

# INTERNATIONAL TROPICAL TIMBER ORGANIZATION

## ITTO

### PROJECT DOCUMENT

TITLE	CAPACITY BUILDING FOR CDM FORESTRY IN THE FRAMEWORK OF SFM EMPHASIZING COMMUNITY FORESTS AND POVERTY ALLEVIATION IN GHANA
SERIAL NUMBER	PD 450/07 Rev.2 (F,I)
COMMITTEE	REFORESTATION AND FOREST MANAGEMENT
SUBMITTED BY	GOVERNMENT OF GHANA
ORIGINAL LANGUAGE	ENGLISH

#### SUMMARY

The Samartex Timber and Plywood Company Ltd. has developed a highly successful agroforestry forestry model system for involving village people. This model has been developed for some 450 hectares and has involved nearly 1000 farmers, villagers and young people in various aspects of clearing, planting and maintaining productive plantations in addition to short and midterm agricultural and horticultural production systems to provide income to the participants and to decrease slash and burn as well as shifting agriculture. This model system has involved unique profit-sharing and land ownership agreements between chiefs, elders and village people. In this project, it is proposed to add a CDM component based on accurate growth and yield measurements and carbon inventory to verify and validate carbon storage from the original 450 hectare project. Furthermore, the community-based production forestry/agroforestry/ CDM model will be replicated in another community in the Dry Forest Region of Ghana.

EXECUTING AGENCY FORESTRY RESEARCH INSTITUTE OF GHANA (FORIG)

COOPERATING GOVERNMENTS ----

DURATION 36 MONTHS

APPROXIMATE STARTING DATE TO BE DETERMINED

BUDGET AND PROPOSED SOURCES OF FINANCE	Source	Contribution in US\$	Local Currency Equivalent
	<b>ITTO</b>	<b>402,516</b>	
	Gov't of Ghana (in kind)	110,039	
	Michigan Technological University	94,500	
	SAMARTEX (in kind)	59,200	
	<b>TOTAL</b>	<b>666,255</b>	

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## List of Acronyms

AAC	: Annual Allowable Cut
AfDB	: African Development Bank
CDM	: Clean Development Mechanisms
CER	: Certified Emission Reductions
CIDA	: Canadian International Development Agency
CIFOR	: Center for International Forestry Research
CRM	: Collaborative Resource Management
DANIDA	: Danish International Development Agency
DBH	: Diameter at Breast Height
DFID	: British Department for International Development
DNA	: Designated National Authority
FAO	: Food and Agriculture Organization
FORIG	: Forestry Research Institute of Ghana
FRMP	: Forest Resource Management Program
GEF	: Global Environmental Facility
GIPF	: Ghana Institute of Professional Foresters
GPS	: Global Positioning System
GTZ	: Deutsche Gesellschaft für Technische Zusammenarbeit
ITTO	: International Tropical Timber Organization
JICA	: Japan International Cooperation Agency
KFW	: Kreditanstalt Für Wiederaufbau
KNUST	: Kwame Nkrumah University of Science and Technology
MTU	: Michigan Technological University
NFS	: Nitrogen Fixing Species
NGOS	: Non-Governmental Organizations
NRMP	: Natural Resource Management Program
NTFP	: Non-Timber Forest Product
OCAP	: Oda-Kotomoso Community Agro forestry Project
PRSP	: Poverty Reduction Strategy Paper
ROCS	: Rubber Outgrowing and Carbon Sequestration
SFM	: Sustainable Forest Management
UN	: United Nations
UNDP	: United Nations Development Program
UNEP	: United Nations Environmental Program

UNFCCC : United Nations Framework Convention on Climate Change  
USA : United States of America  
USD : United States Dollars

## PART I. CONTEXT

### 1. Origin

Under the Clean Development Mechanisms (CDM) of the Kyoto Protocol, greenhouse-gas emission offsets are measured in metric tons of CO<sub>2</sub> equivalents and are called “Certified Emission reductions” (CERs). While CDM projects have made substantial progress in developing Asian and South American countries, only a handful have been initiated in Africa (Desanker, 2005). The recent ITTO-sponsored CDM Workshop in Accra, Ghana, December 2006 was an attempt to increase the awareness of the opportunities in CDM forestry in Africa. **This was follow up with an African Regional workshop to build capacity in project design document (PDD) of ITTO producer countries for Aforestation and Reforestation Projects Development under the CDM in Abidjan, Cote d’Ivoire (June 2008).** A major outcome of these workshops was a clear message that improved capacity building is needed in CDM forestry in Africa (Anon. 2006).

In this project, we aim to add a CDM component to an existing and highly successful community agroforestry/production forestry model system that the Samartex Timber and Plywood Company Ltd., a Ghanaian-based forest products company, has developed in western Ghana. This model system, the Oda-Kotomso Community Agroforestry Project (OCAP), has developed on some 450 ha and has involved nearly 500 farmers, villagers, and young people in various aspects of clearing, planting, and maintaining productive forest tree plantations, in addition to short- and midterm agricultural and

horticultural crops. The project is truly unique in Ghana as it involves technical outreach, profit-sharing and land ownership agreements between chiefs, elders, village people, and Samartex that provide a mechanism for long-term sustainable community forest management.

It is our intention to replicate the OCAP with another 100 ha site in the dry forest region of Ghana community using the knowledge generated from OCAP to build a successful community-based, agroforestry project with strong forest products and CDM components. Successful replication of the OCAP model system in a truly sustainable manner with shared land ownership would prove this concept can be developed elsewhere in Ghana and western Africa as a means to seriously address poverty alleviation, and restoration of degraded forest major goals for ITTO (ITTO, 2002).



**Figure 1.** An overview of the Oda-Kotomso Community Agroforestry Project (OCAP) in western Ghana. The project has been under development for the past 9 years and includes intensively-managed plantations of rapid growing, commercially important tree species such as *Cedrela odorata* (A), *Cieba pentandra* (B), as well as agricultural crops such as black pepper (C) and snails (D). In addition, a factory to generate gari from cassava employs some 40 people (E).

## **2. Ghana Sectorial Policies**

The objectives of this project are in conformity with the overall goal of Ghana's Forest and Wildlife Policy of 1994 which all the forest management related legislation, strategies, programmes and projects in Ghana should support. This is to "conserve and sustainably" develop the nation's forest and wildlife resources while maintaining environmental quality and perpetual flow of benefits to all segments of society". The Forestry Department Master Program (1996-2020) and the Poverty Reduction Strategy Paper (PRSP) of Ghana emphasize the importance of Collaborative Resource Management (CRM). In 2001 the Forestry Commission of Ghana developed a CRM policy and strategy with this goal; "Working partnership between different stakeholders which enhances the management and development of forest and wildlife resources and leads to equitable distribution of benefits".

Specifically, the priority objectives of the Forest and Wildlife Policy include:

- Manage and enhance Ghana's permanent forest estate for conservation of biological diversity and sustainable production of domestic and commercial produce.
- Promote research-based and technology-led forestry and wildlife management, utilisation and development to ensure resource availability, socio-economic growth and environmental stability.
- Promote public awareness and active involvement of rural people in forestry and wildlife conservation so as to maintain life-sustaining systems, preserve scenic areas, enhance the potential for recreation, tourism and wealth creation opportunities.
- Promote the development of viable and efficient forest-based industries, particularly in secondary and tertiary processing, so as to fully utilize timber and other non-timber forest products (NTFP) including health and wildlife resources that satisfy domestic, local, national and international demand at competitive prices.

Strategies outlined in the Forestry and Wildlife Policy, CRM, PRSP and supported by the proposed project are:

- 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.
- Enhance community involvement in the management of forest and wildlife resources and savannah woodland resources and improve the benefit flows to communities from resource sales.
- Increase community and farmer adaptation of improve land and water management techniques.

### **2.1 Ghana's Sectorial Policies on Plantation Establishment**

The goal of Ghana's plantation establishment initiative is to develop 200,000 ha of plantations that are financially, environmentally and socially sustainable by creating an enabling environment primarily for the private sector to engage and operate effectively in Best Practice plantation forestry, both industrial and non industrial. The policy recognized a distinction between industrial and nonindustrial plantations as they have different expectations, inputs, and requirements.

### **2.2 Ghana's Key Policy Principles for Plantations**

200,000 ha is a realizable target of forest plantations on suitable lands which are required for the economic development of Ghana because:

- It will satisfy the projected future demand for timber;
- It will rehabilitate unproductive lands;
- It will provide additional livelihood options for rural people and private sector;
- It will reduce pressure on natural forests;

- Plantations are one suitable land use for degraded forest reserves;
- The private sector is the principal sources of investment and engine of growth for plantation development;
- The government should act principally as a facilitator to the process by providing an enabling environment and appropriate support mechanisms and incentives;
- Forest plantation development must be environmentally and socially acceptable;
- Government forestry institutions should be reformed to make them accountable and cost effective;
- Existing industrial beneficiaries of natural forests should be obliged to reinvest in plantations to restore degraded forest reserves.

### 2.3 Ghana's Key CDM Principles

The Designated National Authority (DNA) of Ghana for the CDM is the Environmental Protection Agency. The forest national threshold for the afforestation and reforestation (A/R) CDM project is defined as

- crown cover: 30%
- tree height: 5.0 m
- minimum land area: 1 ha

Pristine forests which were degraded before 1990 and remain fallow without forest vegetation could be planted with trees and qualify for the A/R CDM project activity in Ghana. One A/R methodology has been submitted to the CDM Executive Board from Ghana for review: "ARNM0029: Rubber outgrowing and carbon sequestration in Ghana (ROCS – Ghana)".

### 2.4 Ghana's Land and Tree Tenure

- (i) Forest Reserves – The traditional stools own the land but have nothing to do with its management. The stools only have a share of the benefits that the government accrues from forest resources. The management is vested in government in trust for the land owners (stools). The law provides for the grant of lease to communities and commercial investors to encourage them to establish plantations in degraded forest reserves. The 2008 approved benefit sharing for commercial forest plantation development has a clearly defined tree ownership right for afforestation and reforestation in Ghana. Any body including communities that invest into commercial plantations on degraded forest lands, the benefits from the resources will be shared with this formula; Investor gets 90%, landowner (stool) 6%, Forestry Commission 2%, and Local community 2%. Here the investor manages the plantation until harvesting of the trees.

In the case of the improved Taungya plantation system, the government provide the seedlings for farmers to inter plant with their food crops in degraded forest reserve the benefit sharing is according to this formula; Farmer 40%, Government 40%, Landowner 15%, and local community 2%. Here the forestry commission manages the plantation after the farmers has collected his food crops.

- (ii) Outside forest reserves (private land) – Tree planting and forest resource development is protected by legislation that allows planted trees to be owned by those who plant them after investors have negotiated with landowners for their own benefit sharing schemes (eg the OCAP Agreement See appendix). Investors are required to register the land and get a tilte of deed to secure their investment on the land.

Off-reserve land (private/outside reserve land) available for plantations are subjected to market forces of supply and demand, based on the relative profitability of alternative land uses and land owners' preferences. The policy recognizes that grants, subsidies and incentives may encourage land owners to start plantations thereby reducing access to land for tenant farmers.

**In the short term this is unlikely to be an issue. Investors who want to acquire private land for forestry plantations have to establish a legal tenure with the landowners. The investor will then own the trees planted on the land. The investor can sell or use its produce for profit making as any other cash crop grown in Ghana e.g., cocoa, oil palm, etc.**

### **3. Program and Operational Activities**

Complementary measures and programs supported by legislative enactments to achieve the goals and objectives of the forest policies of Ghana include the following:

- Ensuring an equitable distribution of natural resource benefits to communities, resource owners, and farmers as a way of facilitating effective participation of all relevant stakeholders in the sustainable management and development of resources;
- Transparently and efficiently allocating timber resources through competitive bidding and controls against over-exploitation of timber;
- Appropriate pricing timber and other forest-based products to increase revenue, and thus address the problem of under-pricing of forest resources;
- Reviewing annual allowable cut (AAC) as a transitional measure to salvage valuable timber being destroyed in off-reserve timber utilization contract areas;
- Mobilizing chainsaw operators into alternative productive ventures, and the control of illegal chainsaw logging and lumbering operations;
- Rationalizing the timber industry and adopting fiscal, as well as market-based, incentives that improve the efficiency of the industry while at the same time encouraging down-stream processing of wood products;
- Developing an extensive forest plantation program so as to bridge the wood deficit in the timber industry while improving environmental quality; and
- Improving incentives with respect to the co-management of forest resources so as to ensure sustainability.

In this regard, there have been many programs to achieve this broad aim. Some of the programs include Forest Resources Management Program (FRMP) supported by The World Bank, the British Department for International Development (DFID), and Denmark's DANIDA. Currently, the above Institutions and the African Development Bank are supporting the Natural Resources Management Program (NRMP) and the National Plantation Development Project, respectively. Other major projects contributing to sustainable forest management in Ghana include

- (i) The community Forest Management Project funded by the African Development Bank (AfDB)
- (ii) The High Forest Biodiversity Conservation Project - funded GEF and the World Bank
- (iii) The participatory Forest Management in the Transition Zone Project – supported by JICA of Japan
- (iv) Wildfire Management Project and Wildlife Division Support Project being funded by the Royal Netherlands Government
- (v) The Northern Savannah Biodiversity Project funded by GEF and the World Bank
- (vi) The Land Administration Project funded being funded by the World Bank, FAO GTZ, DFID, KFW, CIDA etc

### **4. ITTO-Supported Projects in Ghana**

**Previous ITTO assisted projects in Ghana and lessons learnt from those implemented by FORIG:**

Project PD 3/95 Rev.2 (F) “Conservation and provenance plantings and integrated pest management to sustain Iroko production in West Africa (Ghana, Cote d’Ivoire, Cameroon)” achieved the objectives set with a couple of outstanding results, including the following:



- pattern of occurrence of Iroko in the natural forest of Ghana and its relationship to the pest *Phytolyra lata* is documented;
- the establishment of 1.5 hectares of conservation plot with species from various origin (Cote d'Ivoire, Liberia, Cameroon, Kenya and Sierra Leone);
- the creation of arboretum for the selection of adapted, provenances and pest-resistant genotypes;
- the establishment of a fully equipped nursery for cutting production, including irrigation facility (water pump and water storage tank), seedling production area and a rooting cutting production greenhouse;
- the establishment of 1-hectare clone bank of made up of 40 clones;
- the matching of Iroko planting material to the 3 major ecological regions in Ghana 1-hectare plot in each region;
- the planting of 3-hectare Iroko mixed with other plantation species and inter cropped with food crops;
- the training of 4 graduate students on the project using the project studies for their dissertation.

A number of lessons were learnt from this project, such as;

- The Executing Agency responsible for coordinating the project should preferably be in charge of the budget and finances to ensure the proper monitoring not only of expenditure and investments but also of research work progress.
- Partners should ensure that they stay regularly informed through modern means of communication
- Planning should ensure that all the partners are completely aware of their responsibilities and commitments before or at the start of the project
- Project must clearly identify and define the actors involved
- Project management and steering teams should remain as far as possible for the whole duration of the project
- A balance should be found between research and development in order to motivate and interest potential project beneficiaries (including a mid-term review in the case of a lengthy project)

Project PD 105/01 Rev.3 (F) “**Towards sustainable timber production in Ghana: Stage 1. Improving shoot borer resistance and developing silvicultural systems to maximize mahogany plantation success**”. The goal of this project is to improve the sustainability of mahogany timber supply in Ghana by developing an integrated pest management system to minimize the adverse effects of mahogany shoot borer on young mahogany plantations. The project is to examine methods of improving Mahogany plantation successes by enhancing shoot borer resistance/tolerance, cloning superior planting material, developing silvicultural systems that minimize shoot borer attack, examining semiochemical aspects of shoot borer attack, properties of plantation mahogany and economics of integrated mahogany plantation. The project which is in its final year in the first phase of implementation is being executed in collaboration with 3 timber companies and community tree growers. The project has been very successful in achieving its objectives and preliminary results are being tried by stakeholders across the high forest zone of Ghana.

Project PD 256/03 (F) “**Alternative mixed plantation systems and restoration strategies for conservation and sustainable production of native timber species in Ghana**”. The goal of this project is to identify prospects of mixed-species planting as alternative more sustainable plantation strategy to support the development of indigenous species plantations in Ghana. The project objectives include;

- to minimize pest damage to high value indigenous timber species and enhance their success in plantations using mixed-species planting approach;

- to demonstrate the ecological advantages of indigenous mixed-species plantations over exotic monoculture plantations
- to promote the establishment of indigenous mixed-species plantations as viable alternative forest plantation enterprise.

This project is currently in its 4<sup>th</sup> and final year of implementation with impressive preliminary results and likely to achieve all objectives..

Project PD30/97 Rev.6 (F). **Rehabilitation of degraded forests through collaboration with local communities.** The goal of this study was to arrest the decline and degradation of tropical forests in Ghana. The project achievements included training in nursery seedling production and management in 13 local communities- 4 each from Begoro, Dormaa, Ofinso and one community from the Asankragwa forest district. The communities were involved in rehabilitation of degraded forest through plantations of over 50 hectares. The project also contributed to poverty alleviation in the local communities by equipping project participants with the capacity to produce seedlings and sell to NGOs and agencies involve in plantations and tree planting for environmental sustainability.

Project PD04/98 Rev. 1(F). **Silviculture and economics of improved and natural forest management in Ghana.** This project aimed at improving natural forest management by developing efficient and cost effective selective logging and management practices in Ghana. A methodology has been developed to estimate the NTFP resources in selected forest reserves, and a yield regulation procedure in the form of a manual has been prepared. The manual has been used to train communities on the sustainable methods for harvesting various NTFPs. One FORIG staff was trained at the level of Phd in the best logging practices under this project.

PD 32/98 Rev. 1(F) **Forest fire management in Ghana.** The project largely achieved the specific objective through awareness creation programmes, adequate training offered to fire volunteers squads which increased their response rate to fires, establishment of networking among all the stakeholders, early detection and communication of fires. These measures have contributed to reduction in incidence of forest fires which is helping in reducing the extent of forest depletion. The success of the project could be attributed to its very strong collaborative nature, involving research institutions, implementation institutions, and the forest dependent communities.

**ITTO has` also supported the following projects in Ghana;**

1. Man-made forest of indigenous species - A systematic preparation of industrial tree plantations;
2. Better utilization of tropical timber resources in order to improve sustainability and reduce ecological impacts;
3. Industrial utilization and improved marketing of some lesser used species from a sustainable managed forest;
4. Handbook on tree and wood identification of 100 lesser used and lesser known species from tropical Africa with notes on ethnography, silviculture and uses;
5. Fire-management and post-fire restoration with local community collaboration in Ghana;
6. Investment promotion and enterprise development of the timber industry in Ghana; and
7. Development of energy alternatives for the efficient utilization of wood processing residue: Cogeneration and briquette production.

## PART II. THE PROJECT

### 1. Project Objectives

#### 1.1 Development Objective

The development objective of this project is to develop “the capacity for CDM forestry in Ghana via a community rehabilitation of Ghana’s degraded forests targeted at poverty alleviation in conjunction with sustainable forest management (SFM)”. This project will involve the private sector and native communities in SFM to be implemented in collaboration with the Oda-Kotomso Community Agroforestry Project of Samartex Timber and Plywood Company Ltd.

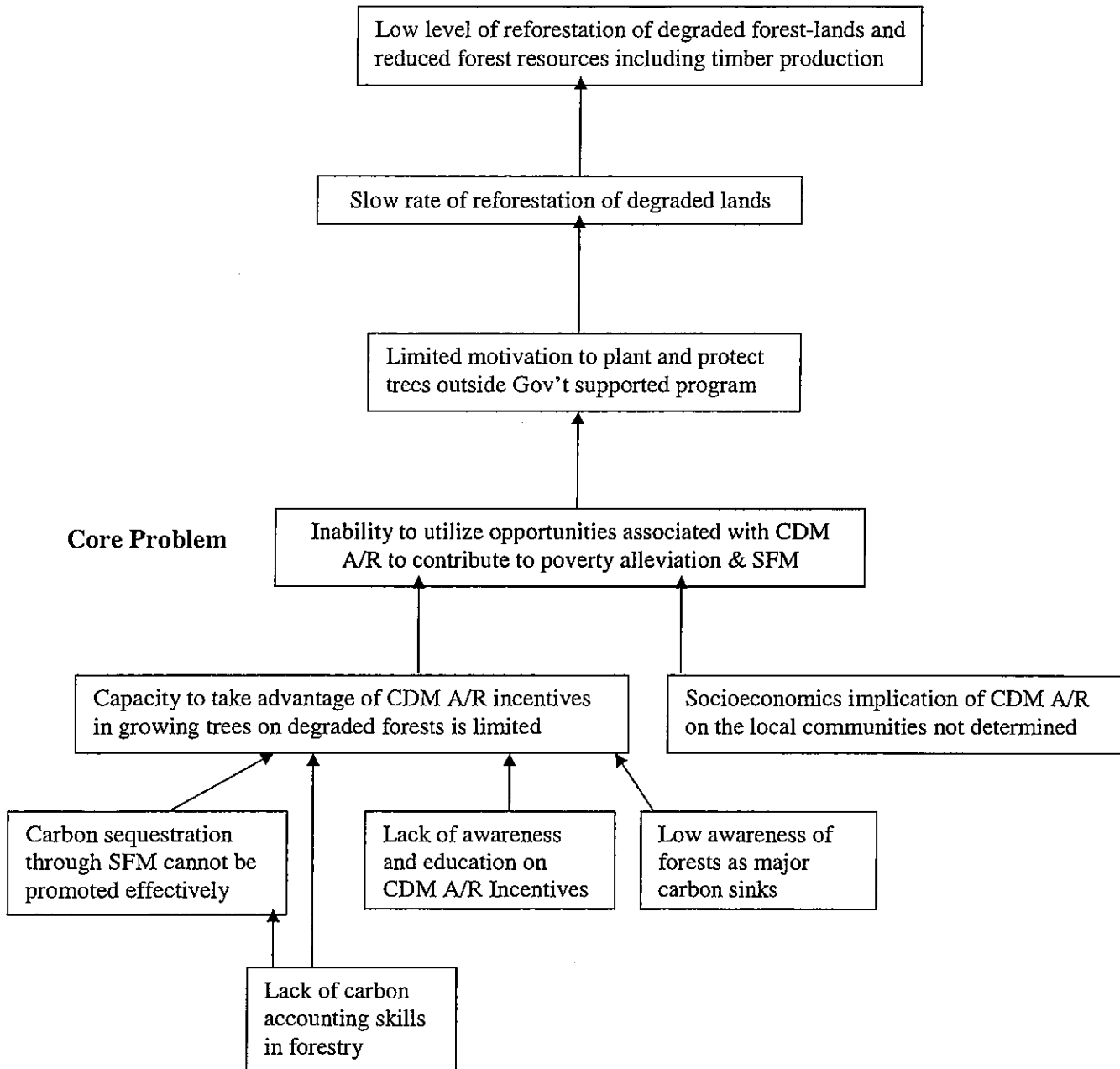
#### 1.2 Specific Objective

The specific objective of the project is to **improve capacity for CDM forestry in Ghana via a community forest targeted at poverty alleviation in conjunction with SFM.**

**Outputs expected to achieve the specific objective are listed below:**

- Output 1.* Carbon stocks of the current OCAP 450 ha project will be determined using GPS-supported comprehensive and complete measurement of all trees in the project.
- Output 2.* Mass spectrophotometric analysis will be done on wood samples from up to 5 trees each of the 19 tree species planted.
- Output 3.* A degraded forest (100 ha) will be reforested with the OCAP model using highly productive native timber species.
- Output 4.* Comprehensive socioeconomic studies related to CDM A/R will be conducted in the communities involved in the project.
- Output 5.* Capacity to conduct CDM forestry will be built with post graduate training of Ghanaian students and tree growers.
- Output 6.* Community-based CDM forestry methodology will be developed for the OCAP project.

## Problem Tree



## 2. Justification

### 2.1 Problems to be addressed

The Oda-Kotomso Community Agroforestry Project (OCAP) is a highly successful model sustainable forest production system that has been running successfully for nearly a decade in western Ghana. The project has many components that are of interest to ITTO's goals (ITTO, 2002) as the project promotes:

- Sustainable forest management to increase the availability of tropical timber with some 19 different important timber species being planted (Goal 3.1.2.1);
- Non-timber forest products with extensive plantings of long-term and short-term crops such as cola, black pepper, cassava, banana, snail farming, beekeeping and vegetable production (Goal 3.2.1.5);
- Restoring degraded tropical forests as the area's non-reserve forests were largely converted to cocoa plantations in the 1960s (Goal 3.2.2.3);
- Monitoring and assessing social, economic and environmental costs and benefits of sustainable forest management as extensive community involvement and training has been a key component (Goal 3.2.2.6); and
- Improving productive capacity of forests with intensive silvicultural practices including plantation establishment, pruning of lower limbs to create clear wood and straight stems, weed control to promote rapid growth, and thinning to promote more diameter growth on selected stems (Goal 3.2.2.10).

In this project, we seek to develop a pioneering CDM component to OCAP to acknowledge the considerable contribution of this project to mitigating the effects of rising CO<sub>2</sub> in the atmosphere (Goal 3.2.1.9) and to further encourage landholders of the value of holding their lands in forests for the long-term via the sharing of CDM monetary rewards (Figure 2).

It is important to develop the capacity to conduct CDM forestry projects in Africa (Desanker, 2005; Anon., 2006). The potential of CDM forestry in western Africa is very significant as large areas of the region's forests have been degraded via over-aggressive, unsustainable logging practices, slash and burn agricultural practices, and conversion of forests to alternative crops such as cocoa and are so, therefore, eligible for CDM reforestation projects.

This project has a strong poverty-alleviation component in an area with very high rural poverty (Anderson *et al.* 2006). Nearly 50% of western African people live below the poverty line of \$1 per day (UNDP, 2005). It is estimated that over two-thirds of Africa's 600 million people rely directly on forests for their livelihoods, including food security (CIFOR, 2005).

**The project is a follow up to the recommendations of the "International Workshop on the Clean Development Mechanism (CDM) Opportunities and Challenges for the Forest Industry Sector in the sub-Saharan tropical Africa, Accra, Ghana, 2<sup>nd</sup> to 4<sup>th</sup> October."**

### Capacity building for Africa in CDM projects

- African countries need support in building up capacities in the appropriate use of approved methodologies and other tools with regard of A/R CDM project activities
- African countries should be better supported to build capacity and to enhance their knowledge in forestry issues in the climate change negotiations especially on reducing

emissions from deforestation and forest degradation and afforestation and reforestation in the CDM to ensure that their priorities and needs are addressed.

- Sufficient training of local staff for increase capacity to formulate A/R CDM projects

#### **Project ideas – Formulating CDM Forestry projects for Africa**

- Multilateral institutions and potential CERs buyers are strongly encouraged to organize a workshop to consider potential project ideas from African countries
- African countries should address the issue of land tenure and property rights so as to facilitate the investments in Africa, including trade of CERs from forestry projects.
- Multilateral institutions should jointly explore with national partners the potential that the Programmatic CDM can offer order to facilitate and reduce transaction costs for A/R CDM projects in Africa. The programmatic CDM allows non-Annex I countries to formulate national level programmes that include CDM activities in specific sectors.
- Balance community needs/requirements with investor needs
- Develop capacity for tapping CDM opportunities; technical expertise e.g. carbon/biomass calculations, project design, understanding of procedures etc.
- Multi-sectoral cooperation e.g. Ministries of Lands, Environment, Forestry, Trade, etc.
- Platform/network for information sharing on CDM e.g. models, best practice showpiece etc.
- Production of manuals/guidelines and samples of approved CDM projects in various project activities

#### **CDM & Poverty alleviation**

- Simplify modalities and categories to participate in CDM projects
- Better definition of ownership of CER
- Poverty Impact Assessment tool/requirement
- Empowerment of target group (community, women, poor, local government)

#### **2.2 Intended Situation after Project Completion**

A Ghanaian Ph.D. student, up to 5 masters level students, 10 forestry technicians and a couple of community tree growers will have been trained in CDM forestry issues, and the Forest Research Institute of Ghana (FORIG) will be brought up to modern top standards for CDM forestry. Thus, Ghana will be positioned to play a major role in CDM forestry in western Africa.

The OCAP project farmer plots will have been thoroughly inventoried to allow for an accurate assessment of carbon mitigation over a nearly decade of existence and the project will be well positioned to apply for sale of carbon credits.

The OCAP project will have been replicated creating a total agroforestry plantation establishment of some 100 ha. Between the two projects, we will have involved nearly 500 western Ghana people who were at or below the poverty level.

The combination of a community-based, sustainable forestry management, agroforestry, and CDM forestry all in one project we are creating will be a model for other communities in Ghana and western Africa.

Wide accessibility of the model will be insured through a CDM Community Forestry handbook which we will prepare, the project's web site, and a series of scientific papers we will prepare on the project.

#### **2.3 Project Strategy**

This project builds on the successful OCAP Community Agroforestry Project in western Ghana and seeks to: (a) conduct the necessary inventory research necessary to determine the carbon mitigation (to develop a CDM project) obtained to date by the project which was initiated over 9

years ago and now includes about 450 ha in a number of different parcels near the community of Oda-Kotomso, and (b) replicate the OCAP experience on a second western Ghana community that has already been chosen and using the most successful components from OCAP. The key formula

involves a “buy in” by the farmers (50,000 cedis/acre) to the chiefs and elders which allows short-term agriculture (100% return to the farmer), medium-term fruit and nut crops (2/3 value to the farmer/1/3 to the chiefs and elders), and long-term forest crops (2/3 value to the farmer/1/3 to the chiefs and elders).

**The CDM credits would be partitioned as part of the long-term forest crop and would be a great incentive for people to hold these lands with trees.** The forest products company provides the seedlings and technical forestry advice and in return, it gets the first right to purchase the logs from the site. The large amount of forest degradation in the Samartex concession area of western Ghana is shown in Figure 3.

In the process of conducting this research, we will build the CDM forestry capacity at FORIG and via training of one Ghanaian Ph.D. student and several Ghanaian masters students.

#### 2.4 Target Beneficiaries

The forest industry in western Ghana will benefit from the timber to be eventually produced from our project’s plantations which will be maintained at highest commercial standards (with weeding, pruning, and thinning). The forest industry in Ghana and western Africa will benefit from the model we have developed as there is tremendous potential

to replicate the model, if successful, throughout western Africa’s forested regions.

The villagers, chiefs, and elders of the communities we work with will all share in the returns from the crops grown on the project lands. In addition, we estimate nearly 2,000 people will be employed on this project in weeding, clearing, and planting of the medium-term and long-term crops and in spin-off activities such as snail raising, beekeeping, and gari production.

FORIG will benefit from this project by becoming a lead CDM information source for all of Africa. The data we generate on carbon content of 10-year-old trees of some 19 important timber species in Ghana will be an invaluable resource in future CDM projects, as currently the carbon contents of important African tree species are not well documented.

#### 2.5 Technical and Scientific Aspects

CDM forestry involves a complex international oversight with elaborate systems for approving, verifying, validating projects and accruing emission reductions. This process is widely seen as too complex and costly for many developing countries to navigate (Desanker, 2005). For this reason, it is critically important that CDM forestry capacity building be done in Africa which is seriously lagging behind other regions of the world in development of CDM projects (Anon., 2006).

Thus, the majority of the technical and scientific aspects will be aimed at allowing for development of a CDM component to the Oda-Kotomso Community Agroforestry Project (OCAP). Among the CDM determinations will be the “baseline project scenarios”, the “additionality” of the project, project “leakage”, the “carbon pools”, and the “land eligibility” (Kagi and Schöne, 2005; Kanel, 2005).



Figure 3. The Samartex forest concession in western Africa is shown in this satellite photo from 1990. The large dark blocks are Ghana forest reserves and the light brown areas in the yellow sections are degraded forests that were changed to cocoa plantations in the 1960s and since have largely been abandoned. Scale: 1:8,000,000

Carbon content of all 19 major tree species in the OCAP project (including indigenous species *Ceiba pentandra*, *Entandrophragma angolense*, *Khaya anthotheca*, *K. grandifoliola*, *K. ivorensis*, *Terminalia ivorensis*, *T. superb*, *Triplochiton scleroxylon*, *Aningeria altissima*, *Milicia excels*, *Heritiera utilis* and exotic *Cedrela odorata*) will be determined by analyses of ground samples from cross-sectional cookies using a Carlo Erba NA 1500 NC elemental analyzer. These data will be used in conjunction with intensive inventory analyses to determine accurate estimates of total carbon stocks in the OCAP project.

In addition, we will replicate the project on another 100 ha site of degraded forests in the dry forest of Ghana using the scientific and technical lessons learned from the original OCAP project.

We will adopt an approved CDM methodology AR-AM0004 "Reforestation or afforestation of land currently under agricultural use", ([http://cdm.unfccc.int/methodologies/ARmethodologies/approved\\_ae.html](http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ae.html)). We will modify the tools for demonstration and assessment of additionality for afforestation and reforestation to suit the Ghanaian agroforestry like the OCAP project. The methodology is applicable to the OCAP project on the basis that;

- Afforestation or reforestation of degraded land, which is subject to further degradation or remain in low carbon steady state, through assisted natural regeneration tree, tree planting, or control of pre-project fuel collection activities and other NTFP collections
- The project activity can lead to a shift of pre-project activities outside the project boundary, eg a displacement of agriculture of fuel collection activities and other NTFP collections.

The conditions under which the methodology will be applicable are:

- Lands to be afforested or reforested are degraded and the lands are still degrading or remain in low carbon steady states;
- Site preparation does not cause significant long-term net decrease of soil carbon stocks or increases of non-CO<sub>2</sub> emissions from soil;
- Carbon stocks in soil organic carbon, litter and dead wood can be expected to further decrease due to soil erosion and human intervention or increase less in the absence of the project activity, relative to the project concept;
- Flooding irrigation is not permitted;
- Soil drainage and disturbance are insignificant, so that non-CO<sub>2</sub>-greenhouse gas emissions from these types of activities can be neglected;
- The amount of nitrogen fixing species (NFS) used in the A/R project activity is not significant, so that greenhouse gas emissions from denitrification can be neglected in the estimation of actual net greenhouse gas removal by sink;

The eligibility of the OCAP project land for afforestation and reforestation to participate in CDM can be demonstrated through satellite imagery. There is a proof that the area was not forest by 31<sup>st</sup> December 1989 and that at no intermediate time was it forested and subsequently deforested. Carbon credits from A/R can be traded in UNFCCC, New South Wales Greenhouse Gas Abatement Scheme, the Chicago Climate Exchange and also the World Bank through its dedicated carbon funds. These carbon markets will be explore to determine the carbon annual financial benefits to be accrued through carbon sequestrations from the project

## 2.6 Socioeconomic Aspects

The project participants are communities (Oda-Kotomso and Forest fringe communities around Pamu Berekum and Tein II Forest reserve) whose main income source is subsistence farming. These farmers have small land holdings with large portions of it degraded and degrading



croplands which are not suitable for profitable agriculture as investment costs are too high for them. Preliminary socio-economic survey conducted indicate that the majority of households in these communities are below the poverty norm of US\$1.00 per day. Their present socio-economic conditions clearly place them as low income farming communities. Therefore, in order to maximize the socio-economic benefits from the proposed A/R CDM project activity a series of Participatory Rural Appraisal (PRA) methods will be conducted, interviewing and consulting with farmers in the project area to understand the expectations and preferences, wishes and concerns of the local farmers, so that the project will better respond to their desires for livelihood development. The project will open up certain new opportunities and enhance the income of the farmers through timber and non-timber forest products (demonstrated by the OCAP Project) besides earnings from the sale of carbon credits. The original OCAP project has had a tremendous impact on the Oda-Kotomso village. Over 1,000 individuals have benefited with employment including farmers, youth, beekeepers, snail producers, and gari processors. The gari factory employs some 40 people including 30 women with peak production generating 12 million cedis per month. Thinned wood and branch wood is being processed for wood carving at a training center at Samartex where people are apprenticed as wood carvers. Profits from the wood carving are shared by the employees.

In this project, we would anticipate replicating these types of numbers of people involved with a second community in the degraded dry forest type. In addition, we anticipate developing the necessary inventory data to develop a PDD for small scale A/R CDM component to these projects with the target community sharing earnings from the sale of carbon credits for the farmers, chiefs, and elders using the agreed and signed model for benefit sharing agreement.

We will conduct extensive socio-economic analyses of the possible project impacts on the indigenous peoples, local employment, food production, fuel wood and other forest products. Returns from planted trees often delays and this a major concern to smallholder farmers investing their resources in tree plantations. Usually, after the initial benefits from food crop harvests in the first few years (3-4 years) in the establishment phase of the plantation, farmers may have to wait for long periods (> 15 years) till the tree matures to be harvested for timber and income. CDM conveniently provides interim cash benefits to the farmer to cater for household cash needs and maintenance of the plantation over the years until harvest. Payments for carbon credits has the potential of stimulating interest in tree planting or afforestation in rural communities providing alternative land use options and increased employment opportunities in forest and agro-based enterprises for diversification of income sources for the rural economy. There is the potential for the emergence of commercial tree nurseries and additional sources of non-timber forest products (fuelwood, medicines, fodder, game, etc.) that can be collected for sale.

## 2.7 Environmental Aspects

The non-reserve forests in western Ghana and couple of reserved forest in the dry forest type in Ghana have largely been degraded due to non-sustainable logging practices, slash and burn agriculture, and forest clearing for alternative crops, some of which have largely failed, such as cocoa that was planted extensively in the 1960s but is little used now. In this project, we are establishing a sustainable forest management system for reforestation of these degraded lands so they can be used for long-term production of important Ghanaian timber species. Eventually, we believe this system could be used in forest restoration projects across Ghana and throughout western Africa.

## 2.8 Risks

Working with communities and groups of farmers is generally a more rigorous challenge than dealing with a single large land owner. However, the extensive experience garnered by the senior Samartex personnel (including co-principal investigator Mr. Ghartey) in dealing with the complex rural

community dynamics in western Ghana will minimize the risk of failure in replicating this experience in another community. **The success of the A/R CDM project will require full participation and sustained interest of the forest fringe communities (Output 3 and output 6). The project team will therefore use a series of Participatory Rural Appraisal (PRA) methods to conduct interviews and consulting with farmers in the project area to understand the expectations and preferences, wishes and concerns of the local farmers, so that the project will better respond to their desires for livelihood development. The communities selected are already involved in reforestation schemes going on presently in Ghana so they are expected to be amenable to the A/R CDM project activities.**

The main carbon accounting procedures needed in this project have all been done on carbon sequestration projects in the USA by co-principal investigator David Karnosky. Thus, the complex carbon accounting determination should be capably overseen in this project.

### 3. Output

#### 3.1 Specific objective: Improving capacity for CDM forestry in Ghana via a community forest targeted at poverty alleviation in conjunction with SFM.

Outputs expected to achieve the specific objectives are listed below:

- Output 1.** Carbon stocks of the current OCAP 450 ha project will be determined using GPS-supported comprehensive and complete measurement of all trees in the project.
- Output 2.** Mass spectrophotometric analysis will be done on wood samples from up to 5 trees each of the 19 tree species planted.
- Output 3.** A degraded forest (100 ha) will be reforested with the OCAP model using highly productive timber species.
- Output 4.** Comprehensive socioeconomic studies will be conducted in the communities involved in the project.
- Output 5.** Capacity to conduct CDM forestry will be built with post graduate training of Ghanaian students.
- Output 6.** Community-based CDM forestry methodology will be developed for the OCAP project.

### 4. Activities

#### **Output 1. Carbon stock of 450 ha OCAP project determined.**

- Activity 1.1** To demarcate and prepare the plantation for complete assessment of carbon stock. This will involve planting line cleaning and clearing around each tree on the 450 ha plantation.
- Activity 1.2** To inventory the total stock of trees in the established community plantation. GPS-supported inventory will be done to locate the position of each tree and also measure height and diameter of each tree.
- Activity 1.3** To determine the canopy cover within the stands of the 450 ha plantation using hemispherical photos. The hemispherical photos will be taken with digital camera fitted with fisheye lens and the photos will be analyzed using the software WinSCANOPY version 2005A (Regent Instruments Inc. Quebec, Canada).
- Activity 1.4** To analyze the data to determine carbon sequestration in the plantation and also determine the canopy cover.
- Activity 1.5** To publish and disseminate the results of the studies.

#### **Output 2. Carbon content of 19 timber species used in the OCAP plantation determined.**

- Activity 2.1** To collect wood samples from root, stem, and branches of at least 5 trees of the 19 species to determine carbon content.

- Activity 2.2** Crushing of the wood samples and mass spectrophotometric measurement of the carbon content of each species.
- Activity 2.3** To analyze the data, publish the results in journals and disseminate the results of the studies at stakeholders forums.
- Output 3. A degraded forest will be reforested replicating the OCAP model.**
- Activity 3.1** To select a degraded forest which fits into development of CDM methodology.
- Activity 3.2** To conduct participatory public appraisal in the communities close to the degraded forest to determine which farmers could be effectively involved in plantation of the project. Crops to be planted will also be determined.
- Activity 3.3** Establishment of nurseries of highly productive timber species to be determined by FORIG.
- Activity 3.4** Clearing of planting sites and planting.
- Activity 3.5** Annual assessment of tree growth and productivity of farmers crops.
- Activity 3.6** Analysis of carbon sequestration in the new plantation.
- Activity 3.7** To publish and disseminate the results of the studies.
- Output 4. Comprehensive socioeconomic studies of the participating communities of the present OCAP project determined.**
- Activity 4.1** Baseline line survey for situation analysis of the participating farmers and communities.
- Activity 4.2** To collect socioeconomic and environmental baseline data in the participating communities. This will allow us to measure the effect of the project on the communities.
- Activity 4.3** To inventory major natural resources used by the participating communities which could impact the project.
- Activity 4.4** To evaluate effective community participating strategies in participating maximum resource management.
- Activity 4.5** To identify mechanisms for effective community based CDM forest management tasks.
- Activity 4.6** To define responsibilities and notes for participating parties
- Output 5 Capacity to conduct CDM forestry in Ghana**
- Activity 5.1** One Ph.D. training at Michigan Technological University of a Ghanian forester in carbon management in forestry.
- Activity 5.2** Five masters graduate students trained Kwame Nkrumah University of Science and technology, Kumasi, Ghana will conduct their research on the project.
- Activity 5.3** At least 5 undergraduate students will be accepted each year for internship training on the project in CDM forestry.
- Activity 5.4** Organize awareness workshop for forestry stakeholders on CDM forestry using the OCAP model.
- Output 6. Community-based CDM forestry methodology will be developed for the OCAP project.**
- Activity 6.1** To educate the participating communities on their responsibilities to qualify for CDM credit.
- Activity 6.2** To disseminate the major findings and results for support participatory community plantation development in Ghana.
- Activity 6.3** To promote CDM forestry in Ghana.
- Activity 6.4** To prepare CDM forestry methodology for the OCAP plantations and prepare the necessary groundwork to submit a proposal to the CDM Executive Board for review.

## 5. 0 LOGICAL FRAMEWORK MARTRIX

Project Components	Indicators	Means of Verification	Relevant Assumptions
Development Objective Building capacity for CDM forestry in Ghana	CDM afforestation and reforestation programs established to support SFM	Skilled personnel in carbon accounting available Community plantations that qualify for CDM accreditation	
Specific Objective: Improving capacity for CDM forestry in Ghana via community forest targeted at poverty alleviation in conjunction with SFM	Forestry personnel with carbon management skills available. - existence of community-owned plantations	Project reports Field visits Workshop reports	Co-operation of degraded forest fringe communities
Output 1 Carbon stock of 450 ha OCAP project determined	Total stock of the trees inventoried -diameter and height of all trees measured in the plantation -canopy cover of the stands determined	Progress reports Workshop report Scientific papers	Access to the plantations granted by individual farmers
Output 2 Carbon content of 19 tree species in OCAP project determined	Wood disk cut from the 19 species processed and carbon content determined	Progress report Scientific papers Field visits	Availability of all 19 species in the plantations
Output 3 Replication of the OCAP model in a degraded forest land	Community plantations established with individual farmers	Field visits Progress report Scientific papers Project completion report	Forest fringe communities accept the participatory afforestation/reforestation program
Output 4 Socioeconomic studies in project participating communities	Communities needs that can be ameliorated with CDM afforestation and reforestation program identified	Workshop reports Progress reports Scientific papers List of participants Project completion report	Sustained co-operation between collaborators in the project
Output 5 Building capacity to participate in CDM A/R programs	Ghanaian forester trained in carbon accounting at PhD level. – 3-5 masters students acquire skills in CDM forest carbon management - undergraduate students internships	Thesis Progress report Project completion reports Students internship reports	Students are interested in carbon accounting and management
Output 6 CDM forest methodology for community afforestation and reforestation developed	Methodology to apply for CDM A/R accreditation developed	Progress report CDM/Community Forestry methods document	Participating farmer agree to participate in CDM A/R program

## 6. Work Plan

OUTPUTS/ACTIVITIES	RESPONSIBLE PARTIES	SCHEDULE IN MONTHS					
		Year 1		Year 2		Year 3	
		S1	S2	S1	S2	S1	S2
<b>OUTPUT 1.0 Carbon stock of 450 ha OCAP project determined</b>							
1.1 Demarcate and compartmentalise	PI, Co-PIs and team in participating countries	✓	✓				
1.2 Tree inventory	PI, Co-PIs and team in participating countries	✓	✓	✓	✓		
1.3 Determine canopy cover of stands	PI, Co-PIs, PhD candidate, Student, Technicians		✓	✓	✓	✓	✓
1.4 Data analysis	PI, Co-PIs, PhD student, Technicians			✓	✓	✓	✓
1.5 Dissemination of results	PI, Co-PIs, PhD student, Entomologist, CMC, SEC					✓	✓
<b>OUTPUT 2.0 Carbon content of 19 species</b>							
2.1 Felling and collection of wood samples	CMC, PI, Co-PIs, Research Assistant, Technicians	✓	✓				
2.2 Crushing and milling of Wood	Co-PIs, PhD Candidate Technicians, CMC			✓	✓	✓	✓
2.3 Analysis of carbon content of wood	Co-PI, PhD Candidate, Technicians			✓	✓	✓	✓
<b>OUTPUT 3.0 Reforestation of degraded land</b>							
3.1 Select degraded forest by CDM definition		✓	✓	✓			
3.2 Participatory public appraisal	Co-PIs, PhD Candidate and Technicians, Samartex	✓	✓	✓			
3.3 Seeds collection and processing	Co-PIs, PhD Candidate and Technicians, Samartex	✓	✓	✓	✓		
3.4 Nurseries establishment	Co-PIs, PhD Candidate, Technicians, Samartex	✓	✓	✓	✓	✓	✓
3.5 Clearing of sites for planting	PL, Co-PIs, Research Assistant/ Forester, Samartex	✓	✓	✓			
3.6 Pegging and planting	PL, Co-PIs, Research Assistant/ Forester, Samartex	✓	✓	✓			
3.7 Assessment of trees and crop production	PC, Co-PIs, Research Assistant/ Forester, Students, SEC		✓	✓	✓	✓	✓
3.8 Analysis of carbon sequestration in stands	CMC, PC, Co-PIs, Research Assistant/ Forester,		✓	✓	✓	✓	✓
<b>OUTPUT 4.0 Socioeconomic studies in participating communities</b>							
4.1 Baseline survey for situation analysis	SEC, Co-PIs, PhD Candidate, Technicians, Samartex	✓	✓	✓	✓	✓	
4.2 Socio-economic and environmental survey	SEC, Co-PIs, PhD Candidate, Students	✓	✓	✓	✓	✓	✓
4.3 Inventory of nat. res. use in communities	SEC PC, Co-PIs, PhD Candidate, Research Assistant/Entomologist, Forester.	✓	✓	✓	✓	✓	✓
4.4 Evaluate participatory strategies	SEC, PI, Co-PIs, PhD Candidate, Research Assistant/Entomologist, Forester.		✓	✓	✓	✓	✓
4.5 Identify mechanisms for CDM forestry	SEC, Co-PIs, Technicians			✓	✓	✓	✓
4.6 Define responsibilities and roles	PI, PhD Candidate, Co-PIs Research Assistant			✓	✓	✓	✓

<b>OUTPUT 5.0 Building capacity for CDM forestry in Ghana</b>							
5.1 PhD training MTU	CMC, Co-Principal Investigator, PhD Candidate	✓	✓	✓	✓	✓	✓
5.2 Master research KNUST	CMC, PI, Co-PI, and other resource personnel	✓	✓	✓	✓	✓	✓
5.3 Undergraduate internships	CMC, PI, Co-PI, and other resource personnel, Samartex		✓	✓	✓	✓	✓
5.4 Awareness workshop	CMC, PI, Co-PI, and other resource personnel, Samartex			✓	✓	✓	✓
<b>OUTPUT 6.0 Community-based CDM methodology developed</b>							
6.1 workshops in participating communities on responsibilities for CDM forestry	SEC, CMC, PI, Co-PI, and other resource personnel, Students	✓	✓	✓	✓	✓	✓
6.2 Promote community CDM forestry in Ghana	SEC, CMC, PI, Co-PI, and other resource personnel, Students			✓	✓	✓	✓
6.3 Prepare CDM methodology for the OCAP Plantation	CMC, PI, Co-PI, and other resource personnel			✓	✓	✓	✓

### Legend

PL	Project Leader
PI	Principal Investigator
Co-PI	Co-Principal Investigator
CMC	Carbon management consultant
SEC	Socio-economic Consultant

**7.1 OVERALL PROJECT BUDGET BY ACTIVITY**

Outputs/Activities + Non-Activity Based Expenses	10 Personnel	20 Subcontract	30 Duty travel	40 Capital	50 Consumables	60 Miscellaneous	Years	Project Total
<b>OUTPUT 1.0 Carbon stock of 450 ha OCAP project determined</b>								
1.1 Demarcate and compartmentalise	2,000		3,200	20,000	2,000		Y1,	27,200
1.2 Tree inventory	3,400		3,800	1,200	4,000		Y1, Y2	13,400
1.3 determine canopy cover of stands	1,800		1,400	1,000	2,000		Y2, Y3	5,200
1.4 Data analysis	2,600		-	-	1,000		Y2, Y3	3,600
1.5 Dissemination of results	2,400		2,000	-	1,500		Y3	5,900
<b>Subtotal 1</b>	<b>12,200</b>		<b>10,400</b>	<b>22,200</b>	<b>10,500</b>			<b>55,300</b>
<b>OUTPUT 2.0 Carbon content of 19 species</b>								
2.1 Felling and collection of wood samples	1,800		4,300		1,500		Y1	7,600
2.2 Crushing and milling of Wood	1,200		3,400		5,000		Y2, Y3	9,600
2.3 Analysis of carbon content of wood	1,000		6,600	1,800	6,500		Y2, Y3	15,900
<b>Subtotal 2</b>	<b>4,000</b>		<b>14,300</b>	<b>1,800</b>	<b>13,000</b>			<b>33,100</b>
<b>OUTPUT 3.0 Reforestation of degraded land</b>								
3.1 Select degraded forest by CDM definition	2,000		1,800		1,500		Y1	5,300
3.2 Participatory public appraisal	2,200		1,200	10,000	2,500		Y1	15,900
3.3 Seeds collection and processing		8,000	2,400	1,200			Y1, Y2	11,600
3.4 Nurseries establishment	1,200	18,000			12,000		Y1, Y2, Y3	31,200
3.5 Clearing of sites for planting	1,500		1,800	10,000			Y1, Y2	13,300
3.6 Pegging and planting		10,000					Y1, Y2	10,000
3.7 Assessment of trees and crop production	5,200		4,200		30,000		Y1, Y2, Y3	39,400
3.8 Analysis of carbon sequestration in stands	4,100		3,000	2,500	2,000		Y1, Y2, Y3	11,600
<b>Subtotal 3</b>	<b>16,250</b>	<b>36,000</b>	<b>14,400</b>	<b>23,400</b>	<b>48,500</b>			<b>138,050</b>
<b>OUTPUT 4.0 Socioeconomic studies in participating communities</b>								
4.1 Baseline survey for situation analysis	2,400		1,000	8,000	1,000		Y1	12,400
4.2 socioeconomic and environmental survey	2,800		2,600		3,600		Y1, Y2, Y3	9,200
4.3 Inventory of nat. res. use in communities	3,500		1,600		2,000		Y1, Y2,	7,100
5.4 Evaluate participating strategies	3,600		600		2,500		Y1, Y2	6,700
5.5 Identify mechanisms for CDM forestry	2,700		2,400		1,200		Y2, Y3	6,300
5.6 Define responsibilities and roles	3,000		1,400		2,500		Y2, Y3	6,900
<b>Subtotal 4</b>	<b>18,000</b>		<b>9,600</b>	<b>8,000</b>	<b>13,000</b>			<b>58,600</b>
<b>OUTPUT 5.0 Building capacity for CDM forestry in Ghana</b>								
5.1 PhD training MTU	94,500				5,000		Y1, Y2, Y3	99,500
5.2 Master research KNUST	15,000		2,400		1,000		Y1, Y2, Y3	18,400
5.3 Undergraduate internships	13,800		2,600		3,000		Y1, Y2, Y3	19,400
5.4 Awareness workshop	5,000		2,200		2,000		Y2, Y3	9,200

<b>Subtotal 5</b>	<b>128,300</b>		<b>7,200</b>			<b>11,000</b>			<b>146,500</b>
<b>OUTPUT 6.0 Community-based CDM methodology developed</b>									
6.1 workshops in participating communities on responsibilities for CDM forestry	5,200		2,000			2,000		Y1, Y2	9,200
6.2 Promote community CDM forestry in Ghana	5,800		2,000			5,600		Y2, Y2	13,400
6.3 Prepare CDM methodology for the OCAP Plantation	6,300		2,000	1,800		1,000		Y2, Y3	11,100
<b>Subtotal 6</b>	<b>17,300</b>		<b>6,000</b>	<b>1,800</b>		<b>8,600</b>			<b>33,700</b>
<b>9. CONSULTANTS</b>									
9.1 Carbon management in forestry	33,000							Y1, Y2, Y3	33,000
9.2 CDM consultant	20,000							Y2, Y3	20,000
9.3 Socio Economics	12,000							Y1, Y2, Y3	12,000
<b>Subtotal 9</b>	<b>45,000</b>								<b>65,000</b>
<b>10. Steering Committee meetings</b>									
10.1 Traveling cost and per diem	4,500							Y1, Y2, Y3	4,500
10.2 Internal monitoring and evaluation			3,600					Y1, Y2, Y3	3,600
<b>Subtotal 10</b>	<b>4,500</b>		<b>3,600</b>						<b>8,100</b>
<b>11. Technology Transfer</b>									
11.1 Conferences and workshops	22,500							Y1, Y2, Y3	22,500
11.2 Drivers			6,000					Y1, Y2, Y3	6,000
<b>Subtotal 11</b>	<b>22,500</b>		<b>6,000</b>						<b>28,500</b>
<b>12. Administrative Costs</b>									
12.1 Administrative and Secretariat Services	9,000							Y1, Y2, Y3	9,000
11.3 FORIG Administrative cost							20,888	Y1, Y2, Y3	20,888
<b>Subtotal 12</b>	<b>9,000</b>						<b>20,888</b>		<b>29,888</b>
<b>Total</b>	<b>277,050</b>	<b>36,000</b>	<b>71,100</b>	<b>59,800</b>		<b>98,600</b>	<b>20,888</b>		<b>579,438</b>



**7.2 CONSOLIDATED PROJECT BUDGET –GOV'T OF GHANA, SAMARTEX, ITTO CONTRIBUTION**

Budget Components		Months/ qty	Unite rate	Gov't of Ghana	Samar tex	MTU	ITTO	Total
<b>10</b>	<b>Project Personnel</b>							
	11 National Experts							
	11.1 Project Leader	36	600	16,200			5,400	21,600
	11.2 Researchers ( 3 )	54	600	24,300			8,100	32,400
	11.3 Technicians (5 )	75	250	11,250			7,500	18,750
	13 Administrative Personnel							
	13.1 Accountant	12	400	4,800				4,800
	13.2 Auditor	12	350	4,200				4,200
	14 Consultants							
	14.1 External Consult.: Carbon accounting	6	5,500				33,000	33,000
	14.2 CDM Consultant	4	5,000				20,000	20,000
	14.3 Local Consult.: Socio-economics	6	2,000				12,000	12,000
	15 Training and workshop							
	15.1 PhD training (fees & stipends) x3	Year	31,500			94,500		94,500
	15.2 Masters Research	60	100	6,000	9,000			15,000
	15.3 Undergraduate Internships	60	80	4,800	9,000			13,800
	15.4 Steering committee meetings	6day	750	4,500				4,500
	15.5 Attending Conference & Workshop	3x3	2,500				22,500	22,500
	<b>19 Component Total</b>			<b>76,050</b>	<b>18,000</b>	<b>94,500</b>	<b>108,500</b>	<b>297,050</b>
<b>20</b>	<b>Sub-contract</b>							
	21 Seeds collection	4	2,000				8,000	8,000
	22 Nursery Establishment and management	36	500		7,200		10,800	18,000
	23 Pegging and planting	100 ha	100		12,000		8,000	20,000
	<b>29 Component Total</b>			<b>-</b>	<b>19,200</b>		<b>26,800</b>	<b>46,000</b>
<b>30</b>	<b>Duty Travel</b>							
	31 Daily Subsistence Allowance (DSA)							
	31.1 D.S.A. Output 1 (x3)	120 MD	40				14,400	14,400
	31.2 D.S.A. Output 2	60 MD	40				2,400	2,400
	31.3 D.S.A. Output 3 (x3)	120 MD	40				14,400	14,400
	31.4 D.S.A. Output 4 (x3)	80 MD	40				9,600	9,600
	31.5 D.S.A. Output 5 (x3)	60 MD	40				7,200	7,200
	31.6 D.S.A. Output 6 (x3)	50 MD	40				6,000	6,000
	32 Internal monitoring & evaluation (x3)	30 MD	40	3,600				3,600
	32.1 Drivers	300 MD	20				6,000	6,000
	33 Air fare, Inter. Experts	3	2,500				7,500	7,500
	<b>39 Component Total</b>			<b>3,600</b>			<b>67,500</b>	<b>71,100</b>
<b>40</b>	<b>Capital Items</b>							
	41 Vehicle 4x4 drive (1)	1	38,000				38,000	38,000
	42 Freezer	1	1,200				1,200	1,200
	43 Computers (2) and printer	2	1,800				3,600	3,600
	44 Digital Camera	1	1,000				1,000	1,000
	45 Software; analyzing carbon sequestration	1	2,500				2,500	2,500
	46 Height & DBH measurement equipment	4	150				600	600
	47 GPS equipment	1	600				600	600
	48 Microscope	1	2,300				2,300	2,300
	49 Land	100 ha	100		10,000			10,000
	<b>49 Component Total</b>				<b>10,000</b>		<b>49,800</b>	<b>59,800</b>
<b>50</b>	<b>Consumable Items</b>							
	51 Office supplies	Year x3	1,000	1,500			1,500	3,000
	52 Laboratory supplies	Year x3	6,000	6,000			12,000	18,000
	53 Nursery supplies	Year x3	4,000	2,000			10,000	12,000
	54 Maintenance of field plots	year x3	1,000		12,000		18,000	30,000
	55 Spare parts	Year x3	2,300				6,900	6,900
	56 Fuel and Lubricants	Year x3	8,900				26,700	26,700
	<b>59 Component Total</b>			<b>9,500</b>	<b>12,000</b>		<b>75,100</b>	<b>96,600</b>
	60 Miscellaneous							
	61 FORIG administrative cost			20,889				20,889
	<b>SUBTOTAL</b>			<b>110,039</b>	<b>59,200</b>	<b>94,500</b>	<b>327,700</b>	<b>591,439</b>
<b>80</b>	<b>ITTO M &amp; E and Administration</b>							
	81 Monitoring and Evaluation x3	Year	10,000				30,000	30,000
	82 ITTO Ex-Post Evaluation						15,000	15,000
	82 Program Support Costs (8%)						29,816	29,816
	<b>89 Component Total</b>						<b>74,816</b>	<b>74,816</b>
	<b>GRAND TOTAL</b>			<b>110,039</b>	<b>59,200</b>	<b>94,500</b>	<b>402,516</b>	<b>666,255</b>

MD – Man-days ha - hectare

**7.3 YEARLY CONSOLIDATED PROJECT BUDGET**

Budget Components		Total (US\$)	Year1	Year 2	Year 3
<b>10</b>	<b>Project Personnel</b>				
	11 National Experts				
	11.1 Project Leader	21,600	7,200	7,200	7,200
	11.2 Researchers ( 3 )	32,400	10,800	10,800	10,800
	11.3 Technicians (5 )	18,750	6,250	6,250	6,250
	13 Administrative Personnel				
	13.1 Accountant	4,800	1,600	1,600	1,600
	13.2 Auditor	4,200	1,400	1,400	1,400
	<b>14 Consultants</b>				
	14.1 External Consult.: Carbon accounting	33,000	11,000	11,000	11,000
	14.2 CDM consultant	20,000		10,000	10,000
	14.3 Local Consult.: Socio-economics	12,000	4,000	4,000	4,000
	<b>15 Training and workshop</b>				
	15.1 PhD training (fees & stipends) x3	94,500	31,500	31,500	31,500
	15.2 Masters Research	15,000	5,000	5,000	5,000
	15.3 Undergraduate Internships	13,800	4,600	4,600	4,600
	15.4 Steering committee meetings	4,500	1,500	1,500	1,500
	15.5 Attending Conference & Workshop	22,500	7,500	7,500	7,500
	<b>19 Component Total</b>	<b>297,050</b>	<b>92,350</b>	<b>102,350</b>	<b>102,350</b>
<b>20</b>	<b>Sub-contract</b>				
	21 Seeds collection	8,000	5,000	3,000	
	22 Nursery Establishment and management	18,000	9,000	5,000	4,000
	23 Pegging and planting	20,000	12,000	8,000	
	<b>29 Component Total</b>	<b>46,000</b>	<b>26,000</b>	<b>16,000</b>	<b>4,000</b>
<b>30</b>	<b>Duty Travel</b>				
	31 Daily Subsistence Allowance (DSA)				
	31.1 D.S.A. Output 1 (x3)	14,400	7,200	4,800	2,400
	31.2 D.S.A. Output 2	2,400	1,600	800	
	31.3 D.S.A. Output 3 (x3)	14,400	4,800	4,800	4,800
	31.4 D.S.A. Output 4 (x3)	9,600	3,200	3,200	3,200
	31.5 D.S.A. Output 5 (x3)	7,200	2,400	2,400	2,400
	31.6 D.S.A. Output 6 (x3)	6,000		3,000	3,000
	32 Internal monitoring & evaluation (x3)	3,600	1,200	1,200	1,200
	32.1 Drivers	6,000	2,000	2,000	2,000
	33 Air fare, Inter. Experts, PhD (x2)	7,500	2,500	2,500	2,500
	<b>39 Component Total</b>	<b>71,100</b>	<b>24,900</b>	<b>24,700</b>	<b>21,500</b>
<b>40</b>	<b>Capital Items</b>				
	41 Vehicle 4x4 drive (1)	38,000	38,000		
	42 Freezer	1,200	1,200		
	43 Computers (2) and printer	3,600	1,800	1,800	
	44 Digital Camera	1,000	1,000		
	45 Software; analyzing carbon sequestration	2,500		2,500	
	46 Height & DBH measurement equipment	600	600		
	47 GPS equipment	600	600		
	48 Microscope	2,300	2,300		
	48 Land	10,000	5,000	5,000	
	<b>49 Component Total</b>	<b>59,800</b>	<b>50,500</b>	<b>9,300</b>	
<b>50</b>	<b>Consumable Items</b>				
	51 Office supplies	3,000	1,000	1,000	1,000
	52 Laboratory supplies	18,000	6,000	6,000	6,000
	53 Nursery supplies	12,000	6,000	4,000	2,000
	54 Maintenance	30,000	10,000	10,000	10,000
	55 Spare parts	6,900	2,300	2,300	2,300
	56 Fuel and Lubricants	26,700	8,900	8,900	8,900
	<b>59 Component Total</b>	<b>96,600</b>	<b>34,200</b>	<b>32,200</b>	<b>30,200</b>
	<b>60 Miscellaneous</b>				
	61 FORIG administrative cost	20,889	6,963	6,963	6,963
	<b>SUBTOTAL</b>	<b>591,439</b>	<b>234,913</b>	<b>191,513</b>	<b>165,013</b>
<b>80</b>	<b>ITTO M &amp; E and Administration</b>				
	81 Monitoring and Evaluation x3	30,000			
	82 ITTO Ex-Post Evaluation	15,000			
	82 Program Support Costs (8%)	29,816			
	<b>89 Component Total</b>	<b>74,816</b>			
	<b>GRAND TOTAL</b>	<b>666,255</b>			

**7.4 YEARLY PROJECT BUDGET BY SOURCES: ITTO**

Budget Components		Months/ Qty	Unit rate	Total (U\$)	Year1	Year 2	Year 3
<b>10</b>	<b>Project Personnel</b>						
	11 National Experts						
	11.1 Project Leader	36	150	5,400	1,800	1,800	1,800
	11.2 Researchers ( 3 )	54	150	8,100	2,700	2,700	2,700
	11.3 Technicians ( 5 )	75	100	7,500	2,500	2,500	2,500
	13 Administrative Personnel						
	13.1 Accountant						
	13.2 Auditor						
	<b>14 Consultants</b>						
	14.1 External Consult.: Carbon accounting	6	5,500	33,000	11,000	11,000	11,000
	14.2 CDM Consultant	4	5,000	20,000		10,000	10,000
	14.2 Local Consult.: Socio-economics	6	2,000	12,000	4,000	4,000	4,000
	<b>15 Training and workshop</b>						
	15.1 PhD training (fees & stipends) x3						
	15.2 Masters Research						
	15.3 Undergraduate Internships						
	15.4 Steering committee meetings						
	15.5 Attending Conference & Workshop	3x3	2,500	22,500	7,500	7,500	7,500
	<b>19 Component Total</b>			<b>108,500</b>	<b>29,500</b>	<b>39,500</b>	<b>39,500</b>
<b>20</b>	<b>Sub-contract</b>						
	21 Seeds collection	4	2,000	8,000	5,000	3,000	
	22 Nursery establishment and management	36	300	10,800	3,600	3,600	3,600
	23 Pegging and planting	100 ha	100	8,000	6,000	2,000	
	<b>29 Component Total</b>			<b>26,800</b>	<b>14,600</b>	<b>8,600</b>	<b>3,600</b>
<b>30</b>	<b>Duty Travel</b>						
	31 Daily Subsistence Allowance (DSA)						
	31.1 D.S.A. Output 1 (x3)	120 MD	40	14,400	7,200	4,800	2,400
	31.2 D.S.A. Output 2	60 MD	40	2,400	1,600	800	
	31.3 D.S.A. Output 3 (x3)	120 MD	40	14,400	4,800	4,800	4,800
	31.4 D.S.A. Output 4 (x3)	80 MD	40	9,600	3,200	3,200	3,200
	31.5 D.S.A. Output 5 (x3)	60 MD	40	7,200	2,400	2,400	2,400
	31.6 D.S.A. Output 6 (x3)	50 MD	40	6,000		3,000	3,000
	32 Internal monitoring & evaluation (x3)						
	32.1 Drivers	300 MD	20	6,000	2,000	2,000	2,000
	33 Air fare, Inter. Experts	3	2,500	7,500	2,500	2,500	2,500
	<b>39 Component Total</b>			<b>67,500</b>	<b>23,700</b>	<b>23,500</b>	<b>20,300</b>
<b>40</b>	<b>Capital Items</b>						
	41 Vehicle 4x4 drive 1		38	38,000	38,000		
	42 Freezer			1,200	1,200		
	43 Computers (2) and printer			3,600	1,800	1,800	
	44 Digital Camera			1,000	1,000		
	45 Software; analyzing carbon sequestration			2,500		2,500	
	46 Height & DBH measurement equipment			600	600		
	47GPS equipment			600	600		
	48 Microscope			2,300	2,300		
	49 Land						
	<b>49 Component Total</b>			<b>49,800</b>	<b>45,500</b>	<b>4,300</b>	
<b>50</b>	<b>Consumable Items</b>						
	51 Office supplies	Year x3	500	1,500	500	500	500
	52 Laboratory supplies	Year x3	4,000	12,000	4,000	4,000	4,000
	53 Nursery supplies	Year x3		10,000	5,000	4,000	1,000
	54 Maintenance of field plots	Year x3	6,000	18,000	6,000	6,000	6,000
	55 Spare parts	Year x3	2,300	6,900	2,300	2,300	2,300
	56 Fuel and Lubricants	Year x3	8,900	26,700	8,900	8,900	8,900
	<b>59 Component Total</b>			<b>75,100</b>	<b>26,700</b>	<b>25,700</b>	<b>22,700</b>
	<b>60 Miscellaneous</b>						
	61 FORIG administrative cost 5%						
	<b>SUBTOTAL</b>			<b>327,700</b>	<b>140,000</b>	<b>101,600</b>	<b>86,100</b>
<b>80</b>	<b>ITTO M &amp; E and Administration</b>						
	81 Monitoring and Evaluation x3	Year	10	30,000			
	82 ITTO Ex-Post Evaluation			15,000			
	82 Program Support Costs (8%)			29,816			
	<b>89 Component Total</b>			<b>74,816</b>			
	<b>GRAND TOTAL</b>			<b>402,516</b>			

**7.5 YEARLY PROJECT BUDGET BY SOURCES: GOVERNMENT OF GHANA**

Budget Components		Months/ Qty	Unit rate	Total (US\$)	Year1	Year 2	Year 3
<b>10</b>	<b>Project Personnel</b>						
	11 National Experts						
	11.1 Project Leader	36	450	16,200	5,400	5,400	5,400
	11.2 Researchers ( 3 )	54	450	24,300	8,100	8,100	8,100
	11.3 Technicians (5 )	75	150	11,250	3,750	3,750	3,750
	12 International Experts						
	13 Administrative Personnel						
	13.1 Accountant	12	400	4,800	1,600	1,600	1,600
	13.2 Auditor	12	350	4,200	1,400	1,400	1,400
	<b>14 Consultants</b>						
	14.1 External Consult.: Carbon accounting						
	14.2 Local Consult.: Socio-economics						
	<b>15 Training and workshop</b>						
	15.1 PhD training (fees & stipends) x3						
	15.2 Masters Research	60	100	6,000	2,000	2,000	2,000
	15.3 Undergraduate Internships	60	80	4,800	1,600	1,600	1,600
	15.4 Steering committee meetings	6days	750	4,500	1,500	1,500	1,500
	15.5 Attending Conference & Workshop						
	<b>19 Component Total</b>			<b>76,050</b>	<b>25,350</b>	<b>25,350</b>	<b>25,350</b>
<b>20</b>	<b>Sub-contract</b>						
	21 Seeds collection						
	22 Nursery Establishment and management						
	23 Pegging and planting						
	<b>29 Component Total</b>						
<b>30</b>	<b>Duty Travel</b>						
	31 Daily Subsistence Allowance (DSA)						
	31.1 D.S.A. Output 1 (x3)						
	31.2 D.S.A. Output 2						
	31.3 D.S.A. Output 3 (x3)						
	31.4 D.S.A. Output 4 (x3)						
	31.5 D.S.A. Output 5 (x3)						
	31.6 D.S.A. Output 6 (x3)						
	32 Internal monitoring & evaluation (x3)	30MD	40	3,600	1,200	1,200	1,200
	32.1 Drivers						
	33 Air fare, Inter. Experts, PhD (x2)						
	<b>39 Component Total</b>			<b>3,600</b>	<b>1,200</b>	<b>1,200</b>	<b>1,200</b>
<b>40</b>	<b>Capital Items</b>						
	41 Vehicle 4x4 drive (2)						
	42 Freezer						
	43 Computers (2) and printer						
	44 Digital Camera						
	45 Software; analyzing carbon sequestration						
	47 Height & DBH measurement equipment						
	47.1 GPS equipment						
	48 Land						
	<b>49 Component Total</b>						
<b>50</b>	<b>Consumable Items</b>						
	51 Office supplies	Year x3	1,000	1,500	500	500	500
	52 Laboratory supplies	Year x3	2,000	6,000	2,000	2,000	2,000
	53 Nursery supplies	Year x3		2,000	1,000		1,000
	54 Maintenance						
	55 Spare parts						
	56 Fuel and Lubricants						
	<b>59 Component Total</b>			<b>9,500</b>	<b>3,500</b>	<b>2,500</b>	<b>3,500</b>
	<b>60 Miscellaneous</b>						
	61 FORIG administrative cost 5%	Year x3	6,963	20,889	6,963	6,963	6,963
	<b>SUBTOTAL</b>			<b>110,039</b>	<b>37,013</b>	<b>36,013</b>	<b>37,013</b>

**7.6 YEARLY PROJECT BUDGET BY SOURCES: SAMARTEX**

Budget Components		Months/ Qty	Unit rate	Total (US\$)	Year1	Year 2	Year 3
<b>10</b>	<b>Project Personnel</b>						
	11 National Experts						
	11.1 Project Leader						
	11.2 Researchers ( 3 )						
	11.3 Technicians ( 5 )						
	12 International Experts						
	13 Administrative Personnel						
	13.1 Accountant						
	13.2 Auditor						
	<b>14 Consultants</b>						
	14.1 External Consult.: Carbon accounting						
	14.2 Local Consult.: Socio-economics						
	<b>15 Training and workshop</b>						
	15.1 PhD training (fees & stipends) x3						
	15.2 Masters Research	60	150	9,000	3,000	3,000	3,000
	15.3 Undergraduate Internships	60	150	9,000	3,000	3,000	3,000
	15.4 Steering committee meetings						
	15.5 Attending Conference & Workshop						
	<b>19 Component Total</b>			<b>18,000</b>	<b>6,000</b>	<b>6,000</b>	<b>6,000</b>
<b>20</b>	<b>Sub-contract</b>						
	21 Seeds collection						
	22 Nursery Establishment and management	36	200	7,200	2,400	2,400	2,400
	23 Pegging and planting	400 ha	50	12,000	6,000	6,000	
	<b>29 Component Total</b>			<b>19,200</b>	<b>8,400</b>	<b>8,400</b>	<b>2,400</b>
<b>30</b>	<b>Duty Travel</b>						
	31 Daily Subsistence Allowance (DSA)						
	31.1 D.S.A. Output 1 (x3)						
	31.2 D.S.A. Output 2						
	31.3 D.S.A. Output 3 (x3)						
	31.4 D.S.A. Output 4 (x3)						
	31.5 D.S.A. Output 5 (x3)						
	31.6 D.S.A. Output 6 (x3)						
	32 Internal monitoring & evaluation (x3)						
	32.1 Drivers						
	33 Air fare, Inter. Experts, PhD (x2)						
	<b>39 Component Total</b>						
<b>40</b>	<b>Capital Items</b>						
	41 Vehicle 4x4 drive (2)						
	42 Freezer						
	43 Computers (2) and printer						
	44 Digital Camera						
	45 Software; analysing carbon sequestration						
	47 Height & DBH measurement equipment						
	47.1 GPS equipment						
	48 Land	100 ha	100	10,000	5,000	5,000	
	<b>49 Component Total</b>			<b>10,000</b>	<b>5,000</b>	<b>5,000</b>	
<b>50</b>	<b>Consumable Items</b>						
	51 Office supplies						
	52 Laboratory supplies						
	53 Nursery supplies						
	54 Maintenance of field plots	Year	12,000	12,000	4,000	4,000	4,000
	55 Spare parts						
	56 Fuel and Lubricants						
	<b>59 Component Total</b>			<b>12,000</b>	<b>4,000</b>	<b>4,000</b>	<b>4,000</b>
	<b>60 Miscellaneous</b>						
	61 FORIG administrative cost 5%						
	<b>SUBTOTAL</b>			<b>59,200</b>	<b>23,400</b>	<b>23,400</b>	<b>12,400</b>

**7.6 YEARLY PROJECT BUDGET BY SOURCES: Michigan Technological University**

Budget Components		Months/ Qty	Unit rate	Total (US\$)	Year1	Year 2	Year 3
<b>10</b>	<b>Project Personnel</b>						
	11 National Experts						
	11.1 Project Leader						
	11.2 Researchers ( 3 )						
	11.3 Technicians (5 )						
	12 International Experts						
	13 Administrative Personnel						
	13.1 Accountant						
	13.2 Auditor						
	<b>14 Consultants</b>						
	14.1 External Consult.: Carbon accounting						
	14.2 Local Consult.: Socio-economics						
	<b>15 Training and workshop</b>						
	15.1 PhD training (fees & stipends) x3	year	31,500	94,500	31,500	31,500	31,500
	15.2 Masters Research						
	15.3 Undergraduate Internships						
	15.4 Steering committee meetings						
	15.5 Attending Conference & Workshop						
	<b>19 Component Total</b>			<b>94,500</b>	<b>31,500</b>	<b>31,500</b>	<b>31,500</b>
<b>20</b>	<b>Sub-contract</b>						
	21 Seeds collection						
	22 Nursery Establishment and management						
	23 Pegging and planting						
	<b>29 Component Total</b>						
<b>30</b>	<b>Duty Travel</b>						
	31 Daily Subsistence Allowance (DSA)						
	31.1 D.S.A. Output 1 (x3)						
	31.2 D.S.A. Output 2						
	31.3 D.S.A. Output 3 (x3)						
	31.4 D.S.A. Output 4 (x3)						
	31.5 D.S.A. Output 5 (x3)						
	31.6 D.S.A. Output 6 (x3)						
	32 Internal monitoring & evaluation (x3)						
	32.1 Drivers						
	33 Air fare, Inter. Experts, PhD (x2)						
	<b>39 Component Total</b>						
<b>40</b>	<b>Capital Items</b>						
	41 Vehicle 4x4 drive (2)						
	42 Freezer						
	43 Computers (2) and printer						
	44 Digital Camera						
	45 Software; analysing carbon sequestration						
	47 Height & DBH measurement equipment						
	47.1 GPS equipment						
	48 Land						
	<b>49 Component Total</b>						
<b>50</b>	<b>Consumable Items</b>						
	51 Office supplies						
	52 Laboratory supplies						
	53 Nursery supplies						
	54 Maintenance						
	55 Spare parts						
	56 Fuel and Lubricants						
	<b>59 Component Total</b>						
	<b>60 Miscellaneous</b>						
	61 FORIG administrative cost 5%						
	<b>SUBTOTAL</b>			<b>94,500</b>	<b>31,500</b>	<b>31,500</b>	<b>31,500</b>

## PART III: OPERATIONAL ARRANGEMENT

### 1. Management Structure

#### 1.1 Principal Investigators:

**Dr. Emmanuel Opuni-Frimpong:** : Project Leader and Principal Investigator, will provide scientific advice on project design, planning and implementation. Responsible for managing and coordinating all project activities, including preparations and submission of project reports to ITTO, Responsible for monitoring and assessment of project activities on the field.

**Dr. Victor K. Agyeman:** Director of FORIG, Co-principal Investigator, will provide scientific advice on project design, capacity building for CDM forestry in Ghana, involve in promotion of CDM forestry in Ghana.

**Dr. Beatrice Darko Obiri:** Research Scientist, will advice on community plantation issues, socio-economic analysis on community plantations, developing CDM forestry methodology for community plantations

**Mr. K. K. F. Ghartey:** Forestry consultant, SAMARTEX, will be responsible for agroforestry and link to community leaders involve in the OCAP project.

**\*Professor David F. Karnosky:** Co-Principal Investigator, Forest Carbon Management Consultant, Michigan Technological University will advise on a project design, carbon accounting, propagation of seedlings, training and will be major professor for the Ghana Ph.D. candidate.

#### 1.2 Scientists:

**Mrs Lucy Amissah:** Research Scientist in Biodiversity, Environment and Land Use. Community needs assessment, Gender related issues in CDM and community participation.

**Mr. F.S. Amoah:** Director of plantations, Ghana Forest Service Division, Forestry Comission. He will be advise on forest policy issues and will be involved in promotion of CDM forestry in Ghana.

**Mr. Lord Ameyaw:** Silviculturist/Project Research Assistant, candidate for graduate studies, will work closely with Principal and Co-Principal Investigators.

#### 1.3 Consultants:

A consultant will be contracted to assist in the development of the CDM methodology

#### 1.4 Institutions Involved in the Project

<u>Country</u>	<u>Institution</u>
Ghana	Forestry Research Institute of Ghana (FORIG) Samartex Timber and Plywood Company limited Oda Kotomso Community Agroforestry (OCAP)
USA	School of Forest Resources and Environmental Science, Michigan Technological University (MTU)

### 2. Monitoring, Reports and Evaluation

#### 2.1 Monitoring

The project will be subject to periodic technical monitoring in accordance with the policies and procedures laid down by ITTO.

#### 2.2. Reports

Progress reports will be prepared according to ITTO guidelines and submitted to ITTO every six months.

#### 2.2 Evaluation

The project will be evaluated yearly by Project Technical Committee (Steering Committee) meeting to assess its overall orientation and organization and determine whether the project is achieving its objectives. The organization, terms of reference and periodic evaluation will be determined by consultation between project scientists, directors of implementing institutions and ITTO.

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\* Note: The co-principal investigator is budgeted in this proposal as external consultants.

## 2.3 Steering Committing

The Steering Committee will be comprised of :

- Government of Ghana/Forest Commission,
- Director of the Forest Research Institute of Ghana,
- Timber Industry Association,
- SAMARTEX,
- Tree Growers Association/Community tree growers,
- OCAP representative,
- Michigan Technological University, and
- ITTO representative.
- Designated National Authority (DNA) for CDM

Project Directorate will be made up of Project Leader, Co-Principal Investigators, and Ghana Forest Commissions.

## 3. Future Operations and Maintenance

The individual farmers will be responsible for taking care of their trees after the completion of the project. Successful completion of the project and submission of CDM methodology to the CDM executive board could enable the farmers to eventually sell carbon sequestered by the tree on their farm to help them sustain the project. Forestry Research Institute of Ghana will continue to monitor the project through the Ghana government annual budgetary allocation for research. It will also be responsible for advising the farmers on the best forestry practices to improve productivity after completion of ITTO support. SAMARTEX will continue to maintain nurseries established under the project to sustain supply of seedlings to later adaptors of the program.

## PART IV. TROPICAL TIMBER FRAMEWORK

### 1. Compliance with ITTA 2006 objectives

This project is related to 7 of 19 ITTA objectives of the successor agreement to the ITTA, 1994 (UN, 2006):

**Objective c.** This project contributes to sustainable community forestry development and it seeks to alleviate poverty for over 2,000 rural poor people of western Ghana.

**Objective d.** This project promotes sustainable production, via community forestry, of some 19 major timber species of Ghana.

**Objective g.** This project promotes adding a CDM component with potential for CDM financial resources to an already well-established community forestry program in western Ghana.

**Objective j.** The area this project focuses on was largely cut over to establish cocoa plantations in the 1960s. These plantations have largely been abandoned leaving extensive areas of degraded forests that we are working with local communities to restore.

**Objective q.** This project has a strong agroforestry component promoting sustainable forest management via production of short-term agricultural crops and medium-term horticultural crops in addition to longer-term timber production. All key institutions promoting sustainable forest management in Ghana including Forest Commission, Forest Service, Game and Wildlife



Department, Forestry Research Institute of Ghana, timber industries and community tree growers are integrated in this project.

**Objective r.** This project has a strong “forest-dependent indigenous and local community” component and we are using novel strategies such as profit-sharing and land-ownership sharing that we have shown are successful (in the original OCAP project) in enhancing participation by farmers, villagers, and especially by young people and women.

**Objective s.** This project is dealing with capacity building a key new emerging issue in Africa: CDM forestry. It is well-documented that CDM forestry capacity building is needed in Africa (Desanker, 2005; Anon. 2006).

## **2. Compliance with ITTO Action Plan**

This project addresses a number of goals and actions recommended in the ITTO Action Plan (ITTO, 2002):

**Goal/Action 3.1.2.1** We are promoting increased reforestation with 19 important timber species in western Ghana.

**Goal/Action 3.2.1.3** We are examining the role of newly established forests for mitigation of the effects of climate change by examining the amount of carbon being sequestered.

**Goal/Action 3.2.1.5** We are promoting non-timber food products for both short-term agricultural crops and mid-term horticultural crops which would be planted among longer-term forest crops. Thus, the project reduces the use of slash and burn agriculture.

**Goal/Action 3.2.2.3** The project promotes restoration of degraded forests in the area’s non-reserve forests were largely converted to cocoa plantations in the 1960s. These plantations have largely been abandoned in recent years.

**Goal/Action 3.2.2.6** The project has strong social and economic implications for the poor rural communities involved and stresses the benefits of sustainable forest management. Furthermore, we have a substantial training component in our project for the community farmers to enable them to intelligently manage their forest resources.

**Goal/Action 3.2.2.10** The project promotes intensive forest management (including weed control, pruning, and thinning of plantation-grown tropical timber) to promote reforestation of degraded forest lands. We also promote multiple uses of the forests.

### **Relevant Citations**

- Anderson, J., C. Benjamin, B. Campbell, and D. Tiveau. 2006. Forests, poverty and equity in Africa: new perspectives on policy and practice. *International Forestry Review* 8:44-53.
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- ITTO, 2002. ITTO Yokohama Action Plan 2002-2006. Yokohama, Japan. 15 pp.
- Kagi, W. and D. Schöne. 2005. Forestry projects under the CDM: Procedures, experiences and lessons learned. FAO. Forests and Climate Change Working Paper 3. 61 pp.
- Kamel, S. 2005. Clean development mechanism POD guidebook: Navigating the pitfalls. UNEP. 76 pp.
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## **ANNEX A: PROFILE OF THE EXECUTING AGENCY**

### **A.1 Expertise of the Executing Agency FORIG**

The mission of FORIG, Ghana's forestry research institute and the executing agency is to conduct use-focused research that generates scientific knowledge and appropriate technologies to enhance sustainable development, conservation, and efficient utilisation of

Ghana's forest resources. FORIG also disseminates forestry information for the improvement of social, economic and environmental well being of the people of Ghana. Completed and ongoing ITTO assisted projects are as found below.

### **A.2 Infrastructure of the Executing Agency FORIG**

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 Savanna Zone. There are also research stations at Subri, Afram, Pra-Anum Area, Main Northern Grassland and BiaTano and Asenanyo. The laboratories of the Institute have a wide range of equipment for research and development. They include impregnation plants, seasoning kilns, wood testing machines, steam generators, microscopes, growth chamber and UV spectrophotometer. The Institute's library facilities include a CD-ROM workstation and The CD compiled by CAB International.

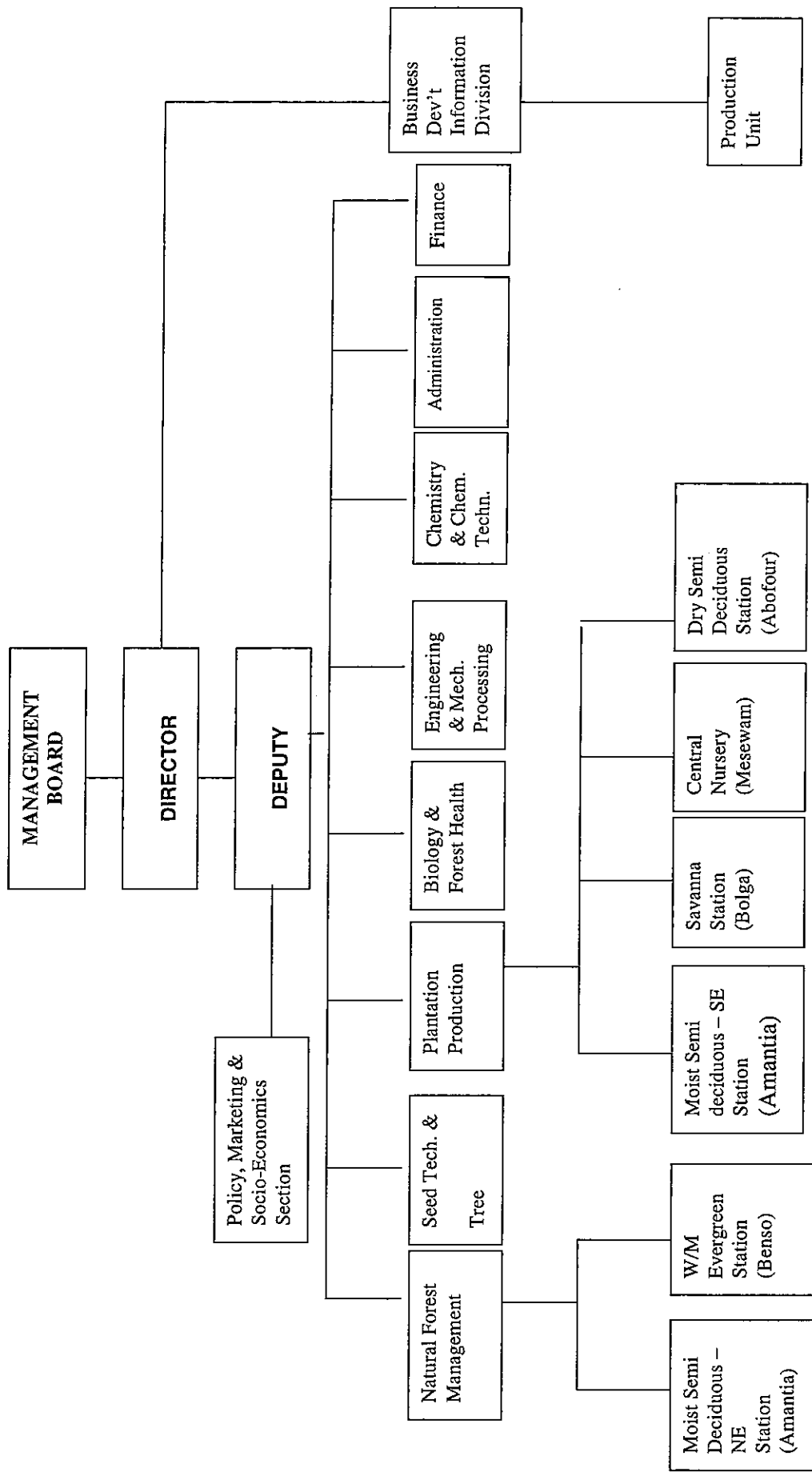
### **A.4 FORIG Personnel**

Quantitative experts with post-graduation degrees	-	29
Quantitative experts with graduation degrees	-	9
Quantitative of middle level technicians	-	33
Quantitative of administrative personnel	-	21
<b>Total number of FORIG personnel in forestry-related fields</b>	<b>-</b>	<b>71</b>

**RECENTLY COMPLETED AND ON-GOING ITTO ASSISTED PROJECTS AT FORIG**

<b>PROJECT TITLE</b>	<b>Project Number</b>	<b>VALUE OF PROJECT</b>	<b>COLLABORATING INSTITUTIONS</b>	<b>Status</b>
1. 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	\$287,000	Swiss Federal Institute of Technology, Zurich (SFIT).	Completed
2. Silviculture and economics of improved natural forest management in Ghana ITTO PD 41 98 Rev. 1 (F)	PD0 41/98 Rev.1 (F)	\$428,006	Forestry Department, Institute of Renewable Natural Resources (IRNR), Ghana Timber Millers Organization, University of Aberdeen, Scotland, Ghana Fire Service	Completed
3. Rehabilitating degraded forest through local community collaboration	PD030/97 Rev. 6 (F)	\$272,000	Forestry Department  Institute of Renewable & Natural Resources, UST.	Operational
4. Development of energy alternatives for the efficient utilization of wood processing residue: Co-Generation and Briquette production	PPD053/02 Rev. 1 (I)	\$87,802		Completed
5. Investment promotion and enterprise development of the timber industry in Ghana	PPD063/02	59.300	FORIG, GTA, GTMO, Forestry Commission, FAWAG	Operational
6. Fire-management and post-fire restoration with local community collaboration in Ghana	PD284/04 Rev. 2(F)	731,925	IUCN, FORIG	Operational
7. Alternative mixed plantation systems and restoration strategies for conservation and sustainable production of native timber species in Ghana	Pd256/03 Rev. 1(F)	433,964	FORIG, Northern Arizona University	Operational
8. Towards sustainable timber production in Ghana: Stage 1. Improving shoot borer resistance and developing silvicultural systems to maximize mahogany plantation success.	PD105/01 Rev. 3 (F)	588,601	FORIG, Michigan Tech	Operational
9. Timber of tropical Africa Part1: Group7(1) within the PROTA programme	PD 264/04 Rev. 2(M.I)	1,654,487	PROTA, Government of Ghana, Gabon, The Netherlands, France and UK	Operational

**FORIG ORGANIZATIONAL STRUCTURE**



## Annex B Curriculum Vitae

**1. Name** EMMANUEL OPUNI-FRIMPONG  
Principal Investigator (Forest Entomologist/Ecologist, Project Leader)  
**Address** Forestry Research Institute of Ghana, UST, P.O. Box 63, Kumasi, Ghana  
**Position:** Research Scientist

### Education

B.Sc. (Hons) Natural Resources University of Science and Technology, Kumasi, Ghana (1994)  
M.Phil Siviculture & Forest Mgt. University of Science and Technology, Kumasi, Ghana (Awarded 2001)  
Awarded AAS Research Grant for M.Phil research in mahogany shoot borer (1997-2000)  
Ph.D. (Forest Science) Michigan Technological University, USA (2006)

### Research Experience

Co-Principal Investigator of ITTO Project PD105/01Rev.3: "Towards Sustainable Timber Production in Ghana: Stage I. Improving Shoot Borer Resistance and Developing Silvicultural Systems to Maximize Mahogany Plantation Success" 2005-2009. Principal Investigator on African Forestry Research Network Project entitled "Development of an integrated strategy for reduction of shoot borer impact on African mahogany in the tropical humid forest of Africa" 2000-2002. Butterfly diversity in sacred forest groves of Ghana. Funded by The National Geographic. 2001-2003. The potential use of insect pathogenic viruses to control mahogany shoot borer in the genus *Hypsipyla* (Lepidoptera: Pyralidae). Funded by ODA. 1995-1997. Shoot borer; *Hypsipyla robusta* (Lepidoptera: Pyralidae) damage to growth and survival of native Meliaceae (African Mahogany). Funded by the African Academy of Sciences. 1997-1999. Survey of plants with potential insecticidal properties used for traditional preservation of grains and legumes in the moist-semideciduous zone of Ghana. Funded by ODA.

### Selected Publications

- Opuni-Frimpong, E.,** Karnosky D.F., Storer A.J., Abeney E.A., and Cobbinah J.R. 2008. Relative susceptibility of four species of African mahogany to the shoot borer *Hypsipyla robusta* (Lepidoptera: Pyralidae) in the moist semi-deciduous forest of Ghana. *Forest Ecology and Management*, 255: 313-319.
- Opuni-Frimpong E.,** Karnosky D.F., Storer A.J., and Cobbinah J.R. 2008. Silvicultural systems for plantation mahogany in Africa: Influences of canopy-shade on tree growth and pest damage. *Forest Ecology and Management*, 255: 328-333.
- Opuni-Frimpong E.,** Karnosky D.F., Storer A.J., and Cobbinah J.R. 2008. Key roles of leaves, stockplant age, and auxin concentration in vegetative propagation of two African mahoganies: *Khaya anthotheca* Welw. and *Khaya ivorensis* A. Chev. *New Forests* (In press).
- Ofori, D.A. **Opuni-Frimpong, E.** and Cobbinah, J.R. (2007). Provenance variation in *Khaya* species for growth and resistance to shoot borer *Hypsipyla robusta*. *Forest Ecology and Management*. 242: 438-443
- Opuni-Frimpong E. (2006)** Improving productivity and conservation of African mahogany: genetic selection, propagation and silvicultural management of *Hypsipyla robusta* (moore). Ph.D. Thesis submitted to the Graduate School of Michigan Technological University, September 2006, 176pp.
- Bossart, J. L., **E. Opuni-Frimpong,** S. Kuudaar and E. Nkrumah (2006) Richness, abundance, and complementarity of fruit-feeding butterfly species in relict sacred forests and forest reserves of Ghana. *Biodiversity and Conservation*. 15: 333-359.
- Opuni-Frimpong E.,** Karnosky D.F., Storer A.J., and Cobbinah J.R. 2006. Silvicultural systems for plantation mahogany in Africa: Effect of mixed species stands on growth and *Hypsipyla* attack of African mahogany (*Kaya anthotheca* Welw. and *K. ivorensis* A. Chev). *Agriculture and Forest Entomology* (In review).
- Opuni-Frimpong E.,** Karnosky D.F., Storer A.J., and Cobbinah J.R. 2006. *In vitro* propagation of African mahoganies: *Khaya anthotheca* Welw. and *K. ivorensis* A. Chev. *In Vitro Cellula and Developmental Biology – Plant* (In review).

- Opuni-Frimpong E.**, Karnosky D.F., Storer A.J., and Cobbinah J.R. 2006. Key roles of leaves, stockplant age, and auxin concentration in vegetative propagation of two African mahoganies: *Khaya anthotheca* Welw. and *Khaya ivorensis* A. Chev. *New Forests* (In review).
- Apetorgbor, M. M., Darkwa, N.A., **Opuni-Frimpong. E.** and Agyman, V.K. (2004). Biodeteriorating agents associated with three tropical timber species. *Forest Ecology and Management*. 195 311-323
- Opuni-Frimpong, E.** 2000. Damage to growth and survival of native meliaceae (African mahogany) by shoot borer, *Hypsipyla robusta* (Lepidoptera: Pyralidae). M. Phil Thesis. IRNR University of Science and Technology. 83 pp.
- Opuni-Frimpong, E.** and Cobbinah, J.R. (2000). Mahogany shoot borer *Hypsipyla robusta* (Lepidoptera:Pyralidae) impact on growth and survival of native Meliaceae. IUFRO World Congress, Kuala Lumpur, Malaysia. 7-12 August, 2000, 3:389-390.
- Hauxwell, C., Vargas, C and **Opuni-Frimpong, E.**, 2001. Entomopathogens for control of *Hypsipyla* spp. In: Floyd, F. and Hauxwell, C. (Eds.) Proceedings of an International workshop on *Hypsipyla* shoot borers of the Meliaceae, Kandy, Srilanka, 1996. ACIAR Proceedings No. 97 Canberra pp. 131-139.

**NAME :** Victor Kwame Agyeman

**Address:** Forestry Research Institute of Ghana, UST, P.O. Box 63, Kumasi, Ghana

**EDUCATION :** PhD 1994(Forestry), University of Aberdeen, U.K.; M.Phil. (Forest Management) 1990. University of Science and Technology, Ghana. B.Sc. (Hons) Natural Resources Management, 1985. University of Science & Technology, Ghana.

**CAREER/EXPERIENCE :** Research Scientist, FORIG, 1990-1996, Senior Research Scientist FORIG, 1996 to 2004, Principa Research Scientist 2004-2007, Director 2007 to date.

**RELEVANT WORK DONE :** Project leader for ITTO PD 4/98 Rev. 1 (F). Part of Project Implementation Team of NRMP Programme supported by the World Bank and Ghana Government

**PROJECT DUTIES:** Co-principal Investigator, will provide scientific advice on project design, capacity building for CDM forestry in Ghana, involve in promotion of CDM forestry in Ghana.

2. Name           **DAVID F. KARNOSKY**  
(Co-Principal Investigator)  
(Professor of forestry and Robins Chair of Sustainable Management of the Environment)

Address           School of Forest Resources and Environmental Science, Michigan Technological University, 101 U.J. Noblet  
Forestry Building, 1400 Townsend Drive, Houghton, Michigan 49931-1295

#### Education

B.S. Forestry, University of Wisconsin, Madison, Wisconsin, 1971  
M.S. Forest Genetics, University of Wisconsin, Madison, Wisconsin, 1972  
Ph.D. Forest Genetics, University of Wisconsin, Madison, Wisconsin, 1975

#### Professional Experience

**1975-1983 Forest Geneticist**, Cary Arboretum of the New York Botanical Garden, Millbrook, New York. Development of air-pollution-tolerant and disease-resistant trees; use of tissue culture in tree improvement and traditional forest tree improvement in ash, sweetgum and elm.

**1983-Present Professor**, Michigan Technological University, School of Forest Resources and Environmental Science, Houghton, Michigan. Combining traditional tree improvement methods such as hybridization and cloning with modern forest biotechnology approaches, including gene isolation and transfer, micropropagation and *in vitro* disease screening to improve forest trees emphasizing *Populus* and *Larix*. Study of the genetic and physiological aspects of air pollution and climate change effects on trees. I am also Director of the FACTS II (Aspen FACE) project. This project is examining the impacts of elevated greenhouse gases (CO<sub>2</sub>, O<sub>3</sub>) on the structure and function of forest ecosystems. The carbon sequestration potential of forest trees are being examined in this project. I have also worked as a consultant for the past 8 years on mahogany improvement and community forestry project in Ghana.

#### Relevant Papers (of nearly 300 publications)

- Isebrands, J.G., E. P. McDonald, E. Kruger, G. Hendrey, K. Pregitzer, K. Percy, J. Sober, and D.F. Karnosky. 2001. Growth responses of *Populus tremuloides* clones to interacting carbon dioxide and tropospheric ozone. *Environmental Pollution* 115:359-372.
- Karnosky, D.F., G. Scarascia-Mugnozza, R. Ceulemans, and J. Innes (Eds.) 2001. *The Impact of Carbon Dioxide and Other Greenhouse Gases on Forest Ecosystems*. CABI Press 357 pp.
- Karnosky, D.F. 2003. Impacts of elevated CO<sub>2</sub> on forest trees and forest ecosystems: Knowledge gaps. *Environment International* 29:161-169.
- Karnosky, D.F., K.E. Percy, A.H. Chappelka, C. Simpson, and J.M. Pikkariainen (Eds.). 2003. *Air Pollution, Global Change and Forests in the New Millennium*. Elsevier Press 469 pp.
- King, J.S., M.E. Kubiske, K.S. Pregitzer, G.R. Hendrey, E.P. McDonald, C.P. Giardina, V.S. Quinn, and D.F. Karnosky. 2005. Tropospheric O<sub>3</sub> compromises net primary production in young stands of trembling aspen, paper birch and sugar maple in response to elevated atmospheric CO<sub>2</sub>. *New Phytologist* 168:623-636.
- Norby, R.J., E.H. DeLucia, B. Gielen, C. Calfapietra, C.P. Giardina, J.S. King, J. Ledford, H.R. McCarthy, D.J.P. Moore, R. Ceulemans, P. DeAngelis, A.C. Finzi, D.F. Karnosky, M.E. Kubiske, M. Lukac, K.S. Pregitzer, G.E. Scarascia-Mugnozza, W.H. Schlesinger, R. Oren. 2005. Forest response to elevated CO<sub>2</sub> is conserved across a broad range of productivity. *Proc. Nat. Acad. Sci.* 102:18052-18056.
- Kubiske, M.E., V.S. Quinn, W.E. Heilman, E.P. McDonald, P.E. Marquardt, R.M. Teclaw, A.L. Friend, and D.F. Karnosky. 2006. Climatic variation mediates elevated CO<sub>2</sub> and O<sub>3</sub> effects on forest growth. *Global Change Biology* 12:1054-1068.
- Opuni-Frimpong, E., Karnosky D.F., Storer A.J., Abeney E.A., and Cobbinah J.R. 2008. Relative susceptibility of four species of African mahogany to the shoot borer *Hypsipyla robusta* (Lepidoptera: Pyralidae) in the moist semi-deciduous forest of Ghana. *Forest Ecology and Management*, 255: 313-319.
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**KINGSLEY K.F. GHARTEY**

(Forestry Consultant)

SAMARTEX Timber and Plywood Company Ltd

Ghana

**EDUCATIONAL BACKGROUND AND STUDIES:**

- i. Certificate In Forestry, School Of Forestry, Suyani, Ghana 1972
- ii. Diploma In Forestry (Hons), Forestry College, Prodhromos, Cyprus 1977
- iii. Bsc. (For.) (Hons.), University Of Dares Salaam, Tanzania 1983
- iv. M.Sc. (Environmental Forestry), University College of North Wales, Bangor, UK 1987

**FIELD OF SPECIAL COMPETENCE:** Tropical Forest Management and Silviculture.

**WORK EXPERIENCE:**

JUNE 2000- PRESENT: Self-Employed- Consulting. Forest Management Consultant Samartex  
Timber and Plywood Company Ltd. Samreboi.

MARCH 1998- JUNE 2000: Project coordinator, EU sponsored forest management certification project which aims to develop a system for certifying the management of Ghana's forest resources and labeling timber product from the certified forest resources.

OCTOBER 1995- MARCH 1998: Principal Conservator Of Forests i/c Central Region responsible for Planning Organization and Management of the Forest Resource in the Central Region.

Senior Lecturer (Part Time), Forest Ecology and Management,  
University of Cape Coast.

JULY 1992-SEPT. 1995: Senior Conservator of Forests in-Charge Western Region.  
Responsible for Planning, Organization and Management of Forest Resources in the Western Region.

SEPT. 1987-JULY 1992: Project Manager, Forest Inventory Project, Forestry Department, Kumasi, Ghana. Responsible for the Overall Administration of Ghana/Oda Forest Inventory Project. Duties Involved Planning, Organization and Execution of Field Operations of Inventory-inside High Forest Reserves. Preparation of Inventory report, preparation of working plans and Harvesting Schedules. Planning of Plantation Inventory and Rehabilitation. Stratification of Forest (Outside and Inside) reserves using satellite imagery. Supervision of non Timber Forest Products and protection Workforce, including Local and Expatriate staff. Lecturer in Forest Mensuration, IRNR, Kumasi.

APRIL 1985-1986: School of Forestry, Suyani, Ghana, Principal. Responsible for the Planning, Organization and Training of Technical level Manpower requirement of Forestry Department, Forest Product Research Institute, Forest Product Inspection Bureau and Department of Game and Wildlife. The School offers a three-year post-secondary technical training in Forestry. Tutor of Forest in Mensuration and Management.

MARCH 1983-1985: Forest Department, Akim Oda, Ghana. District Forestry Officer. Responsible for the Planning, Organization and Management of 22 High Forest Reserves of Over 1000 Km<sup>2</sup>. Work included preparation and execution of annual programmes of work, stock surveys and mapping, yield Selection. Preparation of logging schedules and supervision of logging activities of Over 20 concessionaires, monitoring Operations of 10 large veneer and Sawmills, and exploitations outside reserves involving



the use of both indigenous and exotic survey and other technical reports.

JULY 1977-1980:

School of Forestry, Suyani, Ghana Tutor; Forest Management, Mensuration and Botany. Responsible for extra curricula activities of students.

JULY 1972- 1975:

Forestry Department, Planning Branch, Kumasi, Ghana. Technical Officer, Directly responsible for the survey and mapping of 8 high forest and savanna reserves with a total area of 900 Km<sup>2</sup>. Work involved camping in the field for 20 days each month.

JULY 1969- JUNE 1972:

Learner Technical Officer, Forestry Training School, Suyani, Ghana.

### **Annex C: Terms of Reference for Consultants**

#### **Forest Carbon Management Consultant**

A Forest carbon management (carbon sequestration) consultant with expertise in forest health and climate change issues will be engaged by the executing agency to assist with and among other responsibilities, the planning of project activities, design of field experiments, analysis of carbon content of trees in the laboratory, forest productivity with respect to carbon sequestration, carbon stock with forest stand, revision of reports/publications and serve as Principal advisor of PhD student on the project.

**Experience:** The consultant will be a senior professional with at least 10 years teaching/research experience in forest carbon management/carbon sequestration, climate change effects on forest productivity and forest health. He or she should have at least 3 years experience in research in tropical Africa and have fair knowledge on the socio-economic issues in Ghana.

#### **Duties:**

1. Assist with planning, design and execution of all project activities
2. Serve as co-principal investigator on the project and take a lead role in planning and development of protocol for assessing field experiment.
3. Determination of carbon stock in forest stands
4. Help develop protocols for analyzing carbon sequestration in small scale community plantations
5. Provide expertise in determining carbon content of Ghanaian forest species.
6. Provide expertise on statistical analysis of project data.
7. Assist in the preparation and/or revision of technical reports and publications.
8. Serve as the co-principal investigator of PhD student

**Duty Station, Cost, Duration, etc:** He/She will be paid a consultancy fee of USD5, 500 per month for 2 months each year in addition to USD2,500 to cover round trip airfare from the USA each year during the project period. He will be required to travel to Ghana during project initiation to meet with the project team, assist with planning and design of field plots, involve in identifying project sites, recommend interventions for project shortfalls and provide expert advice for smooth running of the project. The project leader shall give additional assignments, which may require his input that may come up as the project is being implemented.

### **Socio Economic Consultant**

A Socio Economic consultant will be engaged to assist with and among other responsibilities, identify the socio economic implications of the project to the stakeholders, the planning of project activities and how it can benefit the people of Ghana, revision of reports/publications. And the best way to disseminate project results in so as to have maximum impact

**Experience:** The Socio Economic consultant with 5-10 years research/teaching experience in Ghana. The person should have good knowledge of the Ghanaian social structure and has demonstrated that she/he can interact with the local communities in Ghana.

### **Duties**

1. To design activities for evaluation of socio economic implication of the project
2. Develop strategies for dissemination of project results to the people
3. Provide expertise in economics of community plantation establishment
4. Assist in the preparation and/or revision of technical reports and publications.
5. Economic analysis of project implementation

**Duties station, cost duration, etc:** He/She will be paid on a contract bases with maximum of \$4000 per year through out the project period. She will be responsible for evaluating the socio-economics of the integrated plantation establishment strategies used, dissemination of project results, economics of project implementation, planning and design of project to have impact. The project leader shall give additional assignments, which may require his input that may come up as the project is being implemented.

### **CDM consultant**

A CDM consultant will be engaged to assist with and among other things the development of CDM methodology for the OCAP project. He /She will be involve in planning and development of CDM project design documents and submission of the methodology developed to the CDM authority.

**Experience:** The CDM consultant must have successfully developed a CDM project design document and have been involved in preparation of an approved CDM methodology.

### **Duties**

1. Review CDM methodology develop by the project team
2. Provide expertise in Project Design Documents on CDM

**Cost and Duration:** He/She will be paid on contract bases with maximum of \$5,000 per yer for two year period.

#### **ANNEX D. Brief Profile of SAMARTEX**

Samartex was created in 1995 when the company was formed and purchased the assets of African Timber and Plywood Ltd (A.T. &P), which at the time were operating under state ownership. A.T. &P had existed under various owners since its creation in 1947 under the UAC group of companies. At the time of acquisition the company was literally in ruins, and there followed an intense period of investment, renewal and recruitment, which continues to this day. Indeed, looking at the company today it is almost impossible to visualize the tremendous change that has been brought about.

The forest operations have also advanced tremendously. Changes in technology and equipment as well as investment in personnel have resulted in massive improvements in production levels and planning. There is now much more emphasis on environmental and social considerations. Samartex Timber and Plywood Company Ltd (SAX) concessions, in which log production takes place, take the form of concessions leased for a period of forty years. These former A.T. & P. concessions were renewed over the first two years of SAX existence, and are now in the process of being converted to Timber Utilization Contracts (TUCs). The concessions are a mixture of Forest Reserves and Off-Reserve concessions. The Forest Reserves are contiguous blocks of forest cover, which were demarcated and set aside for silvicultural use by the then colonial Forest Service. There Forest Reserves consist of fourteen separate leases for separate (albeit sometimes adjoining) forests totaling 158,960ha. The Off-Reserve concessions have not been managed for silvicultural use; instead the national policy has been of conversion to farmland. These concessions (of which SAX has four) do not have the same contiguous cover or stocking levels as the Reserves, and the area is much smaller (32,269ha). The company has maintained these leases with a view to long-term agro forestry projects being implemented in these areas to try and safeguard existing forest estate currently under threat from farming activities.

The company is located in the small town of Samreboi (which is in the center of the concessions). This is the headquarters of the company and comprises the administration center, as well as the timber processing facilities of Ply mill, Sawmill, Veneer Mill, Kiln Drier sheds and Carving section. A garden furniture line is also being implemented. The company also maintains offices in Takoradi and Accra for shipping, importing, banking and logistical purposes.

SAX employs around 2,500 workers in total, the overwhelming majority of whom are living and working in Samreboi town. These workers are largely housed in company accommodation with access to healthcare and educational facilities as well as portable water and electricity all of which is provided by the company. The area is extremely rural and isolated and a lot of development functions in the area are borne by the company (road infrastructure maintenance etc.).

As mentioned earlier, SAX does not own the concessions but rather leases them from the Ghana Government who in turn administers the land on behalf of the owners (Chiefs who own the land on behalf of their people). The Forestry Commission (FC) executes the administration of these concessions. The company pays royalties from timber production to the FC who in turn takes off monies for administration and then pass the remaining proceeds down to the District Assemblies (Local Government) and to the 'Stool'. In addition Social Responsibility Agreements (a statutory obligation under the Timber Resources Management Act) must be in place between the traditional owners (i.e. community) of each concession and the company. These agreements ensure that an additional 5% of the royalty revenue is paid by the company and channeled into local development projects.

The company exports products all over the world as well as limited local sales and overland exports to other West African countries. From almost the inception of the company, it was recognized that it is not in the company's interests to stake the future entirely on traditional timber products. This ethos has led to the establishment of a unique carving section making use of waste tree parts as well as other natural materials. The company also is pioneering artificial sweetener extraction from *Thaumatococcus danielli* (a local abundant NTFP fruit) as well as actively researching essential oil and medicinal plant usage. Fruit production and processing are also areas that Samartex envisages as areas of future diversification, as are eco-tourism ventures. Long-term timber resource security is also a priority and is based on the success of the Agro-forestry project set up by the company in a nearby village. Plantation development (under planted with NTFPs) is also an area of activity. All these diverse activities aim to safeguard the future viability of the company, which is so vital to the local economy of the area. The Samartex strategy is simply sustainability in an environmental, social and economic context.

#### ANNEX E: RESPONSE TO RECOMMENDATIONS

Specific recommendation	Response
1. Redefine the development objective and the specific objective (maximum two specific objectives) with related outputs in relation to the problem tree and problem analysis.	The development objective and the specific objective have been redefined with related outputs to the problem tree and problem analysis.
2. Improve the problem analysis and tree analysis in relation to the redefined development objective and specific objective(s), as it should be simpler and clearly linked to the central problem to be solved.	The problem and tree analyses have been improved in relation to the redefined development and specific objectives; they are simpler and are clearly linked to the central problem to be solved.
3. Provide more information on the lessons learned from ITTO projects, and particularly on the ex-post evaluation of the project PD3/95Rev2 (F).	More information has been provided on the lessons learned from the ITTO projects and especially on the ex-post evaluation of the project pd3/95Rev2 (F)
4. Improve the technical and scientific aspects by clarifying if the project will use an approved CDM methodology or develop a new specific methodology for Ghanaian agroforestry plantations, and also by revising the procedures and methodologies of carbon inventory adequate for CDM projects, and furthermore by determining which species will be used in the eligible activities of afforestation/reforestation.	The technical scientific aspects of the project have been improved.
5. Further elaborate the economic aspects with information on the trade of carbon credits and related CDM eligibility requirements.	The economic aspects have been elaborated with information on the trade of carbon credits and related CDM eligibility requirements.
6. Provide information on land use and land tenure in relation to ownership issue on afforestation and reforestation activities in Ghana, and clarify if the	Information has been provided on land use and land tenure in relation to ownership issue on afforestation and reforestation in Ghana and clarification has been

project is going to rely on existing agroforestry plantations or on those to be established in the future.	provided on whether the project will rely on existing agroforestry plantations or on those to be established in the future.
7. Subsequently to the first recommendation, adequately revise the logical framework matrix;	The logical framework matrix has been adequately revised with respect to the first recommendation
8. The numbers referring to hectares of established plantations or to be established by local communities must be clearly presented and consistent in different sections of the revised project proposal.	The numbers referring to hectares of established plantations or to be established by local communities have been clearly presented and are consistent in the different sections of the revised project proposal.
9. Further elaborate the operational arrangements by describing the roles and responsibilities of main project stakeholders, and provide a brief profile of SAMARTEX company in the annex;	The operational arrangements have been elaborated by describing the roles and responsibilities of the main project stakeholders and a profile of SAMARTEX company provided in the annex.
10. Add a list of acronyms'	A list of acronyms has been added.
11. Revise the budget in the following way; a) Remove from ITTO budget the costs referring to the PhD Training, Master Research and Undergraduate Internships and also their related costs under Duty Travel budget component (they can apply for the ITTO Fellowship Programme), b) Reduce the number of vehicles to one and subsequently the related costs for maintenance, spare parts and fuel and lubricants, c) Shift the cost related to land from the ITTO budget to the national counterpart contribution, d) Recalculate the ITTO Programme Support Costs (sub-term 82) specified in the budget so as to conform with new standard rate 8% of the total ITTO project costs as decided by the 33 <sup>rd</sup> ITTO (see the model budget table on page 27 in the ITTO Manual for Project Formulation); and	a) The costs referring to the PhD Training, Master Research and Undergraduate Internships have been removed from ITTO budget and their related costs from Duty Travel budget. b) The number of vehicles has been reduced to one and the related costs for maintenance, spare parts and fuel and lubricants have also been reduced. c) The cost related to land has been shifted from the ITTO budget to the national counterpart contribution. d) The ITTO Support Costs specified in the budget have been recalculated to conform with the new standard rate 8% of the total ITTO project costs as decided by the 35 <sup>th</sup> ITTO
12. Resubmit the proposal after the African Regional Workshop in Abidjan, Cote d'Ivoire	The Principal investigator (Dr. Emmanuel Opuni-Frimpong) participated in the regional workshop in Abidjan and has improved his capacity in project design document (PDD) under CDM
12. Include an Annex that shows the recommendations of the 33 <sup>rd</sup> Expert Panel and respective modifications in tabular form. Modifications should also be highlighted in the text.	An Annex has been added that shows the recommendations of the 33 <sup>rd</sup> Expert Panel and the respective highlighted modifications in tabular form.

**ANNEX F: RESPONSE TO RECOMMENDATIONS THE 36<sup>TH</sup> EXPERT PANEL**

Specific recommendation	Response
1. Further Elaborate the economic aspects in relation to social aspects in order to show how CDM could contribute to poverty reduction in the project area	<u>The economic aspects has been elaborated as to how the project can contribute to poverty reduction in the project area. (Pages 18-19)</u>
2. Clarify how the problem of land use and land tenure in relation to ownership issue on afforestation and reforestation activities in Ghana will not be an obstacle to ensure benefit for local communities involved in the project implementation	<u>The issue with land tenure and ownership rights has been clarified (page 7-8)</u>
3. Improve the risk analysis in relation to the assumptions of output 3 and output 6, as mentioned in the logical framework matrix, and add appropriate mitigation measures for both assumptions	<u>The risk analysis in relation to the assumptions of output 3 and output 6, as mentioned in the logical framework matrix has been improved, and appropriate mitigation measures for both assumptions has been added as recommended (19-20)</u>
4. Revise the budget in the following way: a. Reduce the amount for maintenance (sub-item 54), and fuel and lubricants (sub-item 56).  b. Shift the cost related to steering committee meetings (sub-item 15.4) and internal monitoring and evaluation (sub-item 32) from ITTO budget to the national counterpart contribution.  c. Recalculate the ITTO Programme Support Costs (sub-term 82) specified in the budget so as to conform with new standard rate 8% of the total ITTO project costs as decided by the 35 <sup>th</sup> ITTO (see the model budget table on page 27 in the ITTO Manual for Project Formulation)	<p><u>The budget sub-item 54 and sub-item 56 has been reduced (pages 28-29)</u></p> <p><u>The cost related steering committee meetings (sub-item 15.4) and internal monitoring (sub-item 32) has been shifted to the Ghana government contribution. (Pages 28-29)</u></p> <p><u>The ITTO programme support cost (sub-item 82) has been recalculated so as to conform with the new standard rate of 8% of the total ITTO project costs. (Pages 28-29)</u></p>
5. Include an Annex that shows the recommendations of the 36 <sup>th</sup> Expert Panel and respective modifications in tabular form. Modifications should also be highlighted in the text.	<u>An annex that shows the recommendations of the 36th Expert Panel has been added and respective modification in tabular form has been added (page50)</u>

## APPENDICES

### Letter of Support - SAMARTEX



P. O. Box 1, Samreboi, Ghana, West - Africa Tel: (233) 31 - 25088, (233) - 277 - 100141  
**Email: [gilmour.dickson@Samartex.com](mailto:gilmour.dickson@Samartex.com)**

Dr. Emmanuel Opuni-Frimpong  
Forest Research Institute of Ghana, UST  
P.O. Box 63  
Kumasi, Ghana

10.11.06

Dear Emmanuel:

Samartex remains faithful to the policy of improving the income level of farmers in western Ghana through agroforestry, afforestation and alternative income generating activities to alleviate poverty. Through expanding the collaborations with chiefs, communities and other stakeholders we initiated the OCAP project, we believe we can prove the replicability of this concept.

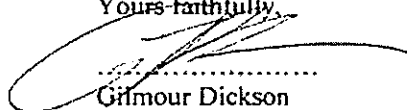
So far, three communities are involved in the OCAP project, and extension service schemes have been put in place for several small landholder farmers. Through this initiative, about 600 hectares of degraded areas have already been rehabilitated and farmers have alternative sources of livelihood. We are anxious to double this effort in this new project and we have already identified the communities and the degraded lands to focus on for this project.

Samartex has also been in collaboration with the Forest Research Institute of Ghana in the implementation of the ITTO project: PD105/01/Rev.3 (F): entitled "Towards Sustainable Timber Production in Ghana: Stage I: Improving shoot borer resistance and developing silvicultural systems to maximize mahogany plantation success".

The final stage of interest to our company is to set up a carbon market from which our farmers can trade to also increase the income level and contribute to the reduction of carbon emissions.

We hope that ITTO will support our collaborative effort which could have a large impact on this poor rural region of western Ghana.

Yours faithfully,



Gilmour Dickson  
General Manager

## OCAP Agreement

Oda-Kotoamsu Community Agroforestry Project (OCAP)

### AGREEMENT

Assemblyman Oda (Kotoamsu) 16<sup>th</sup> May 1999

On 4<sup>th</sup> March 1999 during our steering committee meeting we from Oda were sent to go and help Nananom and the farmers on the Agroforestry Project land to make an agreement and come back to inform the committee.

So on 16<sup>th</sup> May 1999 Nananom and the farmers met and what they agreed upon are the following:

1. Both Nananom and the farmers agreed that the land the farmers are working on (project land) belongs to the Nananom of Asankra Oda (Kotoamsu). Therefore the farmers are tenant farmers and lose their right on the land when their produce such as kola, food stuffs and timber on the land are exhausted.
2. That before one enters to work on the project land an amount of ten thousand (10,000) Cedis should be paid to Nananom as an entry fee (RUM).
3. That this agreement affects all farmers on the land both the indigenous and non-indigenous. They are to be treated equally, those on the land and those yet to come.
4. That any farmer who fails to clear or weed around his farm for a whole one year loses his or her right to the farm except he or she informs Nananom accordingly that he or she is ill.
5. Since the SAMARTEX Co. Ltd. is providing for the seedlings for cultivation on the project land and have provided workers who assist farmers on the land (project land), this company (SAMARTEX) has the exclusive right to buy the timber species on the land (project land). Neither Nananom nor the farmers have the right to sell the timber on the land to any other company. Nananom and the farmers can sell to any other company only when SAMARTEX willingly allows them after the company (SAMARTEX) has been duly informed.
6. Samartex has the right to seek a variation or amendment of this agreement subject to the economic condition of the country. This has to be done in agreement with Nananom and the community.

#### Sharing of the Products of the farm between Nananom and the tenant farmers:

7. That farm products such as foodstuffs i.e. cassava, cocoyam, plantain, tomatoes etc. should be for the farmers only, Nananom has no share of them. This is 100% for the farmers.
8. The medium term farm products such as black pepper, citrus, cola etc. should be shared in the ratio of 2:1. That is two third for the farmers and one third for Nananom.
9. The timber trees or species such as Wawa, Mahogany, Cedrella etc. should be shared in the ratio of 2:1. That is two third for the farmers and one third for Nananom.
10. That the Omanhene of Wasa Amenfi traditional Area is the allodial owner of all Stool lands of Wasa Amenfi including farm lands covered by this agreement and his assent to or concurrence in these presents is requisite or necessary for alienation of such Stool land in accordance with the law and custom of the said Stool lands and shall at all times be confirming party to all alienation of lands before they are validated.
11. The Omanhene shall be entitled to One Third (1/3) share of the part that shall be due to every Nananom as contained in this agreement.



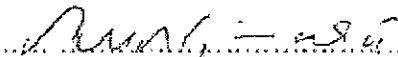
Oda-Kotoamso Community Agroforestry Project (OCAP)

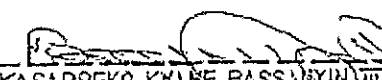
This agreement was made between Nanatom and the farmers on the project land on Sunday, 16<sup>th</sup> Mai and Monday, 09<sup>th</sup> August 1999, before the Chief farmer of the village and the Assemblyman of the Oda electoral area who wrote down this agreement.

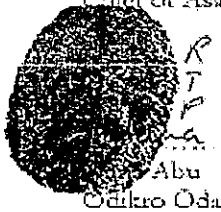
This agreement will start taking effect from 01.12.1999.

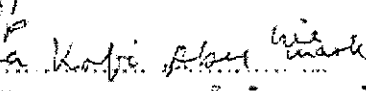
Date, Signature

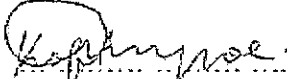
CONFIRMING PARTY

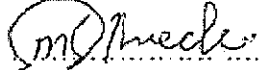
  
Nana Gyapnina Nkyimah II  
Chief of Asankra Oda

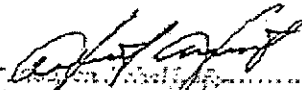
  
KASAPREKO KYAME BASSANYIN III  
(DMANHENE)  
WASA AMENFI TRADITIONAL AREA  
WASA - AKROPONG



  
Abu  
Oduro Oda

  
Kofi Ampoe  
Assemblyman Oda Kotoamso

  
Michael Prede  
Chief farmer (Oda)

  
For Nanatom, Chief farmer  
S. Kurt Ditz, NANYANG CO. LTD.  
Samaritex General Manager

# MEMORANDUM OF UNDERSTANDING

Between

FORESTRY RESEARCH INSTITUTE OF GHANA (FORIG)

And

SAMARTEX TIMBER AND PLYWOOD COMPANY

## 1. AGREEMENT TITLE:

Implementation of ITTO project: PD105/01/Rev.3 (F): entitled: "Towards Sustainable Timber Production in Ghana: Stage I: Improving Shoot Borer Resistance and developing silvicultural Systems to maximize mahogany Plantation Success".

## 2. CO-OPERATION ORGANIZATIONS

The Forestry Research Institute of Ghana (hereafter referred to as FORIG) and SAMARTEX Timber and Plywood Company (hereafter referred to as SAMARTEX)

## 3. COMMENCEMENT AND DURATION

The agreement shall remain in force for a period of four (4) years commencing by the signing of this document, with the option of renewal and variation prior to the termination by joint consent of both parties.

## 4. BACKGROUND OF THE AGREEMENT

In 2004, the International Tropical Timber Organization (herein after refer to as ITTO) approved project No. PD105/01/Rev. 3(F) submitted by the Government of Ghana to be executed by FORIG, in collaboration with Michigan Technological University, SAMARTEX and Swiss Lumber Company Limited on improving Shoot borer resistance and developing silvicultural systems to maximize Mahogany Plantation success.

Additionally, the cooperation between FORIG and SAMARTEX will help to train one FORIG staff in Tropical Forest Entomology and Biotechnology. The implementation of this project coupled with the experiences gained in previous co-operations will help strengthen and develop long- term cooperation between scientists at Ghana (FORIG) and SAMARTEX

## **5. OBJECTIVES OF THE AGREEMENT**

The objectives of the current agreement are:

1. To improve the sustainability of mahogany timber supply in Ghana by developing an integrated pest management system to minimize the adverse effect on young mahogany plantations.
2. To facilitate the training of FORIG and SAMARTEX Forestry Team and technicians by qualified international researchers in Ghana, USA and third country, taking account of the need to promote North- South research co-operation and co-operation between Research and Industry to strengthen Research and Development.
3. To use the implementation of this project to strengthen the understanding between FORIG and SAMARTEX on research network so as to further formulate research needs and receive financial support from ITTO, Industry and other international donor agencies for relevant research in Ghana.

## **6. FINANCIAL ARRANGEMENTS.**

ITTO, MICHIGAN Technological University and Government of Ghana are funding the Project. The project started January 2005 and ending February 2009.

## **7. RESPONSIBILITIES**

1. FORIG will be responsible for all scientific and technical aspects of the co-operation to execute this project.
2. SAMARTEX will be contributing land in the Moist /Wet Evergreen Forest Zone for all experiments that will be conducted in this forest zone. Since the experiments will be on SAMARTEX property, SAMARTEX will be required to see to day-to-day maintenance of the plots during and after the 4-year period of the project life.
3. FORIG will provide all the planting material
4. FORIG project implementation team will see to planting and quarterly evaluation of all project experiments.
5. In addition to the Land and maintenance of the experiments, SAMARTEX will be expected to extend the needed support and co-operation that will make the FORIG research team feel welcome to their premises.
6. SAMARTEX will support 4 personnel of the FORIG project team to assess and evaluate the mahogany plantations once every year for a period of 4 years after the ITTO project funds is exhausted.

## **8. SHARING OF BENEFITS**

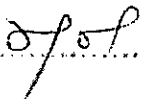
1. FORIG will have total ownership of any scientific finding that will be gained in this study.
2. SAMARTEX will own the trees that will be planted on their land.

3. FORIG can have access to these experimental plots to collect plant material and data till the trees will be ready for harvest as will be agreed by FORIG and SAMARTEX

## 9. VARIATION TO AGREEMENT

Variation to this agreement will be made in writing and be signed for and on behalf of both parties to the agreement.

Signed in Kumasi (Ghana)

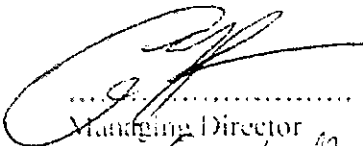
  
.....

Director Project Leader

**DIRECTOR  
FORESTRY RESEARCH INSTITUTE  
OF GHANA  
UNIV. P. O. BOX 63  
KUMASI, GHANA**

Date... 24-10-06

FORESTRY RESEARCH INSTITUTE OF GHANA (FORIG)

  
.....

Managing Director

*General Manager*

**SAMARTEX TIMBER AND PLYWOOD COMPANY**  
SAMARTEX Timber & Plywood Co. Ltd.  
PO Box 1 - Samrebu  
Ghana - West-Africa

Date... 13/11/06

June 6, 2008

Dr. Emmanuel Opuni-Frimpong  
Forestry Research Institute of Ghana  
UST, P.O. Box 63  
Kumasi, Ghana

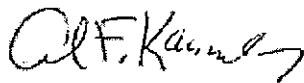
Dear Emmanuel:

It is my pleasure to be involved in this collaborative CDM forestry proposal and I am pleased to offer the support of a Ph.D. graduate student (valued at \$94,500) for three years as my contribution to our project. I have all of the necessary laboratory access here at Michigan Tech to conduct the carbon analyses portion of the work as we have done similar research with determination of carbon content of several North American tree species.

I look forward to working with you and Victor on this valuable project and can give you my best assurances that the Ghanaian Ph.D. student from my lab in this project will develop the necessary carbon accounting knowledge which is a key ingredient for CDM projects.

Best regards,

Sincerely,



David F. Kamosky  
Professor