INTERNATIONAL TROPICAL TIMBER ORGANIZATION

ITTO

PROJECT DOCUMENT

TITLE	PHASE II OF ITTO PROJECT [PD 30/97 Rev.6 (F)] MANAGEMENT OF FORESTS ESTABLISHED THROUGH REHABILITATION OF DEGRADED FORESTS BY LOCAL COMMUNITIES IN GHANA
SERIAL NUMBER	PD 530/08 Rev.3 (F)
COMMITTEE	REFORESTATION AND FOREST MANAGEMENT
SUBMITTED BY	GOVERNMENT OF GHANA
ORIGINAL LANGUAGE	ENGLISH

SUMMARY

All the vegetation types in Ghana, except for those comprising the savanna, are considered tropical forests and play very important role in supporting the livelihood of 21 million Ghanaians and the rural communities as a whole. However, the combined effect of over-exploitation of forest resources, unsustainable farming practices, wildland fires and mining activities have significantly reduced the forest area and degraded most of the reserved forests and the forests outside reserves. The density of many important timber species is now low in these forests, sometimes less than one commercial tree per ten hectares in the "primary" forests. The continuing forest loss threatens the existence of the indigenous tree species and associated biodiversity through habitat loss and accelerated soil erosion, thus affecting the agricultural productivity on which the livelihoods of rural people depend. Sustaining the diversity of the tree species and the value of the natural forest is a matter of increasing concern not only for Ghana but for the entire West Africa region.

The project aims at contributing to rural livelihood by improving benefits from forests established by local communities through rehabilitation of degraded forests. Through a participatory approach, the specific objective is to develop models, identify strategies and use them for management of forests established by local communities through the rehabilitation of degraded lands leading to enhance conservation, provision of goods and services and also determine mechanisms for payment of the services to ensure improved livelihood of local communities.

EXECUTING AGENCY	Forestry Research Institute of Ghana (FORIG)
COOPERATING AGENCIES	Faculty of Renewable Natural Resources of Kwame Nkrumah University of Science and Technology (FRNR/KNUST) Forest Services Division of Ghana Forestry Commission (FSD/GFC)
DURATION	36 MONTHS
APPROXIMATE STARTING DATE	TO BE DETERMINED

BUDGET AND PROPOSED SOURCES OF FINANCE

Source	Contribution in US$	Local Currency Equivalent
ITTO	**569,665**	
Government of Ghana	72,869	(In kind)
TOTAL	**642,534**	

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PROJECT BRIEF

ITTO project PD 30/97 REV 6 (F) was implemented by the Forestry Research Institute of Ghana. By this project local communities established 240 ha of plantations to rehabilitate some of the degraded forests using agroforestry and block plantation systems. However by current regulations passed by the Ghanaian parliament, the farmers who planted the trees and the local communities who are the landowners are entitled to 40% of the area planted. Unfortunately these forests have never been sustainably and collaboratively managed to be of benefit to local communities of any generation since the completion of the project. This was presumably due to

(i) there is no coordination between Forest Service Division of the Forestry Commission, who have the mandate to manage all forest estates in Ghana, the traditional authorities and local communities of the areas where the planted forests are sited
(ii) lack of consensus on management options and strategies because the different stakeholders have different objectives for management
(iii) lack of interest in management by the local communities due to unavailability of many NTFP-producing species, lack of income from timber and non timber species as well as unforeseen payment of the environmental services including the carbon stock.

The effect is that illegal exploitation has started in the planted forests and this will cause forest degradation, damaging the resources that sustain the livelihoods of forest-dependent communities and thus reducing communities' expectation that the forest will contribute to the improvement of their livelihood.

The developmental objective of this project is for forests established by local communities through rehabilitation of degraded forests become one of the major sources of livelihood and improving landscape. Impact indicators are:

i. Benefits from planted forests established by local communities contribute 20% of income forest fringe communities
ii. Improvement of landscapes through rehabilitation of degraded forests increases by 30%

The specific objective is to collaboratively and sustainably manage with local communities forests established by rehabilitating degraded forests. The outcome indicators are:

a) Management options and strategies identified 6 months after project inception
b) Management plans for the planted forests available by 2011
c) Sustainable Management process established for planted forests by 2011.

The major project beneficiaries are the local communities who did the rehabilitation and are now owning forty percent (40%) of the forest they established, the traditional authorities in the project areas who customarily are responsible for all land issues, the illegal tree harvesters who are taking advantage of un-management to harvest the trees for illegal production of lumber, the Forest Services Division who are legally mandated to be responsible for all forest estates. The expected outcomes of this project include management plan for each planted forest to ensure sustainable management; reports on activities implemented from the plans and results achieved to meet the objectives of the plan. The capacity of about sixty (60) community members would have been built in sustainable forest management, production of planting materials, planting techniques, determination of stock of carbon in trees and other vegetation, the calculation of financial valuation of trees before legal exploitation size, as well as environmental services provided by the forests. There will also be reports indicating the type of training organized, the period it was organized, the duration of the training. There will also be reports on nursery and field planting activities which will indicate the number and type of species produced from the nursery, area that was planted on the field, the survival as well as the growth rates of the planted species. Also to be available are documents on the opportunities and challenges facing implementation of PES in project areas and equitable benefit sharing mechanism for instituting PES. Finally there will be reports on the quarterly meetings of the stakeholders and decisions that were arrived at. The main outputs which will lead to these outcomes are : Management options and strategies identified and implemented by stakeholders: The diversity and density of indigenous timber species and NTFPs in plantations increased; Financial value of timber trees before final rotation and environmental services including carbon stocks determined; and feasibility of designing and implementing PES scheme for communities in planted forests

areas determined.The project will be implemented using Knowledge-Empowerment-Governance (KEG) approach: The approach will be as follows:

Start up workshop

There will be a startup workshop where all relevant stakeholders with special emphasis on local communities including women will be briefed about the project. The stakeholders will be requested to make contribution to the project planning and implementation. Roles and responsibilities of stakeholders will be determined and monitoring mechanisms will be established. Periodic meetings will be organized to evaluate the progress of work. Gender and special community group representation will also be identified. Institutional roles and responsibilities as well as resource mobilization will also be identified and detailed out in a Memorandum of Understanding (MOU). All studies and surveys to be carried out will be of reasonable magnitude so as to provide data that will contribute to community based forest management.

The project will increase also the knowledge and understanding on issues that will contribute to community based forest management. Thus capacity building programmes will be made on : Options and Strategies for forest management, preparation and implementation of management plans, Seedling production of selected species, Methodology for calculation of financial values of timber trees before reaching legal size for exploitation and ecosystem services .Studies will also be made on Opportunities and Challenges for PES. The studies will be conducted using desk studies to identify existing literature, and using PAR methodology (administering questionnaires and having focus group discussions with stakeholders.

The capacity building programmes conducted will empower local communities to manage their forest, increase the diversity and density that they have need for, calculate financial values of timber trees before they have reached final exploitation size and also of environmental services including carbon stock. A manual on the community based forest management will also be produced. This will serve as reference for local communities and other stakeholders in the implementation of community based forest management after the project implementation. The improvement of the capacities of the stakeholders especially the local communities and the provision of reference in the form of the manual will contribute to institutionalizing of the practice within local communities.

The project will determine from the communities a governance structure which will supervise the management of the forest as well as supervise the distribution any revenue the forest will generate in future through PRA. This will be validated with all the members of the community and the communities will institutionalize this at any time that it becomes necessary.

To ensure sustainability of management strategies identified and implemented under the project, community-focussed management would be the foundation upon which the project team's approach in dealing with the communities in the project area would be built. The development of a high level of community involvement and organisation will be an overall objective that will be taken into consideration at all stages of the project cycle. Achieving environmental stability and sustainable provision of environmental services are of prime essence to Ghana. Additionally, the following measures will be pursued to ensure sustainability of the outcomes and outputs of the project after ITTO funding has expired:

- Incorporate the project into the national programme on poverty reduction and economic growth. Thus the project can be presented as an innovative model to complement existing efforts on collaborative forest management being pursued by the Forestry Commission,
- Ensure that the activities are mainstreamed into the yearly plan of action of the Forestry Services Division of the Forestry Commission. This will ensure that the activities are budgeted for an implemented in their plan of operations
- Incorporate the programme in the Environmental Plan of the District Assemblies so that the assembly can budget for it and also ensure that it is implemented. Already, the District Assemblies and the Unit Committees are enthusiastic in getting their areas benefit from the emerging carbon market.
- This project recognizes that building on and enhancing community-based forest management is essential to efficiently prevent and/or monitor deforestation and degradation. Already, Community Forest Committes (CFCs) are established in all the project areas the area. These are community-led with structures in the communities. This project will work closely with the CFCs and ensure gradual integration of the project activities into the activities of the CFCs.

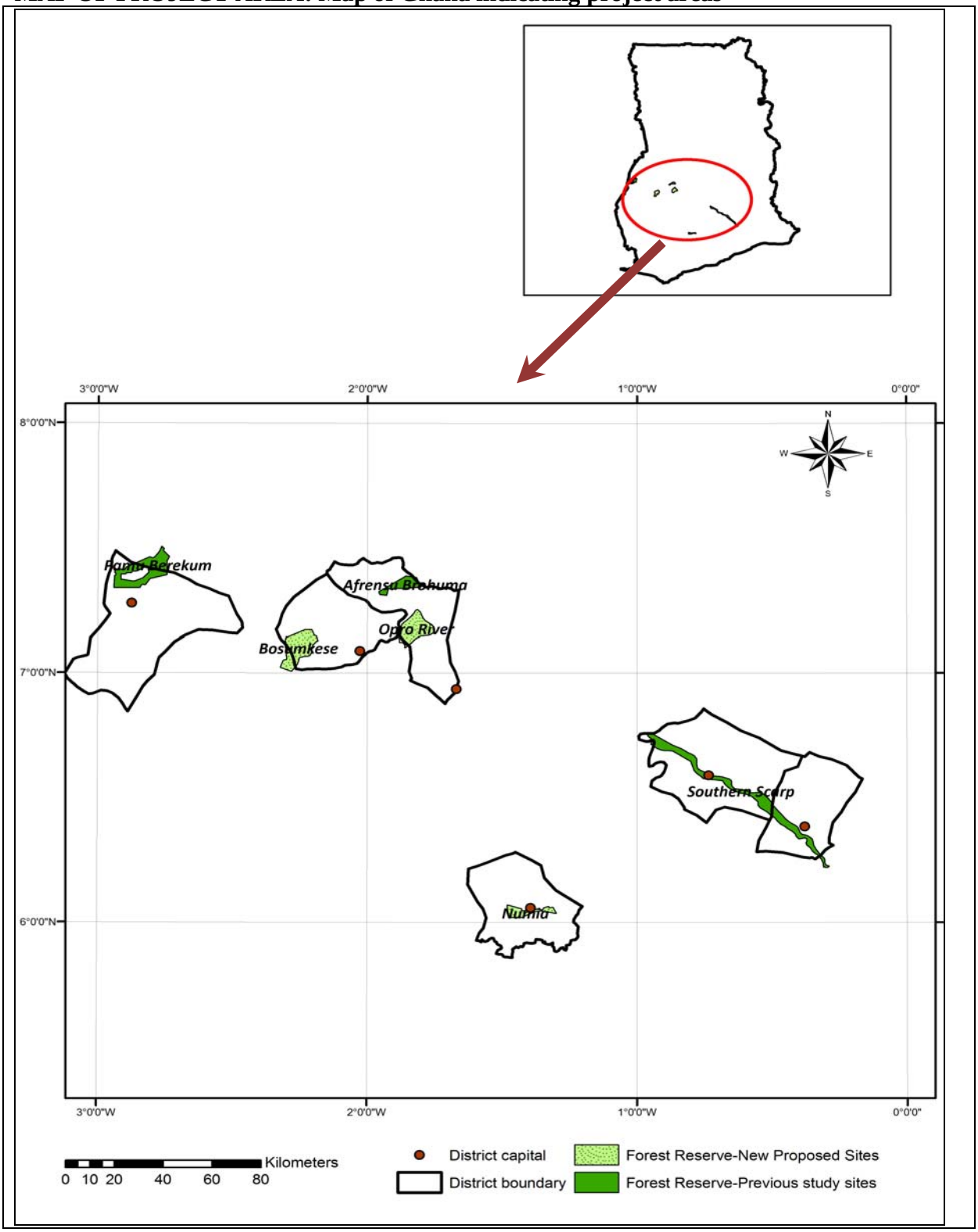
FORIG will continue to use the area as a research site for long-term studies on forest carbon accounting; assessment and monitoring of land use changes; forest resources modelling and other relevant

researchable issues.The project has the objective of empowering local communities to participate in the management and governance of the planted forests to achieve its prime aim of increasing provision of goods and environmental services. Thus major stakeholders in this regard are the local communities and the officials of Forest Services Division who are currently responsible for forest resources in Ghana. However may be due to technical arrogance on the part of administrators and misunderstanding on the part of the local communities there may be conflict between these two major stakeholders especially as concerned with the utilization of goods and services. This conflict if not minimized will demotivate the local communities and thus prevent them from the project activities. To minimize the risks the following action will be taken: Determination of potential risks and actions to mitigate these through participatory consultation with all stakeholders,Development of conflict resolution mechanism between the stakeholders,Empower local communities in the implementation of the mechanism ,Scale up dissemination of good lessons learnt in the implementation of project to the wider community outside the project areas. The total budget for this project will be $642,534. ITTO will contribute $569,665 . Of ITTO amount $94,400 will bent on capital items and personnel cost will be $147,550. The Government of Ghana will contribute $72,869

LIST OF ABBREVIATIONS AND ACRONYMS

FM	-	Sustainable Forest Management
PES	-	Payment for environmental services
GPRSP	-	Ghana Poverty Reduction Strategy Project
FSDP	-	Forest Sector Development Programme
NRMP	-	Natural Resources Management Programme
PADP	-	Protected Area Development Programme
FORUM	-	Forest Protection and Resource Use Management Project
WMTZ	-	Wildfire Management in the Transition Zone
DFID	-	Department of International Development
GTZ	-	German Technical Corporation
NTFPs	-	Non-Timber Forest Products
REDD	-	Reduction of Emission from Deforestation and Degradation
DSFZ	-	Dry semi-deciduous Fire Zone
MSSE	-	Moist Semi-Deciduous Southeast
PRA	-	Participatory Rural Appraisal
HFZ	-	High Forest Zones
IUCN	-	International Union of Conservation of Nature
DSA	-	Daily Subsistence Allowance
FSD	-	Forestry Service Division
WWF	-	World Wide Fund
FAO	-	Food and Agricultural Organisation
ITTO	-	International Tropical Timber Organization
AAS	-	African Academy of Sciences
AFORNET	-	African Forestry Research Network
FPRI	-	Forest Products Research Institute
IFS	-	International Foundation for Science
PADP	-	Protected Area Development Programme
RIS	-	Rural infrastructure services

MAP OF PROJECT AREA: Map of Ghana indicating project areas



1 PART 1: PROJECT CONTEXT

1.1 Origin

This proposal is an extension or phase 2 of the project proposal PD ITTO Project (PD 30/97 Rev 6 (F) on Rehabilitation of degraded forests with collaboration of local communities. This phase originated from (i) report of consultants of the ex-post evaluation which reported as follows that there was need for management of the areas planted, and local people requested for extension of the project and there was the need to replicate the project in other areas (Annex C) ii (consultant report of Prof Olavi which asked that there should be second phase to look at successional development of plantations into plantations Annex D. (2) In a survey undertaken by the project team for ITTO immediately after the project, the local communities requested for an extension of the project because they had seen how beneficial it was. Thus this proposal is to address these requests made.

1.2 Relevance

1.2.1 Conformity with ITTO's objectives and priorities

The following tables demonstrate how the project contributes to the Tropical Timber Framework.

Compliance with ITTA 1994 Objectives
The project complies with the following objectives, as set forth in the International Tropical Timber Agreement (ITTA, 1994), *Article 1*:

	Definition	How the project addresses the objective
(c)	To contribute to the process of sustainable development.	The project contributes to the sustainability of Ghanaian forests by managing restored degraded forest landscapes thus contributing positively to their productivity and biodiversity.
(f)	To promote and support research and development with a view to improving forest management and efficiency of wood utilization as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical forests.	The project has various research components, which aim at producing information for maximising productivity of restored degraded forest landscapes as well as improving livelihood methods for local communities.
(j)	To encourage members to support and develop industrial tropical timber reforestation and forest management activities as well as rehabilitation of degraded forest land, with due regard for the interests of local communities dependent on forest resources.	The project focuses on managing restored of degraded forest landscapes as well extending restoration of the degraded landscapes with local community collaboration to ensure that their interests are served
(i)	To encourage members to develop national policies aimed at sustainable utilization and conservation of timer producing forests and their genetic resources and at maintaining the ecological balance in the regions concerned, in the context of tropical timber trade.	The project will together with the earlier phase demonstrate the linkages between rural activities and rehabilitation of degraded forest landscapes and identify the gaps in current legislation (policy) providing important information for decision makers and encourage revision of current national policy on restoration programmes, though not working directly on legislation at the national level.

The project is in harmony with the project activities: reforestation and forest management, of the organization as stated in *Article 25.1* of the agreement. Further, it will contribute to the following functions of The Committee of Reforestation and Forest Management as stated in *Article 27*:

	Definition	How the project addresses the objective
(b)	Encourage the increase of technical assistance and transfer of technology in the fields of reforestation and forest management to developing countries.	The project has various research components where silviculturists, economists and sociologists, and forest ecologists will provide input to the project beneficiaries.
(e)	Facilitate the transfer of knowledge in the field of reforestation and forest management with the assistance of competent organizations.	The participating local organizations (FORIG, Forest services Division and KNUST) have comprehensive experience in both reforestation and forest management in Ghana. Their participation in the project will ensure that the knowledge is transferred to the community level.

As well as the following function of The Committee on Forest Industry:

	Definition	How the project addresses the objective
(a)	Human resources development and training.	The project has a strong component on human resources development and training.

Additionally, the project will contribute to ITTO's work in relation to statistics, studies and information as stated in *Article 29* by generating new knowledge in relation to communities and restoration of degraded forest landscapes.

Compliance with ITTO Yokohama Action Plan 2002-2006
The project will contribute to the following *cross-cutting actions* of the action plan:

	Definition	How the project addresses the objective
(a)	Encourage and assist producing member countries to identify and address constraints in their implementation of sustainable forest management and the sustainable development of the forest industry to enhance the contribution of the forest sector to national objectives.	The project aids Ghana to address the most fundamental problem of restoring and managing degraded forest landscapes, which is a constraint for SFM in Ghana. When this constraint is addressed, it will have a significant impact on the productive capacity of the Ghanaian forests both at the local and national level contributing to poverty alleviation, one of Ghana's most important national objectives.

	Definition	How the project addresses the objective
GOAL 1, Action 1	Support the effective enforcement of forest laws and regulations that ensure sustainable forest management and secure the production base.	The project will work with the communities on creation of by-laws as well as introduction of the most applicable incentive schemes. Both activities will contribute to sustainable forest

		management by transferring the existing laws and regulations related to forest rehabilitation into formats that are utilizable by the local communities.
GOAL 1, Action 2	Support networking and the exchange of information with relevant international organizations to maintain the integrity of the resource base, including protected area networks.	The project will utilise the expertise if international organisations such as IUCN, WWF, FAO etc. There will be strong networking on progress made in enhancing restoration and management of degraded forests in Ghana.
GOAL 1, Action 4	Promote the conservation, rehabilitation and sustainable management of threatened forest ecosystems…	Extension of rehabilitation and management of restored of degraded forest landscapes are the prime focus of the project and will thus contribute as a whole to sustainable management of threatened forests in Ghana.
GOAL 1, Action 5	Asses opportunities for, and promote development of, non-timber forest products and forest services which can improve the economic attractiveness of maintaining the forest resource base.	One of the major outputs of the project will be to promote the sale of environmental services which will improve the economic attractiveness of maintaining the forest resource base. The will also study the market potential of restored lands both at the local and national levels. At the local level, restoration may provide alternative livelihoods depending on the species identified as the most useful for restoration by the local communities.
GOAL 1, Action 6	Review the current situation regarding any undocumented forestry activities relating to the objectives of the Organization.	The project will look at various land use and reforestation options used by the local communities as well as an evaluation of their effectiveness in restoring degraded forest landscapes.
GOAL 1, Action 7	Identify shortcomings in enforcement of forest law and regulations, and overcome them.	The project will review and harmonise existing policy, legislative and institutional framework for forest landscape restoration and management
GOAL 2, Action 3	Develop and promote the implementation of guidelines for the management of secondary tropical forests, the restoration of degraded tropical forests and the rehabilitation of degraded forest land.	The project will produce an easy-to-use manual on forest landscape restoration in the context of Ghana situation. While using existing materials in part of the manual, it will pay special attention to applicability at the community level and the different beneficiaries there.
GOAL 2, Action 7	Contribute appropriately to national and international efforts in the area of prevention and management of fire in relation to tropical-timber producing forests.	Fire protection will be an integral aspect in the project implementation
GOAL 2, Action	Improve the productive capacity of natural forests, …, better utilization of lesser used-	The project aims at generally on improving the productive capacity of Ghanaian forests,

10	species, …, guided natural generation, …, and reforestation; Implement research and development activities in the management of secondary tropical forests, restoration of degraded tropical forests and rehabilitation of degraded forest land, taking into consideration ITTO guidelines; Undertake measures for the prevention and management of fire relating to tropical timber-producing countries; Intensify training of forestry personnel and other stakeholders in the management of both natural forests and timber plantations.	with a special emphasis on the communities. The project follows ITTO Guidelines on management of secondary tropical forests, restoration of degraded tropical forests and rehabilitation of degraded forest land as well as the ITTO/IUCN Manual on Forest Landscape Restoration Fire protection is an integral part of the project implementation. The training and capacity building are well considered in the project implementation.

Further, the project has the following Forest Industry component:

	Definition	How the project addresses the objective
GOAL 2, Action 8	Undertake research into wood properties and end-use requirements, paying particular attention to the properties and availability of lesser-used species and timber plantation species and the potential markets for them.	In consultation with stakeholders the project, will examine different possibilities for using lesser-used species where these are supported by the local communities.

1.2.2 Relevance to the submitting country's policies

This proposal is relevant to the National Forest and Wildlife Policy (1994) which has among it's objectives as "to manage the existing forest estate for sustainability of timber and non-timber resources and to expand the nation's forest cover for increased yields of domestic and industrial products, rehabilitation of denuded lands, protection of water catchments and stream banks and enhancement of the natural environment. It is also relevant to the sectoral programme on Forest Resources Development which has as one of its objectives as "to promote achievement of a 10% increase in the area of forest and tree cover through afforestation, reforestation, industrial plantations and agroforestry.

In addition the proposal is relevant to GPRSP. The GPSRSP document emphasizes the need to:

- Protect, rehabilitate and sustainably manage the national land, forest and wildlife resources through collaborative management and aimed at increasing the incomes of rural communities who own these resources.
- Enhanced community involvement in the management of forest and wildlife and savannah woodland resources and improve the benefit flows to communities from resource sales.
- Increased community and farmer adaptation of improved land and water management techniques.

Various projects in the Forest Sector have been completed and some of them are still being implemented to support the achievement of the objectives of various policies mentioned above. Tables 1 and 2 show the past and ongoing programmes and projects oriented to the development of Ghana's forestry sector. The strategy and activities in this proposal are designed so as to complement these recent and ongoing projects.

Table 1: Major current forestry projects in Ghana supported by multi and bilateral donors

Project	Agency	Donor
Natural Resources Management Programme (NRMP) - Ghanaian national forestry sector programme	Ministry of Lands & Forestry	Multi-donor supported programme implemented project-wise
Forest Sector Development Programme (FSDP) – part of the NRMP	Forestry Commission	DFID
Protected Area Development Programme (PADP) – part of NRMP - First phase has ended 2002	Wildlife Division	European Development Fund
The Forest Protection and Resource Use Management Project (FORUM)	Forestry Commission	GTZ
Wildfire Management in the Transition Zone (WMTZ) – part of NRMP	Forestry Commission, Resources Management Support Centre	The Government of Netherlands

Table 2: The major previous or currently ongoing ITTO supported projects in the forest sector

Project	Agency	Status (start /finish)
Evergreen Club of Ghana / ITTO Youth in Forestry Project PD008/94 Rev.2 (F)	Evergreen Club of Ghana	Completed (1995/)
Conservation and Provenance Plantings and Integrated Pest Management to Sustain Iroko Production in West Africa PD003/95 Rev.2 (F)	Forestry Research Institute of Ghana – FORIG	Completed (1995/)
Forest Fire Management in Ghana PD032/98 Rev.1 (F)	Forestry Research Institute of Ghana – FORIG	Completed (1998/2003)
Establishment of a Wood Workers and Craftsmanship Village PD046/96 Rev.2 (I)	Furniture and Wood Products Association, Ghana	Completed
Manpower Development for the Ghana Wood Industry Training Centre PD012/98 Rev.2 (I)	Timber Export Development Board (TEDB)	Completed
Silviculture and Economics of Improved Natural Forest Management in Ghana PD004/98 Rev.1 (F)	Forestry Research Institute of Ghana – FORIG	Completed (1999)
Reforestation of the Abutia Plains by Indigenous Communities in the Volta Basin PD048/98 Rev.1 (F)	African Environmental Regeneration Movement	Completed (1999)

Handbook on Tree and Wood Identification of 100 Lesser-Used and Lesser-Known Timber Species from Tropical Africa with Notes on Ethnography Silviculture and Uses PD044/98 Rev.2	Forestry Research Institute of Ghana – FORIG	Completed (1999)
Rehabilitating Degraded Forest through Collaboration with Local Communities PD030/97 Rev.6 (F)	Forestry Research Institute of Ghana – FORIG	Completed (2005)
Participatory Tropical Forest Development by Women in Indigenous Communities PD049/98 Rev.1 (F)	31st December Women's Movement	Completed (2000)
Processing and Utilization of Logging Residues through Collaboration with Local Communities and Forest Industries PPD039/02 Rev.2 (I)	Forestry Research Institute of Ghana – FORIG	Completed (2002)
FireFight Initiative: Prevention Rather than Cure PPD044/02 Rev.1 (F) (Pre-Project with a component in Ghana)	IUCN	Completed (2002/2004)
Feasibility of Introducing and Developing Non-Destructive Testing Technologies and Methods for Assessment and Monitoring of Timber/Wood Structures in Various Structural and End-Use Applications in West Africa PPD004/00 Rev.3 (I)	Wood Industries Training Centre	Pending Finance
Development of the Integrated Forestry Compendium: a Knowledge Base for Forest Management and the Forest Industry PD087/01 Rev.1 (M)	Forestry Commission of Ghana	Pending Finance
Development of Energy Alternatives for the Efficient Utilization of Wood Processing Residue: Co-Generation and Briquette Production PPD053/02 Rev.2 (I)	Forestry Research Institute of Ghana – FORIG	Completed 2003
Investment Promotion and Enterprise Development of the Timber Industry in Ghana PPD063/02 (I)	Forestry Research Institute of Ghana – FORIG	Operational 2003

1.3 Target area

1.3.1 Geographic Location

The first phase of the project was undertaken in three forest reserves representing different forest ecological zones. The reserves were Pamu-Berekum Forest Reserve representing the Dry semi-deciduous forest ecological zone (DS) in the Dormaa forest district; Afrensu-Brohoma Forest Reserve in the Dry semi-deciduous Fire Zone (DSFZ) subtype in the Offinso forest district and the *Southern Scarp Forest Reserve* of the Moist Semi-Deciduous Southeast (MSSE) forest subtype in the Begoro forest

district. The above forest zones lies between latitudes 4° and 8° in the southern part of Ghana (Figure 1). The mean annual rainfall in these forest areas ranges between 1,250 and 1,500 mm. The mean daily temperature ranges between about 25° C in the wet season (March-October) and about 27°C during the dry season (November -February).

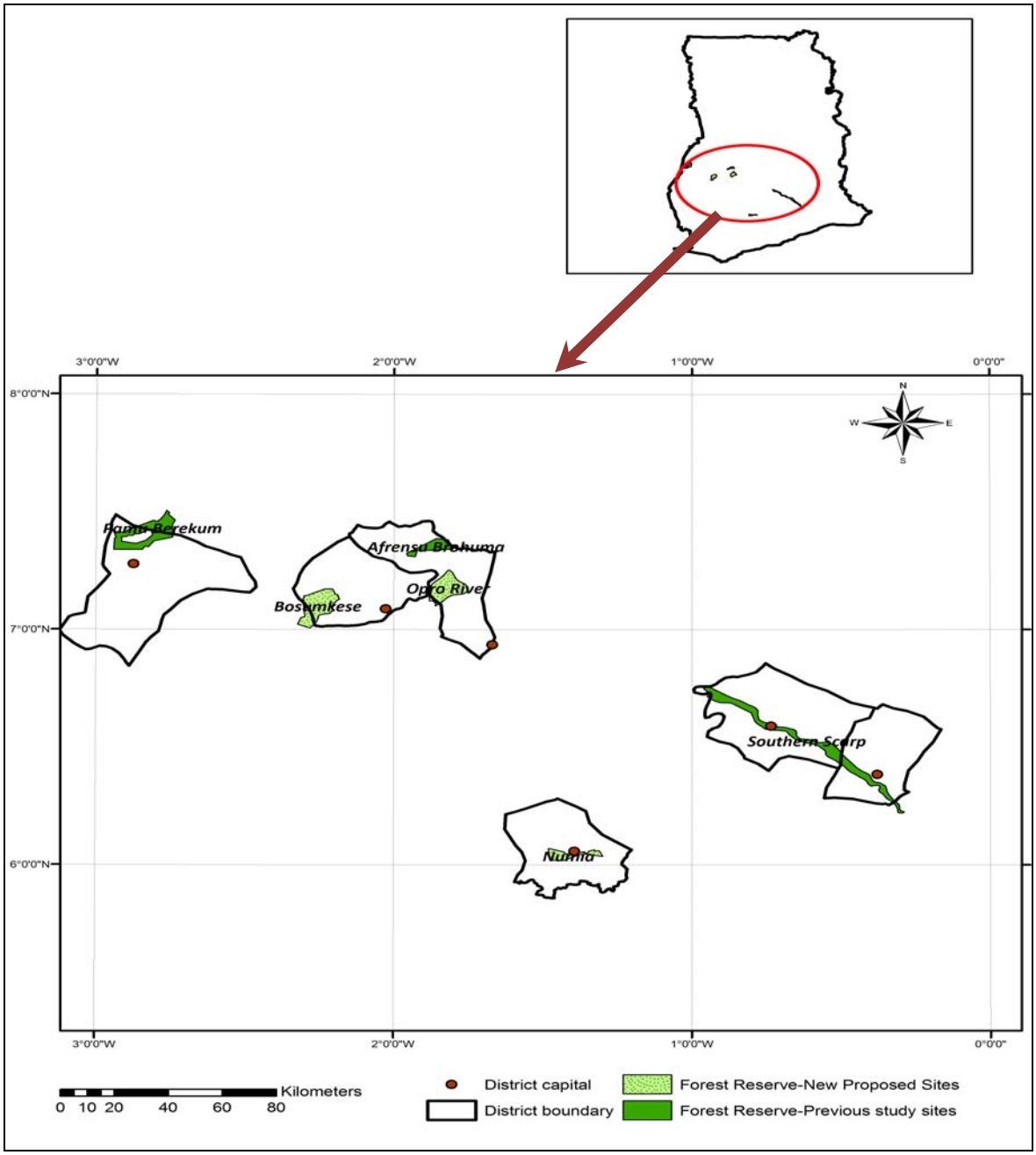


Figure 1: Map of Ghana indicating the previous project sites and the proposed sites for Phase II

Vegetation and soils

The project areas fall within the High Forest Zones (HFZ) in Ghana, considered as tropical forests (Wagner and Cobbinah, 1993). Like tropical forest in other regions, the project area forest show a high species diversity, generally low content of soil nutrients, multiple canopy layers, and slow growth rates for

mature forests. Hall and Swaine (1981) reported over 2,100 plant species in the HFZ of Ghana (of which the study area belongs), 23 of which are endemic. According to Hawthorne (1989), a total of 730 tree species have been recorded in these forests, of which 680 attain a dimension of 5 cm or more at breast height, with heights reaching between 10 and 40 m. Some emergent trees even reach 60 m in height.

The comparatively drier southern marginal forest like the Pamu-Berekum Forest Reserve in the Dormaa forest district and Afrensu-Brohoma Forest Reserve in the Offinso forest district are species-poor, while the moist semi-deciduous forest zone where the Begoro forest district lie is among the most important ones for commercial timber species (Prah 1994). The fauna of all the forest zones together includes over 200 species of mammals, many of which are rare or endangered (Mensah-Ntiamoah 1989). The forests are known to support 74 species of bats, 37 rodents, and over 200 species of birds (IUCN 1992). A variety of reptiles, insects, and other invertebrates also abound in these forests.

The areas are underlain by Precambrian schists, phyllites, green stones, grey wracks, and other metamorphic rocks of Birimian and Tarkwian formations folded along axes running north-east to south-west and by associated granites. In the flat to moderately step terrain, these rocks are frequently covered by a thick mantle of highly weathered material (Burnham, 1989). The soils are of ochrosol type and belong to the family group of the Latosols. They are old weathered soils in which rock minerals have largely been altered to kaolin and sesquioxides of iron and aluminium. The humus content and cation exchange capacity are rather low (Hall and Swaine, 1983).

The second phase will be undertaken in *Bosumkese, Numia* and *Opro* Forest Reserves (Figure 1). *Bosumkese* FR is found on Latitude 7º06' N and Longitude 2º15' W with an area of 138.3 km^2. This FR which is located in the Moist Semi-deciduous North-west (MSNW) forest subtype belongs to the *Bechem* Forest District (Tano District Political District) in the Brong Ahafo Region of Ghana. Local communities expected to parcticipate include: Nkwaankwaa, Adukofikrom and Berekum. *Numia* Forest Reserve covering 50.2 km^2 on Latitude 6º02' N and Longitude 1º24' W. is within the Moist Semi-deciduous South-east (MSSE) forest subtype. The area belongs to the *New Edubiase* Forest District (Adansi South Political District) in Ashanti Region in Southern Ghana. Participating communities will include Beposo, Dwenase and Kwasu Agya. *Opro River* FR which is within the Dry Semi-deciduous forest type can be located on Latitude 7º11' N and Longitude 1º48' W. It has area coverage of 129.2 km^2. The forest area is under the management of Offinso Forest District (Offinso Municipality) within the Ashanti region of Ghana and communities expected to participate are Ankaase, Nemang and Amudurasi.

1.3.2 Social, economic cultural and environmental aspects

1.3.2.1 Social

The Population density for the area varies from 28 persons to 63.5 persons per square kilometre. In 2000 the population density was 110 people per square kilometre. The average household size is 5.5. The composition comprises persons from the nuclear family, extended family and persons outside the nuclear and the extended families. Heads of the households are mainly male. In the other households where females are heads, it is either single or single parent household. Children constitute about 37.3% of the average household. There are three main religious groups in the area. These are Christians (68%), Islam (15.9%) and traditional religion (8.5%). A significant percentage of (6.8%) of the population do not belong to any of the mentioned religious denomination.

The 2000 Population and Housing Census depicts a rural-urban split of 57.8: 42.2 for the district as compared to 56.2: 43.8 for the nation. However, with about 60% of the settlements in the area being rural, the situation poses a problem for the distribution of higher order services and functions in the area Services must have the required threshold population before they are provided. The implication therefore

is that theoretically many of the settlements may not qualify for higher order services. The sex ratio male, female ratio of the district, according to 2000 Population and Housing Census, was estimated at 1:1.01. Again the 2000 Population and Housing Census indicated that children under 15 years accounts for about (46.6%), economically active population 15-64 years (47%) and the elderly (65 years and above) 6.4%. This implies that economic dependency ratio was higher and fewer people were working and that every worker had more than one mouth to feed. The Agriculture sector dominates the labour force. The composition of labour force in the small-scale industries shows that 40% paid labourers, and 23% are apprentices. In the medium scale, 10% are owner, workers, 15% are family workers and 65% are paid workers. While apprenticeship takes 10%. About 64% of the labour force is engaged in agriculture depicting it as the major economic activity. This is followed by commerce 16% service 12% and industry 8%. Migration towards the urban centres is high causing lower densities in some rural area. It is also evident that most people commute from the district to look for jobs in Kumasi.

1.3.2.2 Economic

The Economy of the Area is an agrarian one and used to be one of the richest and leading producers of cocoa and citrus in Ghana before the 1983 bush fires, which destroyed most of the farms in the area. The bush fires have led to large tracts of very rich arable land lying idle besides what has been put under cultivation by few farmers. This is the major contributory factor to high level of poverty in the area especially among farmers. Besides this fire disaster, most of the existing cocoa farms in the area are very old and the yields from these cocoa farms are poor. Moreover, the youth who are supposed to take over from the old farmers have abandoned the land and have moved to the cities, notably Kumasi and Accra to search for non -existing jobs due to lack of material and financial support to enter into farming.

Agriculture is the backbone of in terms of employment and income generation. It employs about 70% of the working population about 55% from food crops, 35% from cash crops and 10% from livestock in terms of household income in the area. The major food crops produced in the area are plantain, Cassava, Yams, Cocoyam and Maize.Vegetables such as tomatoes, peppers and garden eggs, okro are also produced and are mostly grown Cocoa, Oil palm, and citrus are the main cash crops produced in the area Cashew cultivation is being promoted by Adventist Relief Agency (A D R A) and Ministry of Food and agriculture (M 0 F A). Manufacturing is practised on a Small-Scale in the area but it is one of the major economic activities. The industries include sawmills, carpentry, dressmaking, pito brewing, corn milling, cassava processing and many others.Tie and dye making for clothing and Fashion design and tailoring are scattered throughout the area.

1.3.2.3 Cultural

Akan culture which is the most dominant and apparent in Ghana dominates in the area. However there are migrant settlers from the north who also practice their culture alongside the Akan tradition/culture. Each district has one major festival, which is celebrated every three to four years depending on the district. It is an occasion which brings citizens, home and abroad, together to formulate programmes to accelerate the pace of development of the district.

The area can be said to be homogeneous in terms of ethnic composition. The Asante ethnic group forms about 80% of the total district population. The remaining 25% consists of other ethnic groups majority of whom comes from the Northern, Upper West and Upper East.

Each district has one paramount chief. Under the paramount chief are sub-chiefs. The Akan people follow matrilineal rules of ancestry and inheritance. Goods are inherited directly through the mother. The inheritance also involves societal status. The title of being a local chief or important person can be passed on via inheritance. If a male earns property through means that doesn't involve the family wealth then, he can pass it to whomever he pleases. Under customary law, traditional leaders (chiefs) remain the dominant and de facto land owners. It is through them that community members obtain access to land resources held by them in trust but, once allocated, the land comes under the control of the family in most cases.

1.3.2.4 Environmental

The project sites experiences semi-equatorial and tropical conventional.climates characterized by moderate to heavy rainfall annually. The vegetation is mainly moist semi-deciduous forest. The soils in the area are well drained, fertile, and support a great number of arable tree crops. However the vegetation has been altered to that grassland and savannah mainly due to the adverse effect of bush fires. With the commonest farming practice being the the slash and burn method of clearing the land the natural vegetation is being destroyed rapidly and this is altering the ecology of the area. About 85% of the households in the area use wood and charcoal as their main source of energy for cooking. This situation contributes to the depletion of the tree species. The activities of chainsaw operators have also contributed to the depletion of the forest. The exploitation of forest timber by the timber firms operating in the forest reserves has also had adverse effects on the environment. The extent of the degradation of the natural environment and its consequences on land, water bodies and as consequence on the livelihood of the people cannot be overemphasised.

1.4 Expected Outcomes after project completion

After the completion of this project, there will be management plan for each planted forest to ensure sustainable management. There will also be reports on activities implemented and results achieved to meet the objectives of the plan. The capacity of about sixty community members would have been built in sustainable forest managent, production of planting materials, planting techniques, determination of stock of carbon in trees and other vegetation, the calculation of financial values of trees before legal exploitation size, as well as environmental services provided by the forests. There will also be reports indicating the type of training organized, the period it was organized, the duration of the training. There will also be reports on nursery and field planting activities which will indicate the number and type of species produced from the nursery, area that was planted on the field, the survival as well as the growth rates of the planted species. Also to be available are documents on the opportunities and challenges facing implementation of PES in project areas and equitable benefit sharing mechanism. Finally there will be reports on the quarterly meetings of the stakeholders and decisions that were arrived at.

2 PART 2: PROJECT RATIONALE AND OBJECTIVES

2.1 Rationale

2.1.1 Institutional set-up and organizational issues

The Executing Agency will be the Forestry Research Institute of Ghana (FORIG). FORIG has the prime mandate to conduct high quality, user-focused research that generates scientific knowledge and appropriate technologies which enhance the sustainable development, conservation, and efficient utilization of Ghana's forest resources; and also to disseminate the information for the improvement of social, economic and environmental well-being of the people of Ghana. The institute has over the years developed expertise in specialized areas in Forestry and related fields to include, Silviculture, Entomology, Forest botany, Forest ecology, Seed technology, Mensuration / Statistics, Genetics, Wood Science & Technology, Wood Products Chemistry, Socio-Economics and Marketing and Information Science. FORIG has recently expanded its research focus to include issues related to forest policy, environmental conservation including biodiversity and climate change, forest industry and trade. In addition to main stream research activities, FORIG also honours numerous consultancies related to capacity building, institutionalization and management of the forestry sector. The institute is well endowed with facilities and personnel/expertise for efficient execution of a plethora of research and development activities.

Facilities:

The Institute's permanent offices and laboratories are located at Fumesua, near Kumasi. It has research centres in 5 research stations strategically located in Kumasi and in one or more ecological zones of the country. These stations are listed below:

Location	Region	Name of Research Station
Benso	Western	Wet/Moist Evergreen
Kubease	Ashanti	Moist Semi-Deciduous N/E
Amantia	Ashanti	Moist Semi-Deciduous S/E
Abofour	Ashanti	Dry Semi-Deciduous
Bolgatanga	Upper East	Northern Savanna

The institute is the focal point of Plant Resources of Tropical Africa (PROTA) PROTA is an international, not-for-profit foundation. It intends to synthesize the dispersed information on the approximately 7,000 useful plants of Tropical Africa and to provide wide access to the information through Web databases, Books, CD-Rom's and Special Products.

Collaborating Agencies: The collaborating partners will be (i) Forestry Division of the Forestry Commission (ii) Faculty of Renewable Natural Resources of the Kwame Nkrumah University of Science and Technology (KNUST) (iii) and most importantly the local communities.
Responsibilities: The Forestry Division will contribute to the identification of the communities to take part in the project, other stakeholders and to provide technical advice on management. The Faculty of Renewable Natural Resources of the University will contribute to training the local communities and in preparing progress reports. Local communities will be responsible for execution of the field work.

2.1.2 Stakeholder analysis

Table 3: Stakeholder analysis

Stakeholder categories	Rights to ownership and access to resources in the reserves	Roles/responsibilities	Interest	Relationships
Primary stakeholders				
Local communities	Traditional rights of ownership and limited access to resource use	Protection of the resource	Sustainability of the resource base	Collaborate with FC; Conflict with FC; Connivance with chainsaw operators/ illegal loggers
Landowners (Traditional Authority)	Customary and legal rights	Represent communities in official decision-making processes party to timber rights allocation process	Sustainable flow of benefits	Collaboration with FC; Conflict and/or connivance with illegal operators,
Illegal forest resource gatherers	Illegal operators hold no official rights	No formal legal responsibilities	Financial returns	Connivance with FC and communities, Conflict with FC, and farmers
Secondary stakeholders				
GTMO/GTA	Logging rights		Profits	Collaborate with FC and traditional authorities; Conflict with illegal chainsaw operators
Forest Division of Forestry Commission(FC)	Right to administer forest regulation	Enforce protection, management and controls and monitoring	To achieve sustainable management of the forests of Ghana	-Collaboration with other stakeholders -Conflict with respect to controlling access of resource usage
Office of the administrator of stool lands	No rights	Manage revenue from timber resources	Ensuring forest resource revenue capture	Collaborate with FC
Private tree growers	rights to their own plantations	Contribute to forest resource development	Profits and business development	Collaborate with FC and communities Conflicts with illegal operators
Tertiary				
Scientific community- (FORIG, BIRD, CBUD, consultants etc)	No rights	Research and provide scientific information and technical assistance for policy and management	Efficient management and utilization	Collaboration
Environmental NGOs.,	No rights	Advocacy and awareness creation on forest conservation	Sustainable resource use	Collaboration with government agencies academia and communities

2.1.3 Problem Analysis

Degradation of the forests in Ghana is assuming alarming proportions. Although the total area degraded is not known, there are estimates for rate of deforestation, which is the precursor for degradation. At the turn of the 20th century it was estimated that Ghana had 8.1 million ha of forest land (Ghartey, 1990). At present, the total area of forest estates of Ghana occupies an area 2.1 million ha with 1.8 million ha in the

high forest zone (Dykstra et al. 1996) and only 0.3 million ha in the savanna. Outside the gazzetted areas, an estimated 400,000 ha of forest cover still exist (off-reserves). There are 266 forest reserves of a total area of 1,634,100 ha but analysis by Hawthorne and Abu Juam (1995) showed that of the total area, some 90,000 ha is in reasonable condition and the remainder is mostly degraded or has no significant forest left.

The impact of this degradation which affects human livelihood and the environment are shortages of firewood and other wood; shortages of non-timber forest products; increased sediment deposits, floods and land slides; drying up of springs and water bodies; siltation of dams; increased incidence of water-borne diseases; loss of biodiversity; climate change. On the basis of this continuous degradation of the forest resources of Ghana, the Forestry Research Institute of Ghana applied for a research grant from the International Tropical Timber organization (ITTO) to rehabilitate some of the degraded areas with the collaboration of forest fringe communities. . By this project local communities established 240 ha of plantations to rehabilitate some of the degraded forests using agroforestry and block plantation sysystems..

However by current regulations passed by the Ghanaian parliament, the farmers who planted the trees and the local communities who are the landowners are entitled to 40% of the area planted. Thus on a recent ex-post evaluation of the project, farmers expressed the desire to have a new phase of the project so that they could expand their forests areas through rehabilitation of their degraded areas and thus increase the number of tree species they own since different tree species have different prices. From the this desire of the farmers it could easily be deduced that,although the first phase because of the benefits that communities which participated in the first phase stand to gain , many local communities are now eager to participate so that they can also own their forests.

However in order to have the planted forests produce maximum benefits not only for timber but also for NTFP's as well as other environmental services, there is the need for sustainable management of these forests with the collaboration of local communities as the General Assembly of the United Nations 2007 agreed that Sustainable Forest Management (SFM) maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations.

May and Pastuk 1996 also acknowledge that Local knowledge of the environment and indigenous systems of resource management, previously ignored and thought archaic, are now recognized as being essential to an ecologically sound strategy for forest utilization. Formerly, agronomic and forestry extension had relied on the introduction of extensive production systems and models. It has now become imperative to begin with a clear understanding of the local rationale for current land uses. This knowledge can only be obtained by working directly with local people over the long term, documenting existing practices and constraints as well as the reasons behind them, and promoting alternatives only when it becomes clear that they would be appropriate within these systems. Such initiatives must be equally sensitive to both local ecosystem resilience and culturally ascribed values.

Unfortunately these forests have never been sustainably and collaboratively managed to be of benefit to local communities of any generation since the completion of the project. This was presumably due to

(i) there is no coordination between Forest services division of the forestry commission who have the mandate to manage all forest estates in Ghana, the traditional authorities and local communities of the areas where the planted forests are sited

(ii) lack of consensus on management options and strategies because the different stakeholders have different objectives for management

(iii) lack of interest in management by the local communities due to unavailability of many NTFP prodcing species , lack of income from timber and non timber species as well as unforeen payment of the environmental services including the carbon stock.

The effect is that illegal explotation has started in the planted forests and this will cause forest degradation, damaging the resources that sustain the livelihoods of forest-dependent communities and

thus reducing communities' expectation that the forest will contribute to the improvement of their livelihood.

To ameliorate this situation, this proposal has the objective of collaboratively and sustainably managing with local communities forests established by rehabilitating degraded forest lands with the view of producing goods and services that the communities will require as well as enhancing income opportunities. This will support the findings of Forestry Study Outlook Study for Africa 2003 which highlighted the need for forests to be sustainably managed produce goods and services that poor people require, reduce their vulnerability to environmental and economic changes, and enhance income and employment to be opportunities.

The objective of the proposal will be achieved through achieving four outputs and related activities.
The first output will be 'Management options and strategies identified and implemented'. This will be achieved through: Determination of the state of forest cover and land use types in the study area, mobilizing stakeholders, making the stakeholders identify management options and strategies, drawing management plans implementing the options and strategies all with the collaboration of local communities.

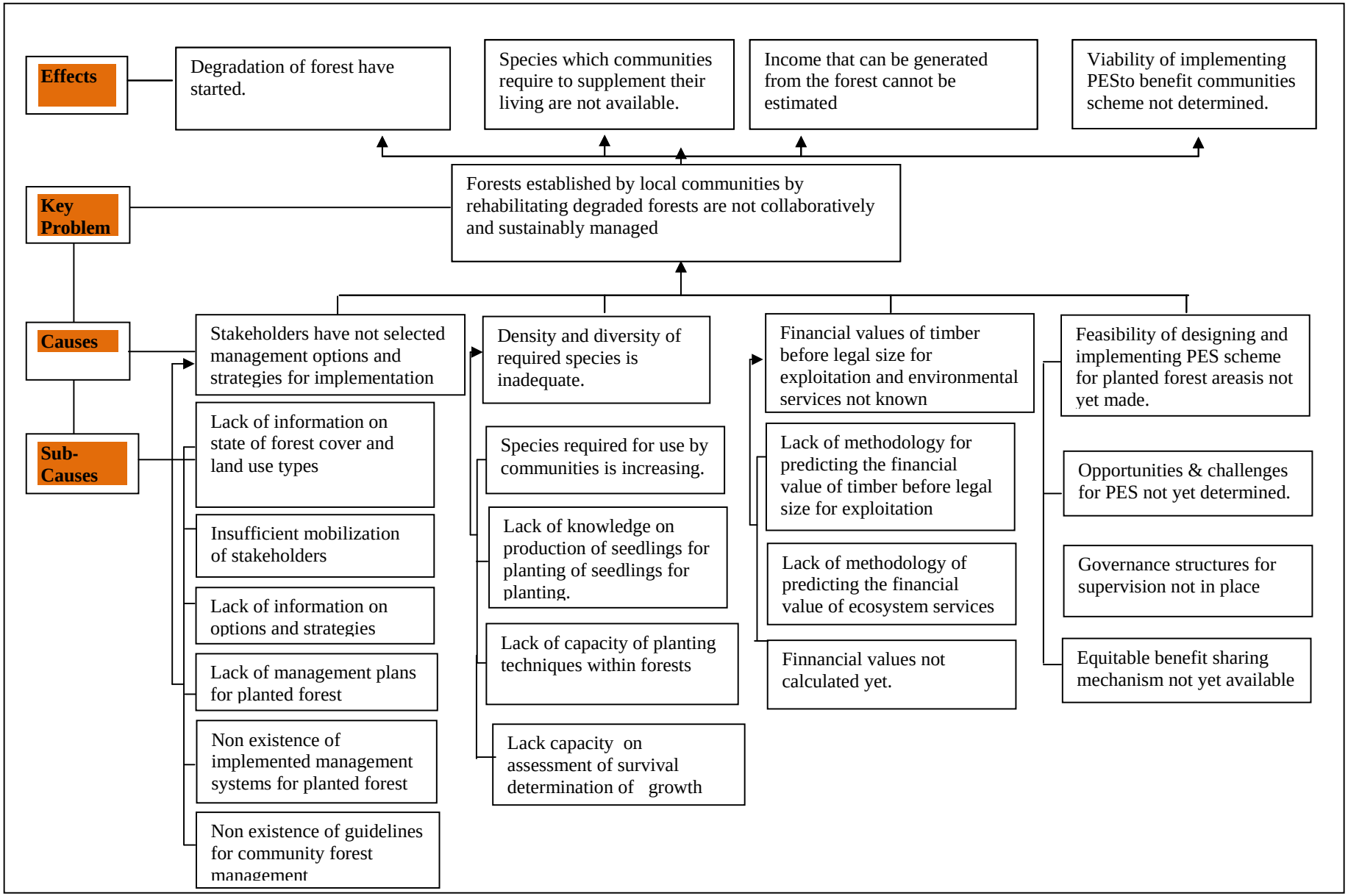
Shrestha and Dhillion (2006), mention that wild food plants play very important role in the livelihoods of rural communities as an integral part of the subsistence strategy. CBD Secretariat 2008 also mention that NFTPs and forest services such as medicinal and food plants, clean water, rattan, bushmeat and bamboo play an important role in rural livelihoods and local and national economies, and yet are mostly under-represented in development strategies and in national databases. Leakey and Newton 1994 also report that the introduction of trees with both timber and non-timber value in the cultivated areas is one of the most promising forest land-use options and an efficient way not only to utilise and manage the forests in a sustainable way, but also to improve the livelihood of the forest dwellers and the forest adjacent communities. Thus second output will thus be on 'The diversity and density of timber and NTFP producing species increased'. This output will be implemented within the planted forest and on degraded forest lands for communities who have expressed interest in rehabilitation of degraded forests.The output will be achieved through : selection of NTFPs and timber species to be introduced by local communities, Building of capacity of local communities in the seedling production of timber and NTFPs species, identification and capacity building local communities of suitable planting techniques as well as Monitoring growth rate of planted timber trees and NTFPs.

The third output wil be on income generation mechanisms in planted forests determined. This output is to build the capacity of local communities in the methodology of calculating the financial values of timber trees which though matured have not reached size for exploitation. This is to enable local communities who wish to sell their timber know what prices they can sell to buyers who can wait until the trees are of the right size. It is also to valuate ecosystem services (which according to IISD (2005) is defined as the benefits that people obtain from ecosystems, including those that supply food, water, timber and fibre; regulate climate, flood, disease, wastes and water quality; provide recreational, aesthetic and spiritual amenities; and support the formation of soil, photosynthesis and nutrient cycling), including the forest carbon stocks so that they will be prepared to sell to buyers at any point in time. Because as mentioned by Clay and Clement 1993 if forest residents don't start generating income from forests in the short term, degradation of forest will start sooner or later.This output will be achieved by: identifying the ecosystem services, Quantifying and valuing them, identifying the methodology for calculating the financial values of timber trees before legal size for exploitation, building the capacity of local communities in the methodogy and communities using the methodology in the calculating the financial values, thus preparing the goods and services for purchase by potential buyers.

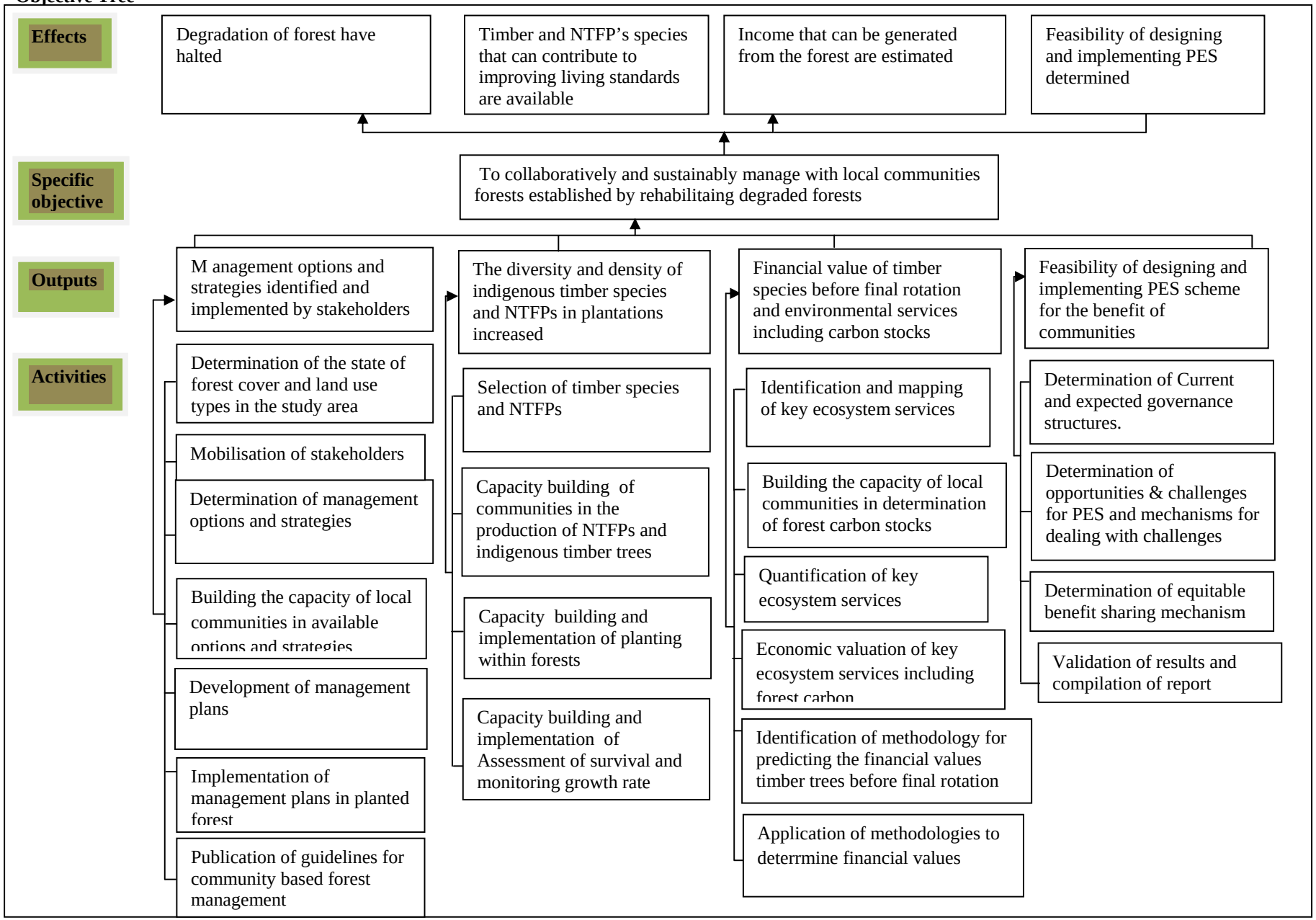
Though the payment for environmental services (PES) are designed to have users compensate those who must bear costs or are prevented from developing the resource such as local communities, developing PES schemes is complex, time consuming and costly because most require designing and implementing new management systems. Therefore the fourth output will be on determining the feasibility of desgning and implementing such a scheme in planted forest areas, although PES has been used in many countries as a way to generate additional revenue to finance SFM, and to promote livelihoods.
Activities that will be implemented to achieve this output include: current governance structure and expected governace structure for PES. Other activities will include determining the opportunities and challenges for PES, determination of equitable benefit sharing mechanism and lastly validation of the results with the stakeholders.

It is hoped that the achievement of the four outputs will contribute significantlyto the achievement of objective of sustainably managing the planted forests so that the local communities will as they expect get additional NTFPs as well as income to supplement their livelihood whiles enjoying from the environmental services provided by the forest.

Problem Tree



Objective Tree –



2.1.4 Logical framework matrix

Project Element	Indicators	Means of verification	Assumption
Development objective Forests established by local communities by rehabililitating degraded forests become one of the major sources of livelihood and improving landscapes. .	Planted by Forests established on degraded forests lands contributes to 20% of rural livelihood by 2020 Improvement of landscapes through rehabilitation of degraded forests increases by 30% by 2020	Field visits Interaction with communities Progress reports and scientific publications	Communities know proportions of their income from different sources including forest. Planting of trees on degraded forest and farmlands become one of important activity for local communities.
Specific objectives To collaboratively and sustainably manage with local communities forests established by rehabilitating degraded forests.	Management options and strategies identified 6 months after project inception (i)Management plans for the planted forests available by 2011 (ii)Sustainable Management process established for planted forests by 2011	Field visits Report of community meetings Report of theoretical and practical training workshops Reports of management activities	Forestry Commission abides by collaborative managent policy . Local communities attend workshops and field activities regularly. Scientists work hard to meet schedules
Output 1 M anagement options and strategies identified and implemented by stakeholders	Start up workshop held and in Primary stakeholders mobilised within three months of start of project Management options and strategies determined in the sixth of project implentation Development of management plans by the the	Report of meetings with communities Progress Reports Management plans	Local communities and other stakeholders regularly attend workshops and meetings on management process

	Ninth month of projecrt implementation Implementation of management options ,strategies and monitoring mechanisms one year after implentation 10 people from each community have their capacity built in forest management Guidelines on community management published by end of 2012.	Published manuals Report of trainings workshops	
Output 2 The diversity and density of indigenous timber species and NTFPs in plantations increased.	Timber species and NTFPs for plantation establishment selected 6 months after start of project Capacity of 60 local community members built in the seedling production of NTFPs and indigenous timber trees 6 months after start of project Field planting of produced seedlings completed within first year of project Assessment of survival, beating up completed three months after planting . Monitoring of growth rate of planted timber trees and NTFPs started six months after planting. Density and diversity of indigenous timber tree species and NTFPs increase by 30%as compared to baseline in forests by 2015 .	Field Visits Report of selection of species Report of Trainning workshops Report of field acivities Progress reports and Scientific journal papers	Communities attend workshops nursery and field activities regularly and schedule Facilitators and supervisors work hard as expected.

Output 3 Financial values of timber tree before final rotation as well as environmental services produced by the forest determined	Ecosystem services within planted forest identified by end of 2010 capacity of local communities built in determination of carbon stocks by first quarter of 2011 Ecosyem services quantified and valued by first quarter of 2011 Identification of methodology for predicting the financial values timber trees before final rotation and environmental services including carbon stock by mid 2011 60 people have their capacity built in Methodologies end of 2011 Methodology applied to calculate financial values by first quarter of 2012	Field visits, Scientific Journal articles Project progress and final reports Carbon stocks of planted forests Report of trainings workshops Financial values of ecosystem services and trees before legal size	The relevant software are procured on schedule for estimating the financial values of timber trees and NTFPs Scientists and local communities work hard and on schedule.
Output 4 Feasibility of designing and implementing PES scheme for benefit of communities in planted forests areas.	Expected governance structures, determined by june 2011. Opportunities & challenges for PES design and implementation determined by third quarter in 2011. Equitable benefit sharing mechanism available by first quarter in 2012. Information on Feasibility of implementing PES for in areas with planted forests available by end of 2012. Mechanisms for equitable benefit sharing available by 2012.	Progress reports Feasibility reports Reports of community meetings Publications in scientific journals. Feasibility report Report on equitable benefit sharing mechanism.	stakeholders provide necessary information in designing and identifying structures for PES and benefit sharing Reports published on schedule and receive wide circulation

2.2 Objectives

2.2.1 Development Objective and Impact Indicators

Development Objective

Forests established by local communities through rehabilitation of degraded forests become one of the major sources of livelihood and improving landscapes.

Impact Indicators

i. Benefits from planted forests established by local communities contribute 20% of income forest fringe communities
ii. Improvement of landscapes through rehabilitation of degraded forests increases by 30%

2.2.2 Specific objective and Outcome Indicators

Specific Objective

The specific objective is to collaboratively and sustainably manage with local communities forests established by rehabilitating degraded forests.

Outcome Indicators

(i) Management options and strategies identified 6 months after project inception

(ii) Management plans for the planted forests available by 2011

(iii) Sustainable management process established for planted forests by 2011

3 PART 3: DESCRIPTION OF PROJECT INTERVENTIONS

3.1 Outputs and activities

3.1.1 Outputs

Output 1: Management options and strategies identified and implemented by stakeholders

Indicators

i. Start up workshop held and primary stakeholders mobilised within three months of start of project
ii. Management options and strategies determined in the sixth month of project implentation
iii. Development of management plans by the the nineth month of projecrt implementation
iv. Implementation of management options, strategies and monitoring mechanisms one year after implantation
v. 10 people from each community have their capacity built in forest management by end of year 1
vi. Guidelines on community management published by end of 2012

Output 2: The diversity and density of indigenous timber species and NTFPs in plantations increased

Indicators

i. Timber species and NTFPs for plantation establishment selected 6 months after start of project
ii. Capacity of 60 local community members built in seedling production of NTFPs and indigenous timber trees 6 months after start of project
iii. Field planting of produced seedlings completed within first year of project
iv. Assessment of survival, beating up completed three months after planting
v. Monitoring of growth rate of planted timber trees and NTFPs started six months after planting
vi. Density and diversity of indigenous timber tree species and NTFPs increase by 30% as compared to baseline in forests by 2015

Output 3: Financial value of timber trees before final rotation and environmental services including forest carbon stocks determined

Indicators

i. Ecosystem services within planted forest identified by end of 2010
ii. Capacity of local communities built in determination of carbon stocks by first quarter of 2011
iii. Ecosyem services quantified and valued by first quarter of 2011
iv. Identification of methodology for predicting the financial values timber trees before final rotation and environmental services including carbon stock by mid 2011
v. 60 people have their capacity built in methodologies by end of 2011
vi. Methodology applied to calculate financial values by first quarter of 2012

Output 4: Feasibility of designing and implementing PES scheme for communities in planted forests areas

Indicators

i. Expected governance structures, determined by June 2011
ii. Opportunities & challenges for PES design and implementation determined by third quarter in 2011
iii. Equitable benefit sharing mechanism available by first quarter in 2012
iv. Information on feasibility of implementing PES for areas with planted forests available by end of 2012
v. Mechanisms for equitable benefit sharing available by 2012.

3.1.2 Activities

Output 1: Management options and strategies identified and implemented

Activity 1.1: Determination of the state of forest cover and land use types in the study area

Activity 1.2: Mobilisation of stakeholders

Activity 1.3: Determination of indigenous knowledge on options and strategies
Activity 1.4: Determination of management options and strategies
Activity 1.5: Building the capacity of local communities in available options and strategies
Activity 1.6: Development of management plans
Activity 1.7: Implementation of management options, strategies and monitoring mechanisms

Output 2: The diversity and density of indigenous timber species and NTFPs in plantations increased.
Activity 2.1: Selection of timber species and NTFPs for plantation establishment
Activity 2.2: Development of capacity of local communities in the production of NTFPs and indigenous timber trees
Activity 2.3: Identification of suitable planting techniques for timber trees and NTFPs
Activity 2.4: Assessment of survival and monitoring growth rate of planted timber trees and NTFPs

Output 3: Financial value of timber species before final rotation and environmental services including carbon stocks determined
Activity 3.1: Identification and mapping of key ecosystem services.
Activity 3.2: Building the capacity of local communities in determination of forest carbon stocks.
Activity 3.3: Quantification of key ecosystem services including forest carbon
Activity 3.4: Economic valuation of key ecosystem services
Activity 3.5: Identification of methodology for predicting the financial values timber trees before final rotation
Activity 3.6: Application of methodologies to determine financial values.

Output 4: Feasibility of designing and implementing PES scheme for communities in planted forests areas
Activity 4.1: Determination of current and expected governance structures.
Activity 4.2: Determination of opportunities & challenges for PES and mechanisms for dealing with challenges.
Activity 4.3: Determination of equitable benefit sharing mechanism.
Activity 4.4: Validation of results and compilation of report.

3.2 Implementation approaches and methods

Community based management projects are based on the empowerment of the rural communities in the management of forest resources with a view to satisfying their wants and promoting local development. Thus in this context, the strategy developed for the project is based on a KEG (Knowledge-Empowerment-Governance) approach: The approach will be as follows:

Knowledge
Start up workshop: There will be a startup workshop where all relevant stakeholders with special emphasis on local communities including women will be briefed about the project. The stakeholders will be requested to make contribution to the project planing and implementation. Roles and responsibilities of stakeholders will be determined and monitoring mechanisms will be established. Periodic meetings will be organized to evaluate the progress of work.
Gender and special community group representation will also be identified. Institutional roles and responsibilities as well as resource mobilization will also be identified and detailed out in a Memorandum of Understanding (MOU). All studies and surveys to be carried out will be of reasonable magnitude so as to provide data that will contribute to community based forest management.

The project will increase also the knowledge and understanding on issues that will contribute to community based forest management. Thus capacity building programmes will be made on : Options and Strategies for forest management, preparation and implementation of management plans, Seedling production of selected species, Methodology for calculation of financial values of timber trees before reaching legal size for exploitation and ecosystem services .Studies will also be made on Opportunities and Challenges for PES.The studies will be conducted using desk studies to identify existing literature, and using PAR methodology (administering questionnaires and having focus group discussions with stakeholders.

Empowerment

The capacity building programmes conducted will empower local communities to manage their forest, increase the diversity and density that they have need for,calculate financial values of timber trees before they have reached final exploitation size and also of environmental services including carbon stock. A manual on the community based forest management will also be produced. This will serve as reference for local communities and other stakeholders in the implementation of community based forest management after the project implementation. The improvement of the capacities of the stakeholders especially the local communities and the provision of reference in the form of the manual will contribute to institutionalizing of the practice within local communities.

Governance

The project will determine from the communities a governance structure which will supervise the management of the forest as well as supervise the distribution any revenue the forest will generate in future through PRA. This will be validated with all the members of the community and the communities will instituitionalise this at any time that it becomes necessary.

3.3 Workplan

Outputs and Activities	Responsible Party	Schedule (in quarters)											
		Year 1				Year 2				Year 3			
		1	2	3	4	5	6	7	8	9	10	11	12
Output 1: Management options and strategies identified and implemented													
1.1. Determination of the state of forest cover and land use types in the study area	F. Dwomoh												
1.2. Mobilisation of stakeholders	D. Blay												
1.3. Determination of indigenous knowledge on options and strategies	D. Blay/L. Damnyag												
1.4. Determination of management options and strategies	D. Blay												
1.5. Building the capacity of local communities in available options and strategies	L. Anglaaere												
1.6. Development of management plans	D. Blay/L. Anglaaere												
1.7. Implementation of management options, strategies and monitoring mechanisms	Project Team												
Output 2: The diversity and density of indigenous timber species and NTFPs in plantations increased													
2.1. Selection of timber species and NTFPs for plantation establishment	K. T. Ampofo												
2.2. Development of capacity of local communities in the production of NTFPs and indigenous timber trees	K. T. Ampofo												
2.3. Identification of suitable planting techniques for timber trees and NTFPs	K. T. Ampofo /D. Blay												
2.4. Assessment of survival and monitoring growth rate of planted timber trees and NTFPs	L. Anglaaere/ K. T. Ampofo												

Output 3: Financial value of timber species before final rotation and environmental services including carbon stocks determined													
3.1. Identification and mapping of key ecosystem services	F. Dwomoh												
3.2. Building the capacity of local communities in determination of forest carbon stocks	F. Dwomoh												
3.3. Quantification of key ecosystem services including forest carbon	F. Dwomoh/L. Damnyag												
3.4. Economic valuation of key ecosystem services	L. Damnyag												
3.5. Identification of methodology for predicting the financial values timber trees before final rotation	L. Damnyag/D. Blay												
3.6. Application of methodologies to detdermine financial values	L. Damnyag/ F. Dwomoh												
Output 4: Feasibility of designing and implementing PES scheme for communities in planted forests													
4.1. Determination of current and expected governance structures	D. Blay/L. Damnyag												
4.2. Determination of opportunities & challenges for PES and mechanisms for dealing with challenges	L. Damnyag/ D. Blay												
4.3. Determination of equitable benefit sharing mechanism	D. Blay/L. Damnyag												
4.4. Validation of results and compilation of report	D. Blay/L. Damnyag												

3.4 Budget

3.4.1 Master budget schedule

Outputs and Activities	Inputs		Unit Costs	Source (I or E)	Year	Budget Component	TOTAL US$
	Units and Quality	No.					
Output 1: Management options and strategies identified and implemented							
Activity 1.1: Determination of the state of forest cover and land use types in the study area	GIS/ Remote sensing expert	3	500	(I)	Y1	11.4	1500
	Forester	1	500	(I)	Y1	11.3	500
	Agroforester	1	500	(I)	Y1	11.2	500
	DSA	12	100	(I)	Y1	31.1	1200
	Fuel	150	3.8	(I)	Y1	53	570
	Vehicle maintenance	1	500	(I)	Y1	52	500
	Satellite images	1	2000	(I)	Y1	51	2000
Activity 1.2: Mobilisation of stakeholders	Socio-economist	1	500	(I)	Y1	11.5	500
	Agroforester	1	500	(I)	Y1	11.2	500
	Forester	1	500	(I)	Y1	11.3	500
	DSA	20	100	(I)	Y1	31.1	2000
	Fuel	400	3.8	(I)	Y1	53	1520
	Vehicle maintenance	1	500	(I)	Y1	52	500
	Stakeholder workshop	1	6000	(I)	Y1	61	6000
Activity 1.3: Determination of indigenous knowledge on options and strategies	Forester	2	500	(I)	Y1	11.3	1000
	Socio-economist	1	500	(I)	Y1	11.5	500
	Agroforester	1	500	(I)	Y1	11.2	500
	DSA	12	100	(I)	Y1	31.1	1200
	Forest Technicians	2	250	(I)	Y1	11.6	500
	DSA	20	50	(I)	Y1	31.1	1000
	Fuel	400	3.8	(I)	Y1	53	1520
	Vehicle maintenance	1	500	(I)	Y1	52	500

Activity 1.4: Determination of management options and strategies	Forester	2	500	(I)	Y1	11.3	1000
	Agroforester	2	500	(I)	Y1	11.2	1000
	GIS/ Remote sensing expert	1	500	(I)	Y1	11.4	500
	Socio-economist	2	500	(I)	Y1	11.5	1000
	DSA	24	100	(I)	Y1	31.1	2400
	Forest Technicians	5	250	(I)	Y1	11.6	1250
	DSA	20	50	(I)	Y1	31.1	1000
	Incentives to local communities	100	50	(I)	Y1	64	5000
	Stakeholder workshop	1	6000	(I)	Y1	61	6000
	Fuel	400	3.8	(I)	Y1	53	1520
	Vehicle maintenance	2	500	(I)	Y1	52	1000
Activity 1.5: Building the capacity of local communities in available options and strategies	Forester	3	500	(I)	Y1	11.3	1500
	Agroforester	3	500	(I)	Y1	11.2	1500
	Socio-economist	3	500	(I)	Y1	11.5	1500
	DSA	30	100	(I)	Y1	31.1	3000
	Forest Technicians	6	250	(I)	Y1	11.6	1500
	DSA	50	50	(I)	Y1	31.1	2500
	Incentives to local communities	100	40	(I)	Y1	64	4000
	Fuel	500	3.8	(I)	Y1	53	1900
	Vehicle maintenance	3	500	(I)	Y1	52	1500
Activity 1.6: Development of management plans	Forester	4	500	(I)	Y1	11.3	2000
	Agroforester	4	500	(I)	Y1	11.2	2000
	Socio-economist	2	500	(I)	Y1	11.5	1000
	GIS/ Remote sensing expert	2	500	(I)	Y1	11.4	1000
	DSA	30	100	(I)	Y1	31.1	3000
	Forest Technicians	8	250	(I)	Y1	11.6	2000
	DSA	40	50	(I)	Y1	31.1	2000
	Incentives to local communities	100	40	(I)	Y1	64	4000
	Fuel	400	3.8	(I)	Y1	53	1520

	Vehicle maintenance	1	500	(I)	Y1	52	500
Activity 1.7: Implementation of management options, strategies and monitoring mechanisms	Forester	5	500	(I)	Y2	11.3	2500
	Agroforester	5				11.2	0
	Socio-economist	4	500	(I)	Y2	11.5	2000
	GIS/ Remote sensing expert	3	500	(I)	Y2	11.4	1500
	DSA	40	100	(I)	Y2	31.1	4000
	Fuel	600	3.8	(I)	Y2	53	2280
	Vehicle maintenance	3	700	(I)	Y2	52	2100
	Incentives to local communities	200	40	(I)	Y2	64	8000
	Forester	4	500	(I)	Y3	11.3	2000
	Agroforester	4	500	(I)	Y3	11.2	2000
	Socio-economist	3	500	(I)	Y3	11.5	1500
	GIS/ Remote sensing expert	2	500	(I)	Y3	11.4	1000
	DSA	30	100	(I)	Y3	31.1	3000
	Fuel	550	3.8	(I)	Y3	53	2090
	Vehicle maintenance	3	500	(I)	Y3	52	1500
	Incentives to local communities	200	40	(I)	Y3	64	8000
Output 2: The diversity and density of indigenous timber species and NTFPs in plantations increased							
Activity 2.1: Selection of timber species and NTFPs for plantation establishment	Forester	2	500	(I)	Y1	11.3	1000
	Agroforester	1	500	(I)	Y1	11.2	500
	DSA	12	100	(I)	Y1	31.1	1200
	Fuel	100	3.8	(I)	Y1	53	380
	Vehicle maintenance	1	700	(I)	Y1	52	700
	Forest Technicians	2	250	(I)	Y1	11.6	500
	DSA	10	50	(I)	Y1	31.1	500
	Incentives to local communities	200	10	(I)	Y1	64	2000
Activity 2.2: Development of capacity of local communities in the production of NTFPs and indigenous timber trees	Forester	3	500	(I)	Y1	11.3	1500
	Agroforester	3	500	(I)	Y1	11.2	1500

	DSA	20	100	(I)	Y1	31.1	2000
	Fuel	200	3.8	(I)	Y1	53	760
	Vehicle maintenance	1	700	(I)	Y1	52	700
	Training workshop	1	6000	(I)	Y1	61	6000
Activity 2.3: Identification of suitable planting techniques for timber trees and NTFPs	Forester	2	500	(I)	Y1	11.3	1000
	Agroforester	1	500	(I)	Y1	11.2	500
	DSA	20	100	(I)	Y1	31.1	2000
	Fuel	150	3.8	(I)	Y1	53	570
	Vehicle maintenance	1	500	(I)	Y1	52	500
	Forest Technicians	4	250	(I)	Y1	11.6	1000
	DSA	20	50	(I)	Y1	31.1	1000
	Incentives to local communities	100	10	(I)	Y1	64	1000
Activity 2.4: Assessment of survival and monitoring growth rate of planted timber trees and NTFPs	Forester	2	500	(I)	Y2	11.3	1000
	Agroforester	2	500	(I)	Y2	11.2	1000
	DSA	20	100	(I)	Y2	31.1	2000
	Fuel	400	3.8	(I)	Y2	53	1520
	Vehicle maintenance	2	700	(I)	Y2	52	1400
	Forest Technicians	6	250	(I)	Y2	11.6	1500
	DSA	40	50	(I)	Y2	11.6	2000
	Incentives to local communities	200	25	(I)	Y2	64	5000
	Forester	2	500	(I)	Y3	11.3	1000
	Agroforester	2	500	(I)	Y3	11.2	1000
	DSA	20	100	(I)	Y3	31.1	2000
	Fuel	400	3.8	(I)	Y3	53	1520
	Vehicle maintenance	2	700	(I)	Y3	52	1400
	Forest Technicians	6	250	(I)	Y3	11.6	1500
	DSA	40	50	(I)	Y3	31.1	2000
	Incentives to local communities	200	25	(I)	Y3	64	5000
Output 3: Financial value of timber species before final rotation and environmental services including carbon stocks determined							

Activity 3.1: Identification and mapping of key ecosystem services	GIS/ Remote sensing expert	4	500	(I)	Y2	11.4	2000
	Forester	2	500	(I)	Y2	11.3	1000
	DSA	30	100	(I)	Y2	31.1	3000
	Fuel	300	3.8	(I)	Y2	53	1140
	Vehicle maintenance	2	500	(I)	Y2	52	1000
	Forest Technicians	6	250	(I)	Y2	11.6	1500
	DSA	30	50	(I)	Y2	31.1	1500
	Satellite images	1	3000	(I)	Y2	51	3000
Activity 3.2: Building the capacity of local communities in determination of forest carbon stocks	GIS/ Remote sensing expert	2	500	(I)	Y2	11.4	1000
	Forester	2	500	(I)	Y2	11.3	1000
	DSA	20	50	(I)	Y2	31.1	1000
	Forest Technicians	6	250	(I)	Y2	11.6	1500
	DSA	40	50	(I)	Y2	31.1	2000
	Fuel	300	3.8	(I)	Y2	53	1140
	Vehicle maintenance	2	700	(I)	Y2	52	1400
	Training workshop (including venue, facilitation, transport, materials etc)	1	6000	(I)	Y2	61	6000
Activity 3.3: Quantification of key ecosystem services including forest carbon	GIS/ Remote sensing expert	4	500	(I)	Y2	11.4	2000
	Forester	4	500	(I)	Y2	11.3	2000
	DSA	30	100	(I)	Y2	31.1	3000
	Forest Technicians	8	250	(I)	Y2	11.6	2000
	DSA	50	50	(I)	Y2	31.1	2500
	Fuel	600	3.8	(I)	Y2	53	2280
	Vehicle maintenance	2	700	(I)	Y2	52	1400
Activity 3.4: Economic valuation of key ecosystem services	Socio-economist	4	500	(I)	Y2	11.5	2000
	Forester	2	500	(I)	Y2	11.3	1000
	GIS/ Remote sensing expert	1	500	(I)	Y2	11.4	500
	DSA	24	100	(I)	Y2	31.1	2400

	Forest Technicians	4	250	(I)	Y2	11.6	1000
	DSA	30	50	(I)	Y2	31.1	1500
	Fuel	250	3.8	(I)	Y2	53	950
	Vehicle maintenance	1	700	(I)	Y2	52	700
Activity 3.5: Identification of methodology for predicting the financial values timber trees before final rotation	Socio-economist	3	500	(I)	Y3	11.5	1500
	Forester	3	500	(I)	Y3	11.3	1500
	DSA	20	100	(I)	Y3	31.1	2000
	Fuel	200	3.8	(I)	Y3	53	760
	Vehicle maintenance	1	500	(I)	Y3	52	500
Activity 3.6: Application of methodologies to detdermine financial values	Socio-economist	2	500	(I)	Y3	11.5	1000
	Forester	2	500	(I)	Y3	11.3	1000
	DSA	20	100	(I)	Y3	31.1	2000
	Fuel	100	3.8	(I)	Y3	53	380
	Vehicle maintenance	1	700	(I)	Y3	52	700
Output 4: Feasibility of designing and implementing PES scheme for communities in planted forests							
Activity 4.1: Determination of current and expected governance structures	Socio-economist	2	500	(I)	Y3	11.5	1000
	Forester	2	500	(I)	Y3	11.3	1000
	DSA	20	200	(I)	Y3	31.1	4000
	Fuel	100	3.8	(I)	Y3	53	380
	Vehicle maintenance	1	500	(I)	Y3	52	500
Activity 4.2: Determination of opportunities & challenges for PES and mechanisms for dealing with challenges	Socio-economist	2	500	(I)	Y3	11.5	1000
	Forester	2	500	(I)	Y3	11.3	1000
	DSA	20	100	(I)	Y3	31.1	2000
	Fuel	100	3.8	(I)	Y3	53	380
	Vehicle maintenance	1	500	(I)	Y3	52	500
Activity 4.3: Determination of equitable benefit sharing mechanism	Socio-economist	4	500	(I)	Y3	11.5	2000
	Forester	4	500	(I)	Y3	11.3	2000

	DSA	30	100	(I)	Y3	31.1	3000
	Forest Technicians	6	250	(I)	Y3	11.6	1500
	DSA	40	50	(I)	Y3	31.1	2000
	Fuel	400	3.8	(I)	Y3	53	1520
	Vehicle maintenance	1	500	(I)	Y3	52	500
	Incentives to local communities	200	40	(I)	Y3	64	8000
Activity 4.4: Validation of results and compilation of report	Socio-economist	3	500	(I)	Y3	11.5	1500
	Forester	3	500	(I)	Y3	11.3	1500
	DSA	30	100	(I)	Y3	31.1	3000
	Forest Technicians	6	250	(I)	Y3	11.6	1500
	DSA	40	50	(I)	Y3	31.1	2000
	Fuel	400	3.8	(I)	Y3	53	1520
	Validation workshop	1	6000	(I)	Y3	61	6000
Non-activity based expenses							
	Project coordinator	12	700	(I)	Y1	11.1	8400
	Project coordinator	12	700	(I)	Y2	11.1	8400
	Project coordinator	12	700	(I)	Y3	11.1	8400
	Project coordinator	12	200	(E)	Y1	11.1	2400
	Project coordinator	12	200	(E)	Y2	11.1	2400
	Project coordinator	12	200	(E)	Y3	11.1	2400
	Driver	12	300	(I)	Y1	12.2	3600
	Driver	12	300	(I)	Y2	12.2	3600
	Driver	12	300	(I)	Y3	12.2	3600
	Project Secretary	12	350	(I)	Y1	12.1	4200
	Project Secretary	12	350	(I)	Y2	12.1	4200
	Project Secretary	12	350	(I)	Y3	12.1	4200
	4WD vehicle	1	40000	(I)	Y1	43	40000
	Premises	1	3000	(E)	Y1	41	3000
	Premises	1	3000	(E)	Y2	41	3000
	Premises	1	3000	(E)	Y3	41	3000

	Land	1	2000	(E)	Y1	42	2000
	Land	1	1200	(E)	Y2	42	1200
	Land	1	1200	(E)	Y3	42	1200
	Office supplies (Papers, cartridges, etc)	1	1200	(I)	Y1	54	1200
	Office supplies (Papers, cartridges, etc)	1	1200	(I)	Y2	54	1200
	Office supplies (Papers, cartridges, etc)	1	1200	(I)	Y3	54	1200
	Office supplies (Papers, cartridges, etc)	1	1000	(E)	Y1	54	1000
	Office supplies (Papers, cartridges, etc)	1	1000	(E)	Y2	54	1000
	Office supplies (Papers, cartridges, etc)	1	1000	(E)	Y3	54	1000
	Computer and accessories (2 laptops + 2 desktops, printer, scanner, camera, LCD projector)	1	10000	(I)	Y1	44.1	10000
	HP Designjet T1120 HD-MFP Plotter (for GIS/RS lab)	1	19000	(I)	Y1	44.3	19000
	Large-format scanner (A1/D-sized prints)	1	7000	(I)	Y1	44.3	7000
	Paper & ink for plotter	1	2500	(I)	Y1	52	2500
	Google Earth Professional software	1	3000	(I)	Y1	44.4	3000
	Precision cutter	1	400	(I)	Y1	44.2	400
	Clinometer	2	800	(I)	Y1	44.2	1600
	Consumables	2	2500	(I)	Y1	51	5000
	Consumables	1	2500	(I)	Y2	51	2500
	Consumables	1	2500	(I)	Y3	51	2500
	Consumables	1	500	(E)	Y1	51	500
	Consumables	1	500	(E)	Y2	51	500
	Consumables	1	500	(E)	Y3	51	500
	Media, publication & education	1	2000	(I)	Y1	55	2000
	Media, publication & education	1	2000	(I)	Y2	55	2000
	Media, publication & education	1	2000	(I)	Y3	55	2000
	Attending seminars, workshops & conferences	1	4500	(I)	Y1	32.1	4500
	Attending seminars, workshops &	1	4500	(I)	Y2	32.1	4500

	conferences						
	Attending seminars, workshops & conferences	1	4500	(I)	Y3	32.1	4500
	Steering Committee meeting	1	2500	(I)	Y1	63	2500
	Steering Committee meeting	1	2500	(I)	Y2	63	2500
	Steering Committee meeting	1	2500	(I)	Y3	63	2500
	Steering Committee meeting	1	1000	(E)	Y1	63	1000
	Steering Committee meeting	1	1000	(E)	Y2	63	1000
	Steering Committee meeting	1	1000	(E)	Y3	63	1000
	Auditing	1	1200	(I)	Y1	62	1200
	Auditing	1	1200	(I)	Y2	62	1200
	Auditing	1	1200	(I)	Y3	62	1200

(I) - Contribution of the ITTO

(E) - Contribution of the Executing Agency /Government of Ghana

3.4.2 Consolidated budget by component (in U.S. Dollars)

Budget Components		TOTAL Costs US$	YEAR 1	YEAR 2	YEAR 3
10	**Project Personnel**				
	11. National Experts (Long term)	-	-	-	-
	11.1. Project Coordinator	32,400	10,800	10,800	10,800
	11.2. Agroforester	12,500	8,500	1,000	3,000
	11.3. Forester	29,500	10,000	8,500	11,000
	11.4. GIS/Remote Sensing Expert	11,000	3,000	7,000	1,000
	11.5. Socio-economist	18,000	4,500	4,000	9,500
	11.6. Forest Technicians	20,750	6,750	9,500	4,500
	12. Other Personnel	-	-	-	-
	12.1. Secretary	12,600	4,200	4,200	4,200
	12.2. Driver	10,800	3,600	3,600	3,600
	12.3. Other Labour	-	-	-	-
	13. National Consultants (Short term)	-	-	-	-
	14. International Consultants	-	-	-	-
	19. Component Total	**147,550**	**51,350**	**48,600**	**47,600**
20	**Sub-contracts**				
	29. Component Total	**-**	**-**	**-**	**-**
30	**Travel**				
	31. Daily Subsistence Allowance	-	-	-	-
	31.1. National Experts/Consultants	75,900	26,000	22,900	27,000
	32. International Travel	-	-	-	-
	32.1. National Experts/Consultants	13,500	4,500	4,500	4,500
	39. Component Total	**89,400**	**30,500**	**27,400**	**31,500**
40	**Capital Items**				
	41. Premises	9,000	3,000	3,000	3,000
	42. Land	4,400	2,000	1,200	1,200
	43. Vehicles	40,000	40,000	-	-
	44. Capital Equipment	-	-	-	-
	44.1. Computer Equipment (Computers, printer, scanner etc)	10,000	10,000	-	-
	44.2. Forestry Equipment (Clinometer, precision cutter, etc)	2,000	2,000	-	-
	44.3. GIS/RS Equipment - HP Designjet Plotter & Large Format Scanner	26,000	26,000	-	-
	44.4. Software - Google Earth Professional	3,000	3,000	-	-
	49. Component Total	**94,400**	**86,000**	**4,200**	**4,200**
50	**Consumable Items**				

	51. Raw materials (Satellites images, Seeds, Polythene sacs etc)	16,500	7,500	6,000	3,000
	52. Spares (including vehicle manitenance)	22,500	8,900	8,000	5,600
	53. Fuel & Utilities	28,120	10,260	9,310	8,550
	54. Office Supplies	6,600	2,200	2,200	2,200
	55. Media, Publication and Education	6,000	2,000	2,000	2,000
	59. Component Total	**79,720**	**30,860**	**27,510**	**21,350**
60	**Miscellaneous**				
	61. Sundry	30,000	18,000	6,000	6,000
	62. Auditing	3,600	1,200	1,200	1,200
	63. Steering Committee	10,500	3,500	3,500	3,500
	64. Incentives to Local Communities	50,000	16,000	13,000	21,000
	69. Component Total	**94,100**	**38,700**	**23,700**	**31,700**
70	**National Managment Costs**				
	71. Executing Agency Management Costs	44,769	14,923	14,923	14,923
	72. Focal Point Monitoring	-			
	79. Component Total	**44,769**	**14,923**	**14,923**	**14,923**
	SUBTOTAL	**549,939**	**252,333**	**146,333**	**151,273**
80	**Project Monitoring and Administration**				
	81. ITTO Monitoring and Review	30,000	10,000	10,000	10,000
	82. ITTO midterm, final, ex-post Evaluation Costs	15,000	5,000	5,000	5,000
	83. ITTO Programme Support Costs (8% on items 10 to 82 above)	47,595	21,387	12,907	13,302
	84. Donor Montoring Costs	-			
	89. Component Total	**92,595**	**36,387**	**27,907**	**28,302**
90	**Refund of Pre-Project Costs (Pre-project budget)**				
100	**GRAND TOTAL**	**642,534**			

3.4.3 ITTO Budget by component (in U.S. Dollars)

Annual Disbursements Budget Components	Total	Year 1	Year 2	Year 3
10. Project personnel	**140,350**	48,950	46,200	45,200
20. Sub-contracts	**-**	-	-	-
30. Duty travel	**89,400**	30,500	27,400	31,500
40. Capital items	**81,000**	81,000	-	-
50. Consumable items	**75,220**	29,360	26,010	19,850
60. Miscellaneous	**91,100**	37,700	22,700	30,700
Subtotal 1	**477,070**	**227,510**	**122,310**	**127,250**
80. ITTO Monitor. Evaluation. Costs				
81. Monitoring and Review Costs (effective estimation)	**30,000**			
82. Evaluation Costs (effective estimation)	**15,000**			
Subtotal 2	**522,070**			
83. Program Support Costs (8% of Overall Budget)	**47,595**			
84. Donor Monitoring Costs	**-**			
90. Refund of Pre-Project Costs	**-**			
ITTO TOTAL	**569,665**			

3.4.4 Executing Agency budget by component (in U.S. Dollars)

Annual Disbursements Budget Components	Total	Year 1	Year 2	Year 3
10. Project personnel	**7,200**	2,400	2,400	2,400
20. Sub-contracts	**-**	-	-	-
30. Duty travel	**-**	-	-	-
40. Capital items	**13,400**	5,000	4,200	4,200
50. Consumable items	**4,500**	1,500	1,500	1,500
60. Miscellaneous	**3,000**	1,000	1,000	1,000
70. Executing Agency Management Costs	**44,769**	14,923	14,923	14,923
EXECUTING AGENCY/HOST GOVT. TOTAL	**72,869**	**24,823**	**24,023**	**24,023**

3.5 Assumption risks and sustainability

3.5.1 Assumption and risks

The project has the objective of empowering local communities to participate in the management and governance of the planted forests to achieve its prime aim of increasing provision goods and environmental services. Thus major stakeholders in this regards are the local communities and the officials of Forest Services Division who are currently responsible for forest resources in Ghana. However may be due to technical arrogance on the part of administrators and misunderstanding on the part of the local communities there may be conflict between these two major stakeholders especially as concerned with the utilization of goods and services.
This conflict if not minimized will demotivate the local communities and thus prevent from the project activities. To minimize the risks the following action will be taken.

- Determination of potential risks and actions to mitigate these through participatory consultation with all stakeholders.
- Development of conflict resolution mechanism between the stakeholders
- Empower local communities in the implementation of the mechanism
- Scale up dissemination of good lessons learnt in the implementation of project to the wider community outside the project areas.

3.5.2 Sustainability

To ensure sustainability of management strategies identified and implemented under the project, community-focussed management would be the foundation upon which the project team's approach in dealing with the communities in the project area would be built. The development of a high level of community involvement and organisation will be an overall objective that will be taken into consideration at all stages of the project cycle. Achieving environmental stability and sustainable provision of environmental services are of prime essence to Ghana. In view of this the project has the support of the government and all the local communities. Forestry projects are essentially long term. However it is hoped that the project objectives will be achieved by the year 2014. Therefore lessons learnt will serve as significant input in the overall improvement of SFM in Ghana and thus Ghana's contribution to Global SFM. The study area will serve for the transfer of knowledge from participating communities to non-participating ones.

Additionally, the following measures will be pursued to ensure sustainability of the outcomes and outputs of the project after ITTO funding has expired:

(i) Incorporate the project into the national programme on poverty reduction and economic growth. Thus the project can be presented as an innovative model to complement existing efforts on collaborative forest management being pursued by the Forestry Commission

(ii) Ensure that the activities are mainstreamed into the yearly plan of action of the Forestry Services Division of the Forestry Commission. This will ensure that the activities are budgeted for an implemented in their plan of operations

(iii) Incorporate the programme in the Environmental Plan of the District Assemblies so that the assembly can budget for it and also ensure that it is implemented. Already, the District Assemblies and the Unit Committees are enthusiastic in getting their areas benefit from the emerging carbon market. Therefore political support from the local government is high.

(iv) This project recognizes that building on and enhancing community-based forest management is essential to efficiently prevent and/or monitor deforestation and degradation. Already, Community Forest Committes (CFCs) are established in all the project areas the area. These are community-led with structures in the communities. This ITTO project will work closely with the CFCs and ensure gradual integration of the project activities into the activities of the CFCs.

(v) FORIG will continue to use the area as a research site for long-term studies on forest carbon accounting, assessment and monitoring of land use changes, forest resources modelling and other relevant researchable issues.

4 PART 4: IMPLEMENTATION ARRANGEMENTS

4.1 Organization structure and stakeholder involvement mechanisms

4.1.1 Executing agency and partners

The Executing Agency of the Project will be the FORIG and the collaborating partners will be Forest Service Division of the Forestry Commission, Faculty of of Renewable Natural Resources of the Kwame Nkrumah University of Science and Technology (KNUST) and most importantly the local communities (Figure 2).

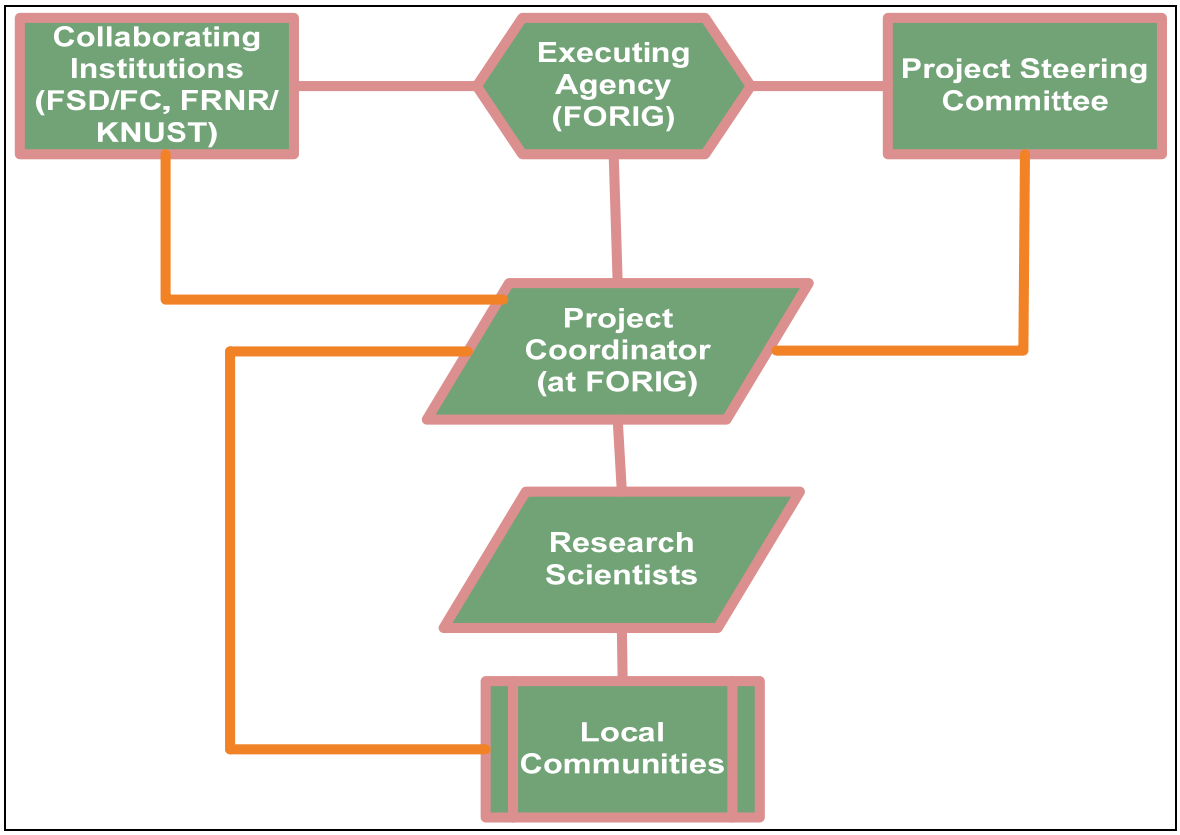


Figure 2: Organizational structure

Responsibilities

FORIG:

- Will nominate project coordinator
- Submit all reports relevant to the project implementation
- Ensure smooth implementation of the project
- Facilitate writing of all publications including scientific papers
- Collaborate with others to ensure smooth running of the project

Forest Services Division:

- Provide technical input to the preparation of management plans
- Facilitate in the identification of ecosystem services provided by the conservation area
- Liase with local communities to ensure effective participation

KNUST

- Responsible for all training sessions

Local Communities

- Will be responsible for implementation of most of the field activities

The Forest Service Division will contribute to the identification of the communities to take part in the project, other stakeholders and to provide technical advice on management. The Faculty of Renewable Natural Resources of the Kwame Nkrumah University of Science & Technology (KNUST) will contribute to training the local communities and in preparing progress reports.

4.1.2 Project management team

Key project staff and their responsibilities will be:

- *Dr. Dominic Blay*: (Project Coordinator, Forester/Ecologist), Forestry Research Institute of Ghana (FORIG). He is responsible for the design of the project; the execution and coordination of all aspects of the project; collection and collation of project reports for all participating scientists and community project teams. He will also be take charge of all forestry & ecological aspects of the project.

- *Mr. Francis K. Dwomoh:* (GIS/Remote Sensing Expert and Silvicultrist), FORIG. He will be responsible for all aspects of the project related to silviculture, carbon accounting and mapping.

- *Mr Lawrence Damnyag*: (Social-economist), FORIG. He will be in charge of all socio-economic studies and for organizing workshops.

- *Dr. Luke Anglaare* (Agroforester), FORIG. He will take responsibility of all agro-forestry related aspects in the project implementation

- *Dr. Kwame Twum Ampofo*: (Silviculturist/Agroforester), Faculty of Renewable Natural Resources of the Kwame Nkrumah University of Science and Technology. He will be responsible for organizing capacity building activities.

- Local representatives, Responsible for representing local communities on Monitoring and Evaluation Team

4.1.3 Project steering committee

The steering committee will have representatives from:

- Forestry Research Institute of Ghana (FORIG)
- Representative of the Ministry of Lands and Natural Resources
- Representative of Distrct Assemblies
- Forestry Commission
- Representative of Local Communities
- Representative of Traditional Authorities
- Representative of NGO

- The steering committee will meet once a year to review the project and provide guidance to ensure successful implementation of the project.

4.1.4 Stakeholder involvement and mechanisms

Stakeholders will be involved through participatory planning and implementation. Their role would include identification of management options and strategies, management of the planted forests, identification and valuation of ecosystem services including including carbon stock, determination of structure of paymemt of environmental services; determination of good governance and benefit sharing arrangements. Stakeholders at the local communities would play active role in the overall execution of field activities, especially on forest monitoring and carbon accounting.

4.2 Reporting, review, monitoring and evaluation

(a) Project Progress Report

The project coordinator will be responsible for the preparation of project process reports minimum four weeks before each ITTO monitoring visit and two months before ITTC sessions.

(b) Project Completion Report

The project coordinator will be responsible for the compilation of the project completion report and have it submitted to ITTO within three months of the project completion.

(c) Project Technical Report

Project technical reports will be prepared by project staff responsible for specific technical activities, peer reviewed by other project staff and submitted to ITTO by the project coordinator. All technical reports will be disseminated at the national, sub-regional as well as international level in order to share lessons learnt by this project with other actors in area of Rehabilitation of degraded forests.

(d) Monitoring, Review and Steering Committee's visits

ITTO monitoring visits will be carried out every 12 months, a total of 4 visits throughout the project cycle. An internal monitoring and self-evaluation for the project will be carried out .To do this, a monitoring committee of five (5) members made of three members selected by the community and two project team members in each project area. This tea\m will be responsible for ensuring the successful execution of project in their respective areas and will required to submit progress on activities in their areas bi- yearly (before submission to progress report to ITTO) to the project coordinator .

The results of the self-evaluation will be used in fine-tuning the activities foreseen for the rest of the project cycle. The project steering committee will meet once a year to discuss project technical details as well as to approve certain documents, such as the yearly plan of operations (YPO).

4.3 Dissemination and on mainstreaming of project learning

Dissemination and mainstreaming of management of planted forests by local communities and rehabilitation of degradred areas by local activities into SFM would emerge out of this study. In all, technical lessons learnt will be essential information for the development of these in Ghana. Technologies developed from these and monitoring will be a significant contribution for the realisation of SFM. This in particular will improve SFM in Ghana and Ghana's commitment to the global agenda.

4.3.1 Disseminating of project results

Results of the project will be disseminated as follows:

(i) Final workshop will be held at the end of the project to disseminate the results of the project as well as agree on follow up actions.

(ii) Web site developed on the Internet to disseminate the results of each activity completed

(iii) Scientific publications will be made scientific journals.

(iv) Media publications will also be made especially during the steering committee meeting

4.3.1 Mainstreaming of project learning

Technical lessons learnt will be used for the development of overall national community based forest management strategy and help in scaling up to other communities which may be interested in having forests of their own and subsequently manage them. Technologies developed on forest carbon inventory and monitoring especially by local communities will be significant contribution in the development of methodologies for the realisation of REDD in other communities in Ghana and in other tropical countries in Africa. The methodology for financial valuation of trees before trees reach legal size for exploitation and economic valuation of ecosystem services could be used by other communities and even nationally. Results of feasibility for desgning and implementing PES will also be applied nationally.

REFERENCES

Clay and Clement (1997). Rain forest extraction and conservation in Amazonia. *Geographical Journal*

FAO (2003). Forestry Study Outlook Study for Africa. FAO Forestry paper 141

Hall, J. B., & Swaine, M. D. (1981). Distribution and ecology of vascular plants in a tropical rain forest: Forest vegetation in Ghana: W. Junk, The Hague.

Hawthorne,W.D. (1989). The flora and vegetation of Ghana's forests. In: Ghana forest inventory proceedings (pp. 8–13). Overseas Development Agency/Ghana Forestry Department, Accra.

Leakey,R. R.B & Newton, A.C., (1994). The domestication of indigenous fruit trees opportunities and challenges for agroforestry. In: *Proc. 4th International BIO-REFOR Workshop* (Eds K Suzuki, S Sakurai, K Ishii & M Norisada), 15-26, BIO-REFOR, Tokyo, Japan.

Prah E. (1994). Sustainable management of the tropical high forest of Ghana (pp. 73). London:

International Development Research Centre

SCBD (2008). Guidelines for Mainstreaming Gender in Biodiversity strategies and Plans

Shrestha, P.M. and Dhillion, S. S. (2006). Diversity and traditional knowledge concerning wild food species in a locally managed forest in Nepal, Agroforestry Systems, Volume 66, Number 1, p.55-63, United Nations Department of Social and Economic Affairs- Sustainable Forest Managenent

Wagner, M. R. and Cobbinah, J. R. (1993). Deforestation and sustainability in Ghana: the role of tropical forests. Ghana Journal of Forestry, 91, 36–39.

Annex 1. Profiles of Forestry Research Institute of Ghana (FORIG)

The Forestry Research Institute of Ghana is one of the 13 institutes of the Council for Scientific and Industrial Research (CSIR). It is located at Fumesua near Kumasi in the Ashanti Region of Ghana. It started as a research unit within the Forestry Department in 1962. It was fully established as a research institute and named FOREST PRODUCTS RESEARCH INSTITUTE (FPRI) under the then Ghana Academy of Sciences in 1964 and in 1968 placed under the Council for Scientific and Industrial Research (CSIR).By Act of Parliament (Act 405) the Institute was transferred from the CSIR to the Forestry Commission in 1980. In 1991, the name of the Institute was changed to Forestry Research Institute of Ghana to reflect the widening scope of its research activities. In 1993, by another Act of Parliament (Act 453) the Institute was reverted to the CSIR.

The goals of FORIG are:

- Conduct user-focused research commissioned by its client
- Generate and disseminate useful scientific and appropriate technological information directly to its clients, stakeholders and the general public in a timely manner.
- Anticipate and address the major research information needs that are likely to face managers, policy makers, and stakeholders in the future, (i.e. develop capacity for quick response to changing circumstances)
- Enhance its institutional capability through appropriate training programmes to address technical problems in forestry resources protection, sustainable management, and utilization.
- Contribute, through research to the social, economic and environmental well-being of the people of Ghana
- Enhance the sustainable management, conservation and efficient utilization of Ghana's forest resources
- Foster strong linkages, through collaborative research across disciplines among forestry professional, stakeholders and external institutions.

FORIG has the following objectives:

- Develop technologies for sustainable management of natural forests and biodiversity conservation

- Develop technologies fundamental to the success of plantation forestry. Generate technological properties and develop appropriate processing techniques for the efficient utilization of Ghana's forest resources
- Enhance sustainable management and utilization of non-timber forest products (NTFPs)
- Mobilize, process and disseminate information critical to the management of Ghana's forest resources
- Strengthen capacity and use it for optimum research and commercialized services
- Establish mechanism for attracting financial assistance from donors, private and public institutions for research
-

Expertise: The Institute has specialists in Silviculture, Entomology, Forest botany, Forest ecology, Seed technology, Mensuration / Statistics, Genetics, Agro-forestry, Socio-Economics and Marketing and Information Science, GIS and Remote Sensing.

Staff Strength: The Institute has total staff strength of 278 made up of 47 senior members 17 who have Ph.D degrees and the remaining with M.Sc degrees and 61 non-research senior officers.

Facilities:

The Institute's permanent offices and laboratories are located at Fumesua, near Kumasi. It has research centres at Bobiri and Amantia both in the Moist, Semi-Deciduous Forest Zone, Benso in the Wet Evergreen Zone, and Bolgatanga in the Savannah zone. There are also research stations at Subri, Afram Headwaters, Pra-Anum, Accra plains, Northern grassland, Bia Tano and Asenanyo.

Externally Funded Projects

FORIG has won a number of competitive grants/donor supports for a wide variety of projects. Currently, there are over 10 donor-funded projects. These are in the areas of forest management, wood utilization and construction, sivliculture and management and entomology.

Donors/sponsors are varied and range from bilateral support through to researcher support. Our donors include ITTO, DFID, AAS and the European Union. Below is the list of some on-going donor sponsored projects:

- Silviculture and Economics of Improved Natural Forest Management in Ghana
- Processing and Utilization of Logging Residues through Collaboration with Local Communities and Forest Industries
- Development of an Integrated Strategy for Reduction of Shoot Borer Impact on African Mahogany in the Tropical Humid Forest of Africa
- Increasing Productivity and Quality of West African Teak Plantations using Genetic Diversity and Sustainable Management
- Rehabilitation of Mined Sites
- Rehabilitation of Degraded Forests in the Savanna
- Rehabilitation of Degraded Forests through Collaboration with Local Communities
- Sustainable Development of Bamboo Resources in Ghana and Togo (AFORNET)
- Genetic Improvement, Productivity and Biodiversity Conservation of *T. scleroxylon* (AFORNET)
- Flower induction and mass productivity and biodiversity of *T. scleroxylon* using tissue culture (TWAS)
- Alternative mixed plantation systems and restoration strategies for conservation and sustainable production of timber species in Ghana (ITTO)
- Silvicultural strategies for mitigating shootborer impact on African Mahogany; Effect of pruning and companion planting (IFS)

Responding to the challenges and demands of national and global trends FORIG is an active member of prestigious international associations such as Commonwealth Forestry Association, International Union of Forestry Research Organizations (IUFRO) and International Union for the Conservation of Nature (IUCN).

Annex 2: Curricula vitae of the key staff

Dominic BLAY – Principal Research Scientist – Forestry Research Institute of Ghana

Dr. Blay is a principal research scientist at the Forestry Research Institute of Ghana with an expertise on restoration of degraded lands, forest fires, rural forestry and local community collaboration as well as monitoring and evaluation. He has a wide scientific experience on forestry including field experience from different parts of Ghana, Nigeria, Papua New Guinea, Brazil and Austria. He has been the project leader of numerous researches and field projects in his country and is a member of various forestry related professional associations.

- Date and place of birth and nationality: 04 August 1950 Ghana, Ghanaian
- Field and institution of graduation: Botany and Biochemistry, University of Ghana, Legon, Ghana
- Field and institution of post-graduation: M.Sc. Forestry Resources Management, University of Ibadan, Nigeria, Dr. rer. nat. tech. Forestry Ecology, Universitat fur Bodenkultur, Vienna, Austria.

Lawrence DAMNYAG – Environmental and Natural Resources Economist

He is a Research Scientist-(Forest Economics) at the Forestry Research Institute of Ghana. His expertise and relevant experiences include questionnaire design and data analysis, Rural households poverty-environment/forest analysis, Farm/environmental/forest resources valuation, Natural resources decision analysis and working with local communities on natural resources management. He has experience in the application of the following software for data and decision analysis; i) Eviews, ii) SPSS, iii) LIMDEP and v) DEFINITE

- Date and place of birth and nationality: 04 July 1963 Ghana, Ghanaian
- Field and institution of graduation: Economics with statistics, University of Ghana, Legon, Ghana

Field and institution of post-graduation: M.Phil Economics, specializing in Econometrics and Environmental and Natural Resources Economics

Francis K. DWOMOH –Silviculturist/ Remote Sensing & GIS Expert

Mr. Francis Kwabena Dwomoh is currently a Research Scientist at the Forestry Research Institute of Ghana. He is a silviculturist and an expert in Remote Sensing and Geographic Information Systems (GIS) with specialisation in the management of natural resources. His current resarch interests include monitoring and modelling of tree/forest resources, tropical land-cover/land-use changes and ecosystem services. More specific interests are the application of Remote Sensing and GIS techniques in fire behaviour modelling; assessment and modelling of carbon sequestration/emissions from tropical forests. He has worked very well with local communities having worked as a silviculturist on the ITTO funded project 'Rehabilitating Degraded Forest through Collaboration with Local Communities PD030/97 Rev.6 (F)'.

- Date and place of birth and nationality: 7th February, 1978 Ghana, Ghanaian
- Field and institution of graduation: BSc. (Natural Resources Management) - KNUST, Kumasi, Ghana
- Field and institution of post-graduation: MSc. (Geo-information Science and Earth Observation for Natural Resource Management). ITC, Enschede, The Netherlands & KNUST, Kumasi, Ghana

Luke Anglaaere – Agroforester

Luke Anglaare is a Senior Research Scientist at the Forestry Research Institute of Ghana. He has expertise in Agroforestry and forest management. He has wide experience in community forestry, landuse dynamics as well as the design of agroforestry interventions.

- Field and institution of graduation: BSc. Natural Resources Management, KNUST, Kumasi-Ghana
- Field and institution of post-graduation: M.Sc. Agroforestry, KNUST, Kumasi-Ghana; Ph. D. Agroforestry, University of Wales, Bangor