ones and those used for food
7. Usage of household refuse and manure in home gardens and compound farms	Sustains soil fertility for a diversity of crops
8. Use of *nyabatso*, *Neubouldia laevis* as livestake for yams	The basically vertical rooting system of *nyabatso* favours expansion of yam tubers, while the canopy provides shade and the leaf litter mulch and humus. It, also, is suspected that *nyabatso* fixes nitrogen
9. Staggered harvesting of crops	Ensures seed stock and food availability
10. Storage of crops notably yams, *in-situ*, in the soil for future harvesting	Secures seed stock and enhances food security

Annex 11: Information on partner institutions

Box 1: Information on project proposer

1. The main proposer of this project is a network of institutes and scientists. Members were closely involved in the proposal development and contributed to the project formulation workshop in Ghana in September 2002, as well as to the subsequent revision of the initial formulation. The leading institution is the University of Ghana.

Box 2: University of Ghana, Legon

(To oversee southern Ghana demonstration sites, and co- ordinate project countrywide).
Overall National Project Co-ordinator and, also, Team Leader, southern Ghana work component: Professor Edwin A. Gyasi, Department of Geography and Resource Development, University of Ghana, Legon
History and Mandate: Ghana's premier and largest university, was created in 1961 from the University College of the Gold Coast (now Ghana) established in 1948 for the purpose of providing for and promoting university education, learning and researching, and to train local professionals through a liberal arts oriented programme under supervision of the University of London. Since then, the University has placed increasing emphasis on science-oriented teaching and research. The institution comprises 5 Faculties, 5 Institutes, 5 schools, over 40 Departments, and various other teaching and research units, involving over 17,000 undergraduate and postgraduate students. The 1992 Strategic Plan's vision of the University by the year 2000 and beyond, is 'a centre of excellence in research, teaching and delivery of extension services and a world-class institution of higher learning having a unique appeal to students and scholars world-wide in search of Africa's creative and innovative approach to scholarship'. Research work is increasingly development-oriented and carried out on an interdisciplinary and consultancy basis. The focus is on science and technology, food security, human health, population dynamics, natural resources conservation, environmental management, and outreach activities.
Personnel and Funding: There are 646 academic staff and 3,440 support staff. In 2002, the budget was over US$ 17 million, out of which $7.4 million was donor-assisted. Major donors include the World Bank; USAID; UNDP; NARP; DANIDA; UNICEF; ADB (African Development Bank) and VALCO (Volta Aluminum Co.).
Project Experience: The University of Ghana has led the West African cluster of the GEF-funded PLEC project, as well as a wide range of other donor-funded initiatives. UN institutions with which the University conducts projects include: UNU/INRA (United Nations University Institute for Natural Resources in Africa); UN/RIPS (United Nations Regional Institute of Population Studies); UNICEF; WHO; UNFPA and UNU/PLEC, including a major involvement with UNU since 1993. The University established in 1989 a Consultancy Centre to mobilize its skills and human resources. A Management Committee responsible to the Vice-Chancellor controls it. Among the wide variety of research projects administered through the Centre are those funded by GEF; UNDP; USAID; UNESCO; World Bank; Enterprise Programme of New York; Ghana Commercial Bank; and Ghana's Lever Brothers and Volta River Authority. Others include those funded by/through: FAO; IDRC; UNFPA; UNU; DANIDA; NUFU; Stockholm Environment Institute; and Ghana's Mineral Commission. Individual funds up to more than US$600,000 are managed with independent monitoring and auditing. It is through the Centre that funds for PLEC activities in West Africa have been administered since 1993. Besides serving as the overall central co-ordinating node, the University of Ghana shall hold primary responsibility for managing the southern Ghana component of the proposed project.
Box 3:An additional five executing agencies are proposed to cover both geographical and thematic aspects of the project:

1. **Institute of Renewable Natural Resource (IRNR)**, Kwame Nkrumah University of Science and Technology (KNUST - to oversee central Ghana demonstration site).

Project Co-ordinator and Team Leader, central Ghana work component: Dr. William Oduro, Senior Lecturer and Director, IRNR

History and Mandate: The IRNR was established in 1982 to train middle and higher-level manpower for the management of the country's renewable natural resources. It offers degree programmes in Silviculture and Forest Management, Fisheries and Watershed Management, Wildlife and Range Management, Wood Science and Technology, and Agroforestry. INRA is the leading national institution for higher-level training in renewable natural resources management. The vision of IRNR as embodied in its 'Strategic Plan 2K10' is to be internationally recognized as a lead institution in Africa for higher education, entrepreneurship training and research in renewable natural resources; and producing high calibre graduates to promote sustainable management and utilization of natural resources for development in Ghana and Africa. A basic mission is to promote through teaching, research and dissemination of information, the proper management and sustainable utilization of biological diversity, forests, savannas, wildlife, fisheries, and watersheds for industrial and socio-economic development of Ghana.

Personnel and Funding: There are 32 academic staff and 50 support staff. The academic staff is involved in various national and internationally supported programmes within and outside Ghana. Ghana Government subvention received for 2002 is approximately $25,000. Major donors include the World Bank, the UK Department for International Development, International Tropical Timber Organization, Canadian International Development Agency, Netherlands Government and Danish Government.

Project Experience: The IRNR co-ordinates the central Ghana component of PLEC. It hosts the Centre for Biodiversity Utilization and Development (CBUD), Kumasi Information GIS/Remote Sensing (KUMINFO/PERI-URBAN) project, and the Canada In Concert Programme, and is Ghana's scientific authority for the Convention for International Trade In Endangered Species (CITES). It maintains strong collaborative links with both local and international bodies, notably District Assemblies, research institutions (e.g. Savanna Agricultural Research Institute - SARI), NGOs (e.g. World Vision International), Ministry of Land and Forestry; Forestry Commission, Lakehead University, Natural Resources Institute (NRI-UK), the International Centre for Research in Agroforestry (ICRAF), University of Guelph, Canadian International Development Agency (CIDA) and the International Tropical Timber Organization (ITTO).

2. **University for Development Studies (UDS), Tamale** (to oversee northern Ghana demonstration sites).

Project Co-ordinator and Team Leader, northern Ghana work component: Ms. Gordana Kranjac-Berisavljevic, Senior Lecturer, Department of Agricultural Mechanisation and Irrigation Technology, UDS

History and Mandate: The UDS is situated in the interior savanna ecological zone, which has Ghana's largest rural population, severest land degradation, lowest income, and highest out-migration. It was established in 1992 to: provide higher education to all persons suitably qualified and capable of benefiting from such education; undertake research and promote the advancement and dissemination of knowledge and its application to the needs and aspirations of the people of Ghana; and blend the academic world with that of the community in order to provide constructive interaction between the two for the total development of northern Ghana in particular and the country as a whole. It has three campuses, one each in the Upper East Region, Upper West and Northern. Curricula emphasize management of natural resources, food security, and participatory rural development. The vision of UDS as embodied in the 2002 UDS Strategic Plan is to be an internationally recognized center of excellence for the promotion of practically oriented, community based, problem solving knowledge and skills through interactive teaching, learning, research and extension for sustainable and equitable socio-economic transformation of deprived communities.

Personnel: There are some 70 lecturers and 1795 students.

Project Experience: UDS staff are involved in World Bank-sponsored AGSSIP projects, and in DFID-sponsored projects on '*Rethinking Natural Resource Degradation in Sub-Saharan Africa:*

Policies to support Sustainable Soil Fertility Management, Soil and Water Conservation among the Resource-poor Farmers in Semi-Arid Areas'. Besides, UDS staff played a key role in the successful execution of the northern Ghana component of the maiden PLEC work in Ghana.

3. **Council for Scientific and Industrial Research (CSIR -** to play a leading role in trials and demonstrations)

The CSIR's mission is "*To generate and apply innovative technologies which efficiently and effectively exploit science and technology for socio-economic development in critical areas of agriculture, industry, health and environment and improve scientific culture of the civil society*". It encourages and co-ordinates scientific and technical research in the country. It advises government on scientific policies. Towards these ends, the CSIR maintains a network of relevant research institutes e.g. Soils Research Institute (SRI), Savanna Agricultural Research Institute (SARI) and the Plant Genetic Resources Centre (PGRC), to which this project proposal relates. The official vision is for the CSIR "To become a centre of excellence in research and development by generating technologies that are responsive to demands of the private sector and socio-economic development". The CSIR Acting Director-General and one of its Deputy Director-Generals helped design this project at the scientific stakeholders meeting held in September 2002.

4. **United Nations University Institute for Natural Resources in Africa (UNU/INRA -** to play a leading role in human capacity development**)**

(Located at the University of Ghana, Legon)
A brainchild of the Organization of Africa Union (OAU), now the African Union (AU), the mission of UNU/INRA is, "*to strengthen the capacity of Africa's existing universities and research institutions to conduct research and produce well-trained, well-equipped and motivated individuals capable of developing, adapting and disseminating technologies that promote conservation and efficient use of the continent's natural resources for sustainable development*." The strategic focus is to:
a) advance food security by challenging African scientists to collaborate with UNU/INRA to:

- validate and disseminate the indigenous knowledge of African farmers, herders and forest dwellers;
- add value to Africa's primary products through applied science and technology; and,
- focus on education and training of young scientists in cutting edge science;

b) link natural resource knowledge to policy formulation, problem-solving and long-term planning processes by creating public awareness of critical policy issues related to the effective conservation, management and use of Africa's natural resources; and,
c) emphasize the critical role played by African women in the conservation and management of natural resources and highlight policies and interventions that minimize gender inequalities.

Annex 12: Government OFP endorsement letter (separate file)

Annex 13: Co-finance confirmation letters (separate file; list as below)

1. Heifer International
2. United Nations University
3. Ministry of Environment, Science and Technology
4. Environmental Protection Agency
5. Ministry of Agriculture
6. Ministry of Lands and Forestry
7. CERSGIS
8. ECOLAB
9. IPGRI
10. CSIR
11. IRNR
12. UDS
13. UNU-INRA
14. UG-Southern Ghana
15. UNU-INRA, 10 February 2004
16. Ministry of Environment and Science, 21 January 2004, addressed to UNDP
17. Ministry of Environment and Science, 21 January 2004, addressed to CIDA

Annex 14: Expressions of interest for leveraging co-financing during MSP implementation (separate file; list below)

1. USAID
2. Canadian Embassy
3. IPGRI